Proceedings of the European Conference on Intellectual Capital

INHolland University of Applied Sciences
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Edited by

Christiaan Stam and Daan Andriessen
INHolland University of Applied Sciences

Papers have been double-blind peer reviewed before final submission to the conference. Initially, paper abstracts were read and selected by the conference panel for submission as possible papers for the conference.

Many thanks to the reviewers who helped ensure the quality of the full papers.

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Preface

These proceedings represent the work of presenters at the European Conference on Intellectual Capital (ECIC 2009).

The Conference is hosted this year by INHolland University of Applied Science in Haarlem, The Netherlands. The Conference Chair is Daan Andriessen, Centre for Research in Intellectual Capital, INHolland University and the Programme Chair is Christiaan Stam, also from the Centre for Research in Intellectual Capital, INHolland University.

The opening keynote address is given by Professor Leif Edvinsson, Lund University, Sweden and The Hong Kong Polytechnic University, China. On the second day of the conference Verna Allee from Value Networks LLC, USA will talk on the subject of "*Getting to the right questions about intangibles*"

A primary aim of this conference is to contribute to the further advancement of IC theory and practice. The conference provides a platform for presenting findings and ideas for the intellectual capital community and associated fields. The range of people, issues, and the mix of approaches followed will ensure an interesting two days.

121 abstracts were received for this conference. After the double blind, peer review process there are 69 papers published in these Conference Proceedings. These papers represent truly global research from some 31 different countries, including Australia, Belgium, Brazil, Canary Islands, Finland, Germany, Greece, Hong Kong, Hungary, India, Israel, Italy, The Lebanon, Mexico, The Netherlands, Norway, Poland, Portugal, Principality of Liechtenstein, Romania, Russia, Serbia, Slovenia, Spain, Sweden, Taiwan, Thailand, Turkey, Uganda, United Kingdom and USA.

We hope that you have an enjoyable conference.

Daan Andriessen
Conference Chair

Christian Stam
Programme Chair

April 2009

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Alan Willis, Independent Consultant, Mississauga, Ontario, Canada

Inge Wulf, Clausthal University of Technology, Germany

Biographies of Conference Chairs, Programme Chair and Keynote Speaker

Conference Chair

Dr. Daniel Andriessen is Professor of Intellectual Capital at INHOLLAND University of professional education, The Netherlands, and director of the INHOLLAND Centre for research in Intellectual Capital, a research group set up to study the impact of the intangible economy on people and organizations. Recently, his centre organized the very successful Intellectual Capital Congress 2007 in May in Haarlem (The Netherlands), a congress that will be repeated in May 2009 (www.iccongress.com). Through his Weightless Wealth Research Group he offers help to companies, governmental and educational organizations, academics, and students on the subject of knowledge management and intellectual capital valuation and measurement (www.weightlesswealth.com). He is a popular speaker at conferences and likes to do guest lectures, presentations, and training sessions on a variety of subjects related to the growing importance of intangibles.Daniel received his Ph.D. degree at Nyenrode University in The Netherlands and he holds a masters degree in political and administrative science at the Free University, Amsterdam. His publications include Value-Based Knowledge Management: Creating the 21st Century Company: Knowledge Intensive, People Rich (Addison-Wesley, 1998), with Prof. Dr. René Tissen and associate professor Frank Lekanne Deprez. Together with Prof. Dr. René Tissen he wrote Weightless Wealth: Find Your Real Value in a Future of Intangibles Assets (Financial Times Prentice Hall, 2000). His PhD thesis was published in 2004 by Elsevier Butterworth Heinemann and was entitled Making Sense of Intellectual Capital; Designing a Method for the Valuation of Intangibles. In his recent research Daniel explores the role of metaphor in knowledge construction and science. When he realized that the term Intellectual Capital is in fact based on specific metaphors for knowledge he decided to analyze the various metaphors we use for knowledge and their impact on knowledge management. An analysis of metaphors in the work of Stewart, Davenport & Prusak and Nonaka & Takeuchi was published in the Journal of Intellectual Capital: Andriessen, D. (2006) On the metaphorical nature of intellectual capital: a textual analysis, Journal of Intellectual Capital, vol. 7 (1). In his keynote Daniel will share with you the latest results of his research into metaphor and knowledge management.

Programme Chair

Dr Christiaan Stam (1965) is Associate Professor at the Centre for Research in Intellectual Capital at INHOLLAND University of Applied Sciences (www.inholland.nl/intellectualcapital). Central themes in his work are knowledge management, intellectual capital measurement and knowledge productivity. In 1999 he initiated www.intellectualcapital.nl, a startpage for the IC-community. In December 2007 he successfully defended his Ph.D. thesis in Knowledge Productivity at Twente University, The Netherlands. For more information and a list of publications see: http://www.intellectualcapital.nl/ChristiaanStam/home.html.

Keynote Speakers

Professor Leif Edvinsson is a key pioneering contributor to the theory of Intellectual Capital and sometimes named as the Grandfather of IC. As the world's first director of IC in 1991 he initiated the creation of the world's first public corporate Intellectual Capital Annual Report 1994, and inspired the development ever since on IC metrics. He was parallel to that starting the Skandia Future Center as a Lab for Organisational design, one of the very first in the World in 1996, and now being followed by many in various parts of the world. During 1996 he was recognised with awards from the American Productivity and Quality Centre, USA and Business Intelligence, UK, for his pioneering work on IC. In 1999 noted as Most Admired Knowledge Award on Knowledge Leadership. He was also awarded The KEN Practitioner of the Year 2004, from Entovation International, where he also is an E 100. In January 1998, Leif received the prestigious Brain Trust "Brain of the Year" award, UK. In 2006 also listed in a

book by London Business Press, as one of The 50 Most influential Thinkers in the World. He is listed in Who's Who in the world. Also associate member of The Club of Rome. He is also Cofounder and Chairman of The New Club of Paris, focused on the Knowledge Economy initiatives.Leif has his education from the University of California, Berkeley, USA, as MBA and Lund University, Sweden, as civilekonom. He is the author of numerous articles on the service management and on Intellectual Capital. In March 1997, together with Michael S. Malone, he launched one of the very first books on Intellectual Capital. Leif is serving on the Board of Directors of several knowledge intensive enterprises among others earlier the Swedish Brain Research Foundation as well as for many years the Center for Molecular Medicine at Karolinska Institute, Stockholm, Sweden. Since 2000 he has been the Honorary Chairman of the UK based Henley College, KM Forum. Since 2000, he has been the world's first Professor, adjunct at Lund University on Intellectual Capital. In January 2006, he was also appointed professor adj. at The Hong Kong Polytechnic University, and later promoted to Chair Professor in 2007.

Verna Allee is CEO of Value Networks LLC, (www.valuenetworks.com), the leading provider of value network visualization and analysis applications. Customers include Cisco, Boeing, SAP, Rolls Royce Marine Engine, Bristol-Myers Squibb, Symantec, Knoll, Kimberly-Clark, AgResearch, Mayo Clinic and others addressing regional innovation, global finance, large healthcare networks, and emerging industries. Ms. Allee, a noted author, is an expert and pioneer in value networks, intangibles, knowledge management, and new business models. She is a Fellow of the World Business Academy, advisor to the European Commission, and was a member of the Brookings Institution Task Force on Intangibles in 1997. She is on a number of Advisory and Editorial Boards including Hazel Henderson's Ethical Markets television series, Inside Knowledge, and IC (Intellectual Capital) Magazine. Ms. Allee has been a visiting lecturer at many universities around the world, most notably at the Marshall School of Business at the University of Southern California (Los Angeles), Greenwich University (London), Hanken Swedish School of Business (Helsinki), University of Waikato (New Zealand), and Cortrugli Business Academy (Croatia). Her publications include numerous articles and books, including The Future of Knowledge: Increasing Prosperity through Value Networks (2003), and The Knowledge Evolution (1997).

Biographies of contributing authors (in alphabetical order)

Mary Adams is President of Intellectual Capital Advisors (ICA), a man-agement consulting firm. She is the creator of the Intellectual Capital Knowledge Center, an internet-based bibliography of information about IC. She blogs at Smarter Companies about the challenges of putting knowledge to work in the 21st century corporation. Mary has a background from Citibank and Sanwa Business Credit, and received a BA from Rice University and Master of International Management from the AGSIM (Thunderbird).

Fida Afiouni is an Assistant Professor of Management at the American University of Beirut and a consultant in management and HRM. She is the winner of the Sharjah award for the best doctoral thesis in administrative sciences in the Arab world for the year 2005. She is the author of several articles such as "Human Resource Management and strategy in the Lebanese banking sector, is there a fit" in the Journal of American Academy of Management, Cambridge and "Leveraging human capital and value creation by combining HRM and KM initiatives" in the International Journal of Learning and Intellectual Capital. Her research interests are in human capital, strategic Human resource management, Human resource development and Knowledge creation and management.

Carmen Agüero is researcher at the Foresight Studies Center of Monterrey Institute of Technology (ITESM)-Mexico. PhD candidate in Economy, Innovation Management and Technological Policy at Complutense University of Madrid-Spain. She received an MBA degree at Catholic University of Peru. Her research interests are in the areas of Knowledge Management, Intellectual Capital Management, Collaborative Networks, Regional Development and Systems of Innovation.

Regina Asato is Master of Science in Software Production Engineering (MSc. Master Degree) by Paulista University - São Paulo – Brazil. Since 2004 is PMP (Project Manager Professional – PMI). She has 17 years of experience in information system development for companies on Financial, Bank, Insurance and Industrial fields. She minister courses of software quality. Its main interests in

research are in the areas of SPI (Software Process Improvement), Project Management and Governance.

Ossi Aura has defended his thesis "Worksite Fitness Policy in an Intellectual Capital Framework" at Swedish School of Economics and Business Administration in 2006. He is a former researcher in biomechanics and sports physiology in the University of Jyväskylä. Aura is currently working as a scientific director in Elisa Health & Fitness responsible for programs and research of strategic wellness.

Schelte Beltman has a background as an organizational anthropologist and has a successful track record in both managing and delivering executive education in the Netherlands and the United Kingdom. This experience is used as a hatchery for his PhD research on manifestations of organizational culture in institutions offering higher education. He is a research fellow of the Centre for Research in Intellectual Capital and coordinator of the Research School of INHolland University of Applied Sciences.

Tim Berretty is a junior researcher at SEOR (www.seor.nl) with a strong affinity for quantitative analyses. His former work was mainly on the fields of welfare policy, labor market forecasts and education and he has much experience in econometric modeling and working with large datasets. He has a master degree in econometrics and a bachelor degree in psychology.

Constantin Bratianu is professor of Strategic Management and Knowledge Management at the Academy of Economic Studies, Bucharest, Romania. He is the Head of UNESCO Department for Business Administration, and Director of the Research Center for Intellectual Capital, Academy of Economic Studies, Bucharest. His main academic and research interests are: knowledge dynamics, knowledge management, intellectual capital, strategic management and university management. He is co-editor of the academic journal Management & Marketing , and co-president of the annual International Conference on Business Excellence, Brasov, Romania.

Sladjana Cabrilo works as Research Fellow at the Institute of Industrial Engineering and Management, Faculty of Technical Sciences, University of Novi Sad, Serbia. She holds Dr. Tech. and M.Sc. (Eng.) in Industrial Engineering and Management from University of Novi Sad (Serbia). Her main research areas are knowledge management, intellectual capital and business performance measurement and management and her current interests focus on measuring and reporting of intellectual capital. She has authored and co-authored numerous academic articles and papers on intellectual capital, its measurement and disclosure and has presented worldwide. She is a member of Intellectual Capital Group at Regional Chamber of Commerce (Serbia) and she also acts in public sector.

Daniela Carlucci is Assistant Professor at the University of Basilicata. Her research interests encompass knowledge management, knowledge assets and intellectual capital assessment & management, innovation, business performance measurement and management, decision making in organizations and decision support methods. Her work is published in refereed journals and books

William Chang is an assistant Professor for Department of Finance, Ming Chuan University of Taiwan. His research interest is on intangible assets management and financial planning in IT industry.

Hui-Ru Chi is a doctoral student at the Graduate institute of Human Resource Management, National Changhua University of Education, Taiwan. Her major is in the areas of technology management and organizational innovation management. She is a Lecture in the department of Finance at National Taichung Institute of Technology in Taiwan.

Joy Chia is a senior lecturer and program director of the public relations undergraduate and post graduate programs at the University of South Australia. Joy is Fellow of the Public Relations Institute of Australia (PRIA) and past SA, PRIA president and national PRIA, board member. Joy and research partner, Associate Professor Margaret Peters were awarded a Canada-Asia Program Award, International Council for Canadian Studies, to undertake research into employee commitment to social capital investment in credit unions in Australia and Canada. This is work in progress resulting in publications in several international journals.

Marion Collewet is a junior researcher at SEOR. She studied political science and economics in France, Germany and the U.K. She has progressively specialized in research about the labour market, policy evaluation and the role of different stakeholders (state, employers, employees).

Verena Dorner is currently working as a research assistant at the Chair of Business Computing II at the University of Passau. She graduated from the University of Passau in 2006, majoring in business administration and management. Her main research interests include the management of information systems and information technology skills, especially in small and medium enterprises, methodology and quality of survey research in information systems research, and information systems and technology project portfolio optimisation.

John Dumay is a Lecturer in Accounting at the Faculty of Economics & Business at the University of Sydney. His thesis and continued area research interest is based on the study of the implementation of IC practices in organisations. In particular he is interested in the application of IC narratives.

Susanne Durst is a research assistant and lecturer at the Chair of International Management, Institute of Entrepreneurship, University of Liechtenstein. Furthermore she is a doctoral student at the Leslie Silver International Faculty, Leeds Metropolitan University. Her current research interests include: intangible assets, knowledge management, SMEs related topics such as branding and internationalization.

Feray Erselcan is Lecturer in the Department of Economics at Cumhuriyet University, Sivas, Turkey, since 2000. She graduated from the Department of Economics of the Middle East Technical University in 1983 and started her carrier as a commercial expert. She has served as a Commercial Counsellor at the Turkish Delegation to OECD (1989-1992) and at the Turkish Embassy in Helsinki (1997-2000). Her main areas of interest are international trade, development, gender and environment.

Silvia Ferrão BSc of science with honors (a five year degree) in Computer Management, a postgraduate study in computer engineering and she is currently doing her PhD in Knowledge Management, particularly on competences acquisition on Virtual Learning Environments. She's a lecturer in computer management, at the Polytechnic Institute of Leiria, Portugal.

Santanukumar Ghosh is a Professor in the Department of Commerce at the University of Burdwan in India. He has been engaged in teaching and research since 1984. He is presently conducting research on the sustainable business model, CSR reporting besides areas like intellectual capital, modern theories of capital structure, mutual funds and transparency & disclosure in financial reporting. He received Best Research Paper Award from Bentley College, USA and IBS Hyderabad in 2008. He presented a paper at the GRI Global Conference in 2008.

Ramón Galván. Doctor in Economic Science and Management by the University of Extremadura, Badajoz, Spain. Professor in Business Administration and Knowledge Management. Member of the Research Centre for Knowledge Management. Project Director of the Spanish guide for the best European practices in knowledge management of the European Committee standardization.

Ramin Gamerschlag. University studies. Since 09/2008: Georg-August-Universitaet Goettingen, PHD-Program in Management Accounting 10/2006 – 08/2008 Georg-August-Universitaet Goettingen, Master in Management. Degree: Master of Science (M.Sc.). 09/2001 – 06/2005 Fachhochschule Hildesheim/Holzminden/Goettingen, Industrial Engineering and Management. Degree: Diplom (FH) Wirtschaftsingenieur. Work Experience. Since 09/2008 Georg-August-Universitaet Goettingen, Chair of Management Accounting and Control,Scientific Assistant. 07/2005 – 09/2006 Henke-Sass, Wolf GmbH Tuttlingen, Quality Manager. 02/2004 – 06/2004 Volkswagen AG Kassel, student apprentice

Annie Green has a Doctor of Science from the School of Engineering and Applied Sciences at The George Washington University (2004) (Concentration: Intangible Asset Valuation) and a Masters Science of Information Systems (MSIS) from George Mason University.

Annabella Dorothy Habinka is an Information Systems researcher with special interest in Knowledge Management at Mbarara University of Science and Technology, Uganda. She is a strong

advocate for the studio based approach as presented in the paper “Knowledge Management for Small and Medium Enterprises in Developing Countries – Uganda a Studio-based Approach”.

Tamás Harangozó is graduated as an economist (MA) at the Faculty of Business Administration of the Corvinus University of Budapest in 2007. Currently he is a Ph.D. student at the Institute of Management of the same university and his research activities are management control process of intellectual capital and the possible performance-based and behavioural aspects of it. His theoretical and practical interests cover particularly management control (controlling), performance management and organizational behaviour.

Jasper Hsieh is an assistant Professor for Graduate Institute in Aesthetics and Arts Management, Nanhua University of Taiwan. His recent research is on the dynamics of resources in innovative organizations.

Robert Huggins: Director of the Centre for International Competitiveness at the Cardiff School of Management, University of Wales Institute, Cardiff. As the Co-Founder of the World Knowledge Competitiveness Index and Originator of the European Competitiveness Index and UK Competitiveness Index, his research aims to inform corporate strategy and public policy, especially actions aimed at improving global competitiveness.

Elina Hyrkäs is a Ph.D. student at the Lappeenranta University of Technology in the department of business administration. Her research interests include knowledge management in general and especially strategic based competence management, HRM and intellectual capital. Her dissertation topic is competence management in Finnish municipalities.

Aki Jääskeläinen (M.Sc. Eng.) works as a researcher on the Performance Management Team in Tampere University of Technology, Finland. He has written research articles on intellectual capital and performance measurement. He has also participated in many development projects related to performance management in Finnish organisations. His current research interest focuses on productivity measurement of public services. He is also pursuing his doctoral thesis on the topic.

Aino Kianto is a Professor of Knowledge Management in the School of Business at Lappeenranta University of Technology, Finland. Her teaching and research focus on knowledge management, intellectual capital, creativity, innovation and organizational renewal. Her current interests include the knowledge-based view of the firm and measurement of knowledge-related phenomena in organizations. She has authored and co-authored several academic articles, papers, books and book chapters related to knowledge management, intellectual capital and innovation. In addition to the academia, she also has worked with the Future committee of the Finnish parliament and regularly lectures for companies.

Elżbieta Kot born the 2nd of March 1983 in Warsaw, Poland; graduated from the Department of Tourism and Recreation at Academy of Physical Education (M.Sc) in 2006 and from the Faculty of Finance and Banking at Academy of Finance in Warsaw (M.Sc) in 2008;from 2006 - PhD student and teaching assistant in Basic Economy and Finance Department at the Academy of Physical Education in Warsaw; professional tour leader.

Philippe Leliaert is an independent management consultant, specialised in organisational development & change, and an Intellectual Capital practitioner. He is a visiting lecturer at several business schools in Europe, Asia-Pacific, and Latin America, and a regular presenter at conferences and seminars on the identification, measurement and management of Intellectual Capital.

Rosetta Lombardo. Current Position: Research Fellow: ,Department of Economics and Statistics, University of Calabria, Italy.. Education 1992 Degree in Economic and Social Science [110/110, “cum laude”]University of Calabria, 1995 MA in Economic and Social Studies, University of Manchester, 2001 Ph.D. Political economy, University of Naples “Federico II”

Satu Luoma, M.Sc. (Tech) has graduated in Information and knowledge management from Tampere University of Technology (TUT), Finland in 2008. She works as a researcher at the Department of Business Information Management and Logistics, TUT. Her research interests include knowledge management, competence management and social media.

Anca Mândruleanu is a last year PhD student at the Academy of Economic Studies Bucharest and her main field of interest is Intellectual Capital. Her PhD thesis studies the role of the main integrators in generating and developing the IC and has many connections with the economic and business environment. Anca is a member of the Intellectual Capital Research Center from the Academy of Economic Studies Bucharest, and she is involved in several research projects on the same topic.Also, Anca Mândruleanu is an Assistant Professor at the Faculty of Business Administration, where she teaches Business Management and Entrepreneurship.

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Henrik Martin is CEO of Intellectual Capital Sweden AB (ICAB), a leading IC service provider who has developed the unique IC Rating^{TM}, a tool for measuring Intellectual Capital. The tool has been used more than 400 times and has been licensed to partners in more than 30 countries. Living in Stockholm, Sweden, Henrik has a background from McKinsey&Company, and holds a M.Sc. and B.Sc. in Electrical Engineering from MIT.

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Sue Molesworth is a Research Associate at the Clinical Effectiveness Support Unit at the University of Keele, Staffordshire, UK. Her research interests are: organisational research in healthcare settings; how vulnerable/socially excluded groups experience services; the use of participative research methodologies in healthcare settings; and the application of qualitative methodologies in healthcare research.Prior to her employment as a researcher, Sue has mainly worked in community and service development both in the voluntary and public sectors.

Neva Maher graduated in Economics from the University of Ljubljana, in Slovenia. She was a counsellor to the President of Court of Audit of Slovenia. As a state auditor she performed audits and evaluations. Then she was a state undersecretary at the Ministry of labour, family and social affairs and working on European Social Fund management system, its procedures, etc. She is expert on accountancy and finance. She has wide knowledge and practical experience of structural funds system and procedures, in setting administration and programmes, including application packages, establishing of evaluation and selection procedures, capacity building, training and preparation of projects, guidelines and manuals. She is skilled in social measures programming, implementing policies, projects and programmes, funding indicators and information data, financial management, monitoring and evaluation needs. Analysis and follow up, praxis to create flexibility in policy management and public accountability. Involved in writing several manuals (for auditing, controlling, monitoring, implementing and evaluation). Skilled in training for sound financial management and controls, programmes for SME, action plans for trade – internal EU market and external market, training civil servants and developping training programmes for SME entrepreneurship, she is an assistant professor at High School for Business and Management in Novo mesto. She gives lectures in accountancy, finance and marketing. She is the author of several articles on employment, social and economic development matters.

Milly Perry Researcher, CKO and Research director at The Open University of Israel. PhD. in Information science, KM expertise. Bar Ilan University, Israel. " aKadeMya " CEO, CoP for managers and scholars implementing Knowledge Management in Higher education (sponsored by Microsoft) Member of the National Committee for Israeli's Researchers Database. Management committee member at The European network for ScienceAnd Technology Research In a Knowledge - base Economy (STRIKE)and a OECD consultant.

Alfredo Revilak, has a doctor of science from the School of Engineering and Applied Sciences at the George Washington University (2006) (concentration: innovation), a masters in computer science from the University of Arizona (2001) and a bachelors in computer engineering from the instituto.

Susana Rodrigues. PhD in Strategic Management by the university of Wolverhampton, United Kingdom. Member of Research Centre for Management and Sustainability and member of the Research Centre for Rapid Sustainable Product Development. Regional editor for Europe for the Journal of Global Business and Technology. Consultant in the strategic management area. Lecturer in several Master degree programmes. Senior lecturer in strategic management.

Arturo Rodríguez-Castellanos. Plain Professor of Financial Economics at the University of the Basque Country (Bilbao - Spain). Head of the Department of Financial Economics II of the University of the Basque Country. Member of the Royal Academy of Economics and Finance of Spain. Vice-President of the European Academy of Management and Business Economics (AEDEM). Coordinator of the Research Group on Financial Valuation of Business Intangibles (VALINTE). Coordinator of the University Multidisciplinary Group on Advanced Management, Knowledge Management and Public Governance of the University of the Basque Country. Author or co-author of several books and more of eighty articles in scientific journals and chapters of scientific books. Her main research interests are in General Financial Management, International Financial Management, R&D Management, R&D Transference, Intellectual Capital Analysis and Intangibles' Financial Valuation.

Francesco Rogo . Degree: Computer Science Engineering "La Sapienza" University. Since 01-2000, I have worked for 7 years in Marconi Mobile (Tactical Communications), In 12-2002, M.B.A. in Business Engineering at "Tor Vergata" University; In 09-2006, I've joined Finmeccanica Corporate (Product Policy Department);Since 10-2008, PhD Student in Knowledge Management at "Tor Vergata" University.

Don Ropes is a research fellow at the Centre for Research in Intellectual Capital where he looks at the role of knowledge management in organizational development. The focus of his research, and PhD dissertation (which he is currently writing at the University of Amsterdam) is on how communities of practice can be successfully cultivated as organizational development initiatives.

Iain Russell has led the professional team at the Scottish IA Centre for five years and is experienced in the strategic management of an Intellectual Assets Business Support Centre to achieve high performance results. He has a first degree in Economics and Politics, a post-graduate Diploma in Management Studies and a Masters Degree in Management Learning. His publications include articles with Jane Waters and Fiona Jackson in The Journal of Intellectual Capital and he has spoken on Intellectual Asset Management at conferences around the world.

Giovanni Schiuma is associate professor at the University of Basilicata, Visiting Research Fellow at the CBP at Cranfield School of Management and Adjunct Professor at the Tampere University of Technology Management.. His primary research interests focus around the following areas: knowledge asset & intellectual capital management, performance management systems, innovation and change management, organizational learning. His work is published in refereed journals and books.

Sven Erik Skoenberg. Graduated at the University of Oslo as Magister Artium in urban and rural sociology. Post graduate studies at Nuffield College, University of Oxford. External examiner in pedagogy and philosophy. Special advisor Ministry of Finance Norway working on the Norwegian medium-term national programme (topics education and research). Visiting lecturer at universities and conferences in Scandinavia, Europe and USA. At present senior researcher Ostfold Research.

Francesco Sole is a Phd student at the University of Basilicata, since 2007. His main fields of research concern performance measurement and management, intellectual capital management, knowledge intensive services, systems thinking methodology. His work is published in refereed journals and books

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in Finland 2004-2006, head of research at Arcada, University of Applied Sciences 2006 Research interest: Social Capital, citizen participation, rehabilitation (Multiple Sclerosis, Cerebral Palsy, disabilities), occupational health, stress, preventive medicine

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IC: Ready to Cross the Chasm?

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Abstract: Awareness of the concepts of intellectual capital (IC) measurement and management continues to grow world wide. Many organizations have become early adopters of the "technology" of IC. Yet, after more than ten years of development, the field is still not widely known or understood in the mainstream business community. In his bestselling book, *Crossing the Chasm*, Geoffrey Moore explains a fundamental challenge for marketers of new technologies: the chasm between early adopters and mainstream buyers. Early adopters are willing to take risks and make fundamental breakthroughs. Mainstream buyers, in contrast, seek incremental, measurable improvement and a complete product. This paper tells the stories of eight companies from around the world that have used the IC Rating™ intellectual capital assessment (ICR) as part of their management strategies. The stories were developed based on interviews of the key manager who championed the assessment. The goal was to understand why they engaged in an assessment as well as the nature of the findings, what kind of changes the findings inspired and the results from the process (both financial and non-financial). The companies where these managers work are spread across Europe, Asia and the Americas. They include small, private companies; strong, middle market organizations and divisions of the largest multinationals in the world. Different industries are also represented: non-profits, manufacturers, technology and service companies. Despite this diversity, many of the same themes were repeated in the interviews of each manager. It was also clear from these stories that the eight managers interviewed all exhibit the characteristics of "early adopters," as defined by Moore. They each had a strong vision, were willing to fight to sell this "technology" internally. Most felt that the process of evaluating their IC had been extremely positive, even transformational. However, they still have difficulty identifying a clear link between IC and financial results. This still-imperfect link between IC technology and financial results shines light on the chasm between today's early adopters and tomorrow's mainstream buyers. Financial results are a key interest of the mainstream buyer. In order to "cross the chasm" and move into the mainstream, the field of IC will need to do a better job of identifying and documenting the link between intellectual capital and financial measurements.

Keywords: Intellectual capital assessment, Intellectual capital management, crossing the chasm, case studies

1. Early adopters

> *Early Adopters: Visionaries are that rare breed of people who have the insight to match an emerging technology to a strategic opportunity, the temperament to translate that insight into a high-visibility, high-risk project, and the charisma to get the rest of their organization to buy into that project…they are not looking for an improvement, they are looking for a fundamental breakthrough (Moore, 1999)*

In his best-selling book on high tech marketing, *Crossing the Chasm*, Geoffrey Moore laid out the challenges of launching and building businesses based on new technologies. He explains the critical importance of early adopters to the success of a product. But he also cautions that early gains do not guarantee success in the long term. The next stage of buyers after the early adopters has different viewpoints and different needs. These buyers are more pragmatic. Shifting from the visionary early adopter to the pragmatic mainstream is challenging. Many technologies get caught in a "chasm" between the two which can doom their product. Mr. Moore's ideas hold valuable lessons for those interested in intellectual capital.

Intellectual capital (IC) can be understood as a technology, a new way of solving the challenges of strategy and management in the knowledge economy. This new technology emerged over a decade ago but it is still relatively unknown; there is still no broad understanding in the business community of even the basic definition of intellectual capital as consisting of human, relationship and structural capital. Much of the work in the field continues to be performed by academics and publically-sponsored programs.

One exception to this rule has been the community formed by Intellectual Capital Sweden AB (ICAB). ICAB developed the IC Rating™ (ICR) assessment methodology over ten years ago based on early work in the field. The methodology has been used widely in Northern Europe and Asia, and has been licensed to firms around the world. Altogether, this network has performed over 430 projects using ICR. The methodology involves interviews with twelve internal and twenty-five external stakeholders

of an organization. Questions focus on current performance, outlook for renewal/innovation and risk of each category of intellectual capital. The output includes both a letter grade and stakeholder comments. More detail on the methodology can be found in Appendix A.

The companies that have participated in this process are quite diverse. They range from early stage to multinational corporations. They include for-profit and not-for-profit enterprises. Many operate in high tech and service industries, but quite a few operate in basic manufacturing. One of the threads uniting the companies, however, appears to be that the managers choosing to advocate for this process exhibit many of the characteristics of early adopters.

This paper endeavors to draw lessons from these early adopters and asks the question whether the technology of IC is ready to move into the mainstream.

2. The stories of early adopters

The data for this paper was generated through interviews with eight managers, each of whom served as the point person on a past intellectual capital assessment using the ICR technology. The interviews were conducted by members of the ICR community in Europe, Asia and the Americas.

The interviews included five specific questions that elicited responses on a Likert scale from 1-8 and seventeen open questions designed to draw out the story of why the company undertook the assessment and what they learned from the process. The responses were transcribed and, where necessary, translated into English. As much as possible, the managers' own words are used in summarizing their experience.

The focus of the objective questions and average response was as follows (see Table 1):

Table 1: Objective questions and average response

Question	Scale	Ave. Response
Impact on internals	1-Extemely negative 8-Extremely positive	5.6
Impact on externals	1-Extemely negative 8-Extremely positive	6.5
Impact on business performance	1-Extemely negative 8-Extremely positive	6.2
Manager's recommendation of ICR	1-Strongly discourage 8-Strongly recommend	7.4
Future importance of IC	1-No importance 8-Extremely important	7.1

These responses indicate an enthusiasm and confidence that clearly identifies these managers as early adopters. They feel that the process was less understood internally than it was externally. They are not always able to track the direct impact on business performance. But they have a strong belief in the process, based on their willingness to recommend it to others. What is behind these scores? The stories below shed light on this question.

Company: Mindtree

Country: India

Industry: Information technology

Year(s) assessment performed: 2005

> *"We had been focused on knowledge management (KM) for almost three years, and we had stated our KM mission aligned with building intellectual capital, and had started talking about how we can try to measure intangibles.*

The ICR process "brought the attention of not only the management team, but also other employees towards the importance of intellectual capital. There were many questions, and discussions around it. It helped bring in thinking about an often neglected area. Many people who were involved in the ICR process itself thought the questions being asked were excellent and were thrilled. Customers also gave positive feedback on the process."

> *"There were many learnings. A key area that emerged loudly was that we had to focus more on brand building and network creation beyond the senior-most management team. We invested more time and energy on brand building through knowledge dissemination and open external thought leadership, publishing more, speaking more, etc. which was a good way to build brand for a knowledge organization. We strengthened our networking aspects through media, recruitment relationships and partners."*

IC is now part of the strategy of the company. "The plans for building human capital (e.g. competencies), structural capital (e.g. intellectual property) and relational capital are presented and discussed as part of the annual plan process. We probably need to do more in terms of valuation/monetization of IC – we have not been convinced of a systematic way of doing this to date, though we have done this at different levels (e.g. measuring project level profitability due to IC health on the project team)."

The organization was recognized as one of the "Most Admired Knowledge Companies" (MAKE), a global program that identifies leaders that transform corporate knowledge into enterprise intellectual capital and shareholder wealth or societal wealth. "Yes, we received our first MAKE Award the year after the ICR, and we were the only company other than Google to have gotten a MAKE after being in business for seven years. We have subsequently become the overall highest ranked winner in India and Top 10 ranked in Asia. We also won the NASSCOM Innovation Award [an award for Indian information technology companies] for our knowledge ecosystem which was seen as being innovative. Taking a serious strategic view of intellectual capital is part of the reason we have stood out."

His advice to other companies? "They have to take a view of IC being built continuously, and an ecosystem must be created for that. They have to take a strategic view of intangibles, and use surveys as a way of gauging progress. We are in the knowledge economy – what gets done in IC management will define how robust our global economy is."

Company: Norsk Tipping

Country: Norway

Industry: State owned lottery and betting company

Year(s) assessment performed: 2000, 2002, 2004, 2006

The manager at Norsk Tipping felt the roots of their IC effort go back to 1994 when Norway hosted the Winter Olympic Games. "Norway as a nation and Norsk Tipping as a company realized the great gains of reaching out internationally. Partly for marketing, but just as much to be able to take part in all the new ideas and fresh thinking out there." The organization went on to host the global summit of the World Lottery Association in 1999. Preparation for the summit brought them in contact with leaders in the IC field. "We clearly understood then that IC was the true and real value of our company."

At first, there was considerable resistance among the employees. The organization learned that "it is important to clarify at an early stage what this is really about, and that it is not a way to measure individual performance. We all learned a lot about how our environment looked upon us, and it opened for a dialogue with the staff on how we could improve on key factors."

> *"We got some negative feedback from the first rating: we were considered risk averse, we were not good at learning or working horizontally, we needed to make much more cross-over connections in the organization, create cross-organizational teams. There was also the need to strengthen innovation. We realized that, at management level, we are all digital immigrants while our future consumers will all be digital natives. What does that imply for our business today and tomorrow? How do we make sure that we develop in order to meet their needs?"*
>
> *"I had a very interesting discussion with my board. I wanted to go public with the first ICR to make the picture complete, side by side with the financial information in the Annual Report, But the board was hesitant, they were afraid that we would be disclosing too much. We ended up publishing it, and kept doing so over the seven-year period we used the ICR."*

> *"As we moved forward, we achieved a common language in dealing with these issues. Suddenly, things that used to be vague, undefined and a bit diffuse all became clear to us and we could start addressing them together. At Norsk Tipping we introduced Balanced Scorecard where the rating results were included. We definitely had them as part of our three-year strategy plan."*
>
> *"This was the first time we were looking forward instead of backwards, - what were our renewal efforts? How was our capability to manage change? What were the risks in front of us, and so on. Previously we had managed the entire business on historic data, which can only tell you so much. The ICR analysis proved to be crucial for us in making priorities in the years to come."*
>
> *"What were the results? Between the year 2003- 2006 we were listed on the top-ten list of Most Admired Knowledge Enterprise (MAKE) award. We were rated number one in 2007. Our employee satisfaction increased significantly as did our sick-leave (among the lowest in Norway). We strengthened our culture and clarified our core values. Since we got more focus on the efficiency and renewal capabilities of the organization, all this resulted in better financial results."*

His advice to other companies: "Go for it! Bring in staff representatives at an early stage, to be able to de-mystify the process. Be honest when you select the persons to be interviewed and make sure that you have a reflection of all stakeholders. The really great companies are getting more focused on non-financial results. Ethical codes, marketing principles and corporate social responsibility are all requiring companies to see the wider aspects of their business in a sustainable way. ICRs will help to better navigate in the future waters."

Company: Goodyear Dunlop Tire Company

Country: EEMEA, headquartered in Belgium

Industry: Tire and rubber

Year(s) assessment performed: 2003, 2004, 2005, 2007, 2008

> *"When the concept of IC assessment was first was introduced to me, I saw the value immediately. When you work in the emerging markets, you have less data on how your company is perceived and how you perform. . Also the conditions are changing rapidly, you need to have a good external assessment…I wanted to objectively assess the direction of the different business units in a structured way. I also especially appreciated the in-depth interview approach, where you can reach levels of the organization that management cannot."*

The process was extremely helpful to management. Employees were a little slower to jump on board, "People didn't really understand at first, but they soon saw the value locally as well…They saw it as a help for organizational development, and definitely not as a threat. It all was a very positive experience."

> *"We saw that we had poor internal communication, which surprised us. There were big gaps between management and employees, and that had to be addressed immediately. Also, there were high risks in the business recipe due to the dominant positions we enjoyed, which was very useful to discuss with the local organization."*
>
> *"There were a few major learnings: 1) you have to engage people from the outside to look into your companies. Don't try to do this yourself, get help from professionals. 2) There is a huge need for evaluations for non-financial assets, we are too focused on financials in large organizations. You need this sublime assessment of who you are and where you are going. 3) To learn how we are perceived both internally and externally. Also, the risk assessment was excellent…Implementation varied a little between local companies, but on average it was a high impact."*
>
> *"Any company, regardless the size, has a need to do this kind of assessment. It was an eye-opener, that you could look at your company in a different way from the way you have been trained."*

Mary Adams and Henrik Martin

Company: Name withheld

Country: Japan

Industry: Electronics

Year(s) assessment performed: Annually from 2003 – present

The first set of IC assessments in this large multinational manufacturer was performed at the business unit level as part of a Balanced Scorecard project initiated by headquarters. The organization continues to use the process annually, as "a good tool for understanding our status from the external view and provides good opportunities to learn, especially what our customers think about us. We have been conducting the rating every year and can capture the changes each year as well. We use the results to improve and correct our planning."

> *"What struck me last year was that we are always confident about our quality assurance. We also thought our virtualization technologies were outstanding. Our internal KPI's [key performance indicators] were also rising. However, in the rating results, the externals didn't appreciate these things as much as we thought. They saw our level as more or less the same as the competitors. So we are trying to emphasize the benefit of the technologies in seminars now."*
>
> *"It is really difficult to connect the result to the tangible results. We are still working on the formula. I think there is a link somehow. But I have no idea how to monitor it. My advice is to use the result for the business PDCA (Plan-Do-Check-Action) cycle. IC assessment is very effective if it is combined with the PDCA cycle. Also the results are very useful for engineers who normally have very limited interaction with the customers/partners outside."*

Company: Name withheld

Country: Chile

Industry: Shipping

Year(s) assessment performed: 2006

"I first learned about intangibles during my university studies." In the beginning, "the employees did not really see the value of the rating but it was able to sensitize the company to the considerable value of intangibles. We were able to begin a dialog about these issues that are so relevant—and we were able to give them a formal name, which was very positive."

The initial reaction from externals was positive "because the process demonstrated that we are an organization that is concerned about its relationships with clients, suppliers and industry experts. I learned the importance of evaluating our organization from a 360-degree perspective, including externals. Another thing that helped and was enriching was to emphasize to the employees that the company is concerned about intangibles, that it is important to maintain them and develop them in order for the company to meet its goals."

> *"We have been able to use the information for strategic alignment but we are not there yet at the level of applying it to improve our competitiveness. We have not measured the intangibles financially but we believe that they have a positive impact on our financial results. We are beginning to implement KPI's that will measure our progress toward our goals."*
>
> *"Intangibles are very important right now and it is important to be clear that companies exist because their employees are willing to show up and be part of the collective goals."*

Organization: International Storytelling Center

Country: USA

Industry: Non-profit

Mary Adams and Henrik Martin

Year(s) assessment performed: 2005

Going into the assessment process, "I remember the phrase that I used, 'I'm stuck. And I don't know where to go.' I felt that we were having trouble moving from strategy to implementation. Money was a big part. Culture was also a very big challenge."

> *"The rating was a process of learning. Even after we did the rating, it was only with time, as we began to use the recommendations that we understood the power of it. I'm still learning and still trying to get my arms around it. I learn by successfully applying the ideas and seeing how important the intangibles are in how successful you become. Identifying those areas that needed to be pursued to 'unstick' was what I got out of it—those intangibles that had to be addressed to enable to move the dream to results."*
>
> *"I think that most of the staff had trouble making the connections between the process and the knowledge that was gained—and their work at the time. I didn't feel that way. That process was telling us something. I'm still learning. I still held onto the attitude, 'What can we do here?' and I still keep the results from the rating by my desk."*

The organization has implemented many of the recommendations that came out of the rating. These changes recently helped them reach a $3 million fundraising goal. The manager offered, "I would recommend a rating to any organization if they are willing to apply the end results. And understand what it can mean to them."

Company: Name withheld

Country: Japan

Industry: Publishing and Retail

Year(s) assessment performed: 2007, 2008

When this manager first heard about IC assessment, "the concept was very shocking and enlightening to me. The root of the tree is the intangibles or IC and the outcomes, the fruit, is carried from the root. The roots are your future. It was almost an awakening for me. For many years, we had been struggling to grow our business and I was trying to strengthen the relationships with the customers somehow. The concept seemed to explain what I was trying to do."

> *"It was the first time that our business unit faced the voices of the customers…Live comments were really impressive and sort of shocking for many people, I think, in a good way. As we didn't much think about the comparison with our competitors in the past, the comparison result was quite interesting too. What was most impressive is what our customers really thought of us and their expectations are quite big. I never thought that there would be such sincere comments from outsiders. Of course that means that there were very negative comments as well from them, which we have to consider very seriously."*

"We use such terms relational capital and human capital in our process model," an internally-generated tool that is similar to the Balanced Scorecard or Skandia Navigator. "IC is the base of our strategy/business planning. It will take more time to really permeate the concept among the organization, but at least we use it in our official planning process."

In terms of financial results, "I think there is a link but it is very difficult to directly link it. There are some KPIs that we found that indirectly influence the financial results. But still we are in the learning process. This is the biggest challenge: to find out the effective IC drivers to the business results. Once that is identified, the concept is really useful. Personally I am a big fan of ICR. The method is very useful. We are actually trying to market the concept to one of our customers in collaboration with our consulting firm."

Company: Innovatika

Country: Poland

Industry: Consulting

Year(s) assessment performed: 2005

This company makes a business of tracking management trends and learned about IC through their work in knowledge management. The firm was just two-years old and growing rapidly when they undertook an assessment. Their goal was to understand their strengths and weaknesses to enable them to prioritize growth initiatives and develop the right positioning to fuel continued growth. Management was especially interested in taking the pulse of external stakeholders:

The staff of the firm went into the process with mixed feelings, "There was a bit of excitement and maybe fear connected with asking for feedback or appraisal—I guess you need courage to voluntarily ask for it and be ready to hear not just that you are the best, but also listen to the points where you need to improve." But it ended up being a very positive process, including with external stakeholders, "We were very pleased to see how open and willing our partners and clients were to meet and give feedback on our strategy, service and people…we received very valuable advice and ideas for improvements."

"Probably the biggest strategic change has been building a second pillar of our business line, which now accounts for half of our revenues and is still growing in importance." Internally, the assessment made it very clear that the firm needed to develop more robust processes in order to scale the business, specifically for sales, knowledge and project management. "It is good to know if your business is dependent just on human capital…I guess IC helps you in defining where it is worth it to invest in building structural capital and where you can just focus on increasing the skills of your people."

The key manager's advice to other companies, "today's companies are built of IC and you need a good system to measure their performance. Tools like ICR are excellent for 360-degree feedback for the organization, allowing it to grow and renew better than its competitors. But you need to have the courage to ask for feedback and be ready to act on it…and a set key indicators to track between ratings."

3. Lessons from these early adopters

Despite the diversity of the companies involved, there are a number of themes and lessons that are woven throughout their stories:

One of the toughest sells in starting an IC assessment is internal. It is advisable to invest time upfront introducing the concepts of IC and the goals of the process before it begins.

Engaging external stakeholders is a very valuable part of the process. There is less resistance from them upfront. To make the most of the experience, keep them in the loop afterwards and show them how you have taken action on their feedback.

IC assessment needs to be integrated in the company's strategy process. An assessment should be part of an iterative strategy process that circulates from assessment to strategy, then execution, performance measurement, and back to assessment.

KPI's are an important way of measuring performance of IC. Assessment highlights strengths that can be leveraged and weaknesses that should be improved. Establishing KPI's for the key strategic IC efforts keeps these goals top of mind and helps the company internalize its understanding of the importance of IC.

The link between IC and financial results is still hard to establish. None of these early adopters has "cracked the code" to be able to identify the direct link between IC and financials.

IC is not going away. The move to a knowledge economy continues to accelerate. Understanding the knowledge side of business will be increasingly critical.

4. Ready to cross the chasm?

As explained at the outset of this paper, the managers profiled here exhibit many characteristics of technology early adopters, with vision and courage to try something new. Which then begs the questions: "What comes next?" and "Is this technology ready to move beyond the early

adopter?"Moore's scheme of technology adoption describes the market stage after the early adopters as the "early majority." These buyers are mainstream pragmatists:

> *"If the goal of visionaries is to make a quantum leap forward, the goal of pragmatists is to make a percentage improvement—incremental, measurable, predictable progress… Pragmatists tend to be 'vertically' oriented, meaning they communicate more with others like themselves within their own industry…They want a whole product"*

Moore advises that the best way to attract these pragmatists is to focus on specific niches and develop data that can be referenced within an industry. The concept of the whole product is also important. He defines a whole product as "the minimum set of products and services needed to fulfill the compelling reason to buy for the target customer." In the case of IC assessment, it was clear in the interviews of early adopters that a "whole product" needs to include a way of connecting the results to the strategy and performance measurement system of the company. There are already many approaches that accomplish this, including the Skandia navigator and the Balanced Scorecard.

The biggest challenge left in crossing the chasm is the need of the mainstream market for measurement and data. Many in the field of IC insist that data is beside the point, that the innate characteristics of knowledge intangibles make measurement irrelevant. Instead, the argument goes, businesses need to shift their thinking to allow for understanding and appreciation of intangibles without measurement.

While the pragmatists in mainstream business appreciate the difficulties of measuring intangible assets, it is safe to say that they are not ready to throw away a business culture that values measurable results. In fact, this lack of data is probably the principal reason that the field is today, in many ways, caught in the chasm between the early adopters and mainstream pragmatists. The intellectual capital community must address this challenge if it hopes to gain widespread adoption of its concepts and unleash the full power of IC in our economies and businesses.

5. Appendix A: The technology

The ICR technology used for rating all the companies in this study provides feedback on an organization's intellectual capital. The categories of IC examined are summarized in Figure 1.

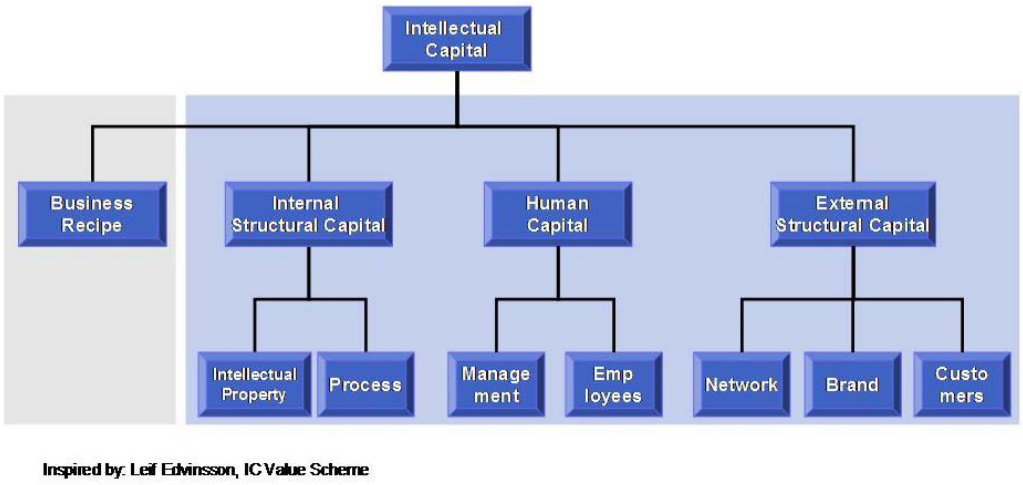

Figure 1: The categories of IC

The approach involves interviews of 35 stakeholders, one third of whom are internal to the company and two-thirds of whom are external. Internals include both management and employees. Externals also include both senior and operational staff. There are also guidelines to help get a good mixture of suppliers, customers, partners and industry leaders into the interview group that know the company well. Interviews take roughly an hour each and include both numerical ratings and open follow-up questions. The questions reflect three perspectives on each category of intellectual capital:

- Current strength and/or performance
- Strength of efforts to sustain and renew

- Risks to future performance

The questions are asked in relationship to the strategic goals of the company, which are discussed at the outset of the interview. Strategy becomes the measuring stick for the IC. This means that questions about processes, for example, are asked in relationship to the company's strategy: "does the organization have the right marketing processes to enable it to achieve its strategic goals." The output of the process is a report that includes letter grades similar to bond ratings (AAA, AA…B, etc.) as well as details behind the ratings and stakeholder comments. This process often represents the first time that the company has seen all of its intellectual capital examined or reported in one place. The use of a standard methodology has led many users to repeat the ratings over time and/or to compare the results across multiple divisions or companies.

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Human Capital Management, What Does it Really Mean?

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Abstract: The use of the term human capital management (HCM) is quiet frequent today among scholars and practitioners. In many schools of business the human resource management (HRM) course has been replaced with human capital management and many companies have adopted the title chief human capital officer (CHCO) as a replacement or in supplement of the vice president of HRM. In sum, HCM seems to be replacing HRM or, at the best, is used with it interchangeably. What have triggered this change are the proponents of the knowledge-based view, inspired by the characteristics of our global, information and knowledge based-economy that consider people with their knowledge, experience, education, personality and behavior as a source of competitive advantage. However, despite the increasing use of the term HCM, there is some conceptual confusion as to what constitutes human capital (HC), and a greater confusion as to how to manage it. When I was first asked by one of my students what was the difference between HCM and HRM, I had a hard time giving him a convincing answer.

It is well known that the roots of human capital lie in economics rather than management theory. The concept of human capital was initially formulated by Nobel prizewinner and economist Theodore Schultz in the early 1960s when it was used as a way of explaining the advantages of investing in education on a national scale. During the last 50 years, other economists have taken up Schultz's definition of human capital many times and extended it in various ways, including measuring criteria, which led to the concept's greater heterogeneity. Currently, there are a variety of definitions and ideas associated with the human capital concept in a variety of disciplines, which leads to an even greater confusion as to what human capital management really means. Thus, the purpose of this paper is to review the HC literature since its inception, examine the various economic and managerial definitions of HC, and propose our own HC definition in an attempt to clarify the human capital management concept.

Keywords: Competitive advantage, Intellectual capital, Knowledge-based view, Human capital, Human capital management, Human resource management

1. Introduction

Welfare, staffing, personnel, human resources and now human-capital management. Finn (2003) believes that HR is in danger of suffering branding-fatigue. No matter what the labeling is, it's a fact today that people are recognized as a business's most important asset and the key determinant of competitive advantage. A major challenge currently facing HR managers is to raise the case of human resource management to the boardroom debate rather than merely being considered as an administrative issue (Finn, 2003).

The human capital concept is a movement beyond HR (Walker, 2001). People are not called human resources or human assets (or certainly workers, personnel, or employees) any more. Human capital is the set of skills, knowledge, and capabilities organizations need to succeed in the new knowledge and technology economy (Walker, 2001). The term is appearing in books and articles, companies, and consulting firms. Despite the wide use of the term HC among practitioners and consultants, and despite the important research stream on HRM and intellectual capital, many people are still confused as to the exact meaning of HC and as to the difference between human capital management and human resource management. By reviewing the literature on HC, this paper aims to clarify what human capital really means and seeks to highlight its importance in generating a sustainable competitive advantage.

We will first identify the emergence of the term HC from a microeconomic perspective and shed the light on how the term migrated from economics to business disciplines. We will then introduce the most common definitions of human capital, develop our own HC definition, and then explore how the HRM literature embraced the HC concept. Finally, we will look into the most abundant literature on HC in the management discipline: the link of HC with the firm's competitive advantage, with the resource-based view as a main theoretical framework.

2. The emergence of human capital theory: A microeconomic perspective

The roots of HC lie in economics rather than management theory. The concept of human capital originates in the fundamental research done by Nobel prizewinner and economist Theodore Schultz (1961), Becker (1964) and Mincer (1958; 1974). Then still being a topic for economists, but not for management theorists, HC represented - besides land and capital - the production factor of "labor" (Bechtel, 2007). HC was then defined as "skill, knowledge, and similar attributes that affect particular human capabilities to do productive work" (Schultz 1961: 8).

But even before labeling it as “Human Capital”, economists have always focused on the productive effects of the quality of workers (Nerdrum and Erikson, 2001). William Petty, in the seventeenth century, was the first economist we know who emphasized labor quality differences and who identified what much later was labeled human capital when he argued for an inclusion of the "value of workers" in accounting for wealth for actuarial purposes. In the Wealth of Nations, Adam Smith (1776) wrote in length on the incidence of workers' and employees' knowledge and skills on the production process and the quality of output. He also argued that wages should be determined (among other things) by the efforts in time, energy and money spent by workers to gain the skills required for their working tasks (Nerdrum and Erikson, 2001). But neither Smith himself, nor Alfred Marshall (1890: 469) who more than a century later stated: "The most valuable of all capital is that invested in human beings", ever used the term human capital.

Well served by the results and foundations of capital theory and driven by influential and skilful economists, human capital theory developed quickly in the 1960s. The research program added markedly to the understanding of human behavior both at individual and social levels (Nerdrum and Erikson, 2001).

3. The adoption of HC by business disciplines

The historical basis for the adoption of the human capital concept from economics to the context of business management is to be found in the first efforts to establish a so called "Human Resource Accounting" (Flamholtz 1974; Flamholtz, Bullen and Hua 2002; Hekimian and Jones 1967). This transfer of human capital theory into "real business world" starting in the 1960s, rather failed in the first instance due to difficulties in consenting on how to put monetary values on a company's human resource (Bechtel, 2007). The term Human capital was later embraced by management disciplines in the early 1990s when academics and practitioners started to talk about Intellectual Capital, Social Capital, Relational Capital, and Human Capital. In 2003, HC again received intensive recognition, both as a simple device for re-labeling older ideas as well as a way of looking at HR activities from an economic point of view (Scholz, 2007). The human capital concept was thus revived at the turn of the 20th century as we entered the knowledge society era. In the business context, knowledge management and the concept of organizational learning paved the way for an interest in all facets of knowledge - including the personal knowledge incorporated in individuals and the workforce as a whole (Bechtel, 2007). The realization that people with their knowledge, experience, education, personality and behavior constitute the only resource that generates and retains organizational value led to the human capital concept (Arthur 1994; Barney and Wright 1998; Becker and Gerhart 1996; Lepak and Snell 1999).

This new interest in HC was pushed not the least by the practice. It resulted in a dramatically increasing awareness for the firm's "intellectual capital" and its "intangible assets". This is particularly reflected in popular publications like the books from pioneers - Brooking (1997); Edvinsson and Malone (1997);Lev (2001) ;Roos, J., Roos, G., Dragonetti, and Edvinsson,(1997); Stewart (1997), and Sveiby (1997) - dedicated to the valuable intangible assets.

Despite the rising interest in the concept of human capital, there is still some conceptual confusion as to what constitutes intellectual and human capital. We will examine in the next section the evolution of HC definitions in a chronological order.

4. Most common HC definitions

In reviewing the literature, we identified the main HC definitions listed below in a chronological order:

- Skill, knowledge and similar attributes that affect particular human capabilities to do productive work (Schultz, 1961: 8)
- The individual stock of knowledge embedded in the firm's collective capability to extract the best solutions from its individual employees (Bontis, 1999, 2001).
- Employees' knowledge, skills and capabilities that are of economic value to organizations (Snell and Dean, 1992).
- The combination of these four factors: your genetic inheritance, your education, your experience, and your attitudes about life and business (Hudson, 1993).
- A primary component of the intellectual capital construct (Edvinson and Malone, 1997; Stewart 1997; Sveiby, 1997)
- A capacity to act in different situations to create both tangible and intangible assets (Sveiby, 1997). Sveiby also uses the concept "employee competence"
- The individual's knowledge, experiences, capabilities, skills, creativity and innovativeness (Edvinsson and Malone, 1997). These elements are connected to each other and collectively contribute to success in work (Ranki, 1999).
- The sum of all value creating behavior and qualities of the employees (Smart, 1998: 157).
- The propensity of a person or group to perform behaviors that are valued by an organization (Smart 1998: 158).
- The intangible resources of abilities, effort, and time that workers bring to invest in their work" (Davenport and Prusak, 1998: 49)
- The firm's individual employees who possess skills, abilities, knowledge, and know-how (Sullivan, 1999)
- A capability, knowledge, skill, experience, and networking, with the ability to achieve results and the potential for growth; individual motivation in the form of aspirations, ambition, drives, work motivations and productivity; work group effectiveness in the form of supportiveness, mutual respect sharing and values; leadership in the form of clarity of vision and ability to communicate that vision; organizational climate in the form of culture, particularly the freedom to innovate, openness, flexibility and respect for the individual (Mayo, 2000)
- It's all about ensuring that the enormous potential provided by people is aligned with the mission and strategic objectives of the business, to maximize their value on behalf of the stakeholders (Finn, 2003).
- An approach to people management that treats it as a high-level strategic issue and seeks systematically to analyze, measure and evaluate how people policies and practices create value (Accounting for People, 2003, p.3).
- The measurement and analysis of human resource "metrics" such as cost per hire, turnover costs, the effectiveness of training interventions, and indicators of overall HRM system effectiveness such as human capital return on investment (Hayton, 2003)
- An umbrella that includes three primary components of corporate knowledge. The first is those human resources functions that influence workforce development. The second is training, and the third is knowledge management. (Hall, 2004)
- Embraces both the broader human resource considerations of the business workforce (traditionally known as the labor market) and the more specific requirements of individual competence in the form of knowledge, skills and attributes of managers and the people they manage (McGregor, Tweed and Pech, 2004)
- Refers to individual employee's knowledge, skills and expertise (Youndt and Snell, 2004)
- A combination of factors possessed by individuals and the collective workforce of a firm. It can encompass knowledge, skills and technical ability; personal traits such as intelligence, energy, attitude, reliability, commitment; ability to learn, including aptitude, imagination and creativity; desire to share information, participate in a team and focus on the goals of the organization (Abeysekera and Guthrie, 2004, p 253)

- HC is part of intellectual capital. The enterprise's human capital consists of the knowledge, understanding, skills, experience and relationships of its employees. Human capital is the property of employees and is only leased or rented to the enterprise. (wig, 2004, p. 335)
- Human capital is often defined as part of intellectual capital (IC) or intangible resources of firms (Johanson, 2005, p. 96).
- "the set of management systems designed to be internally consistent and designed to execute corporate strategy" (Royal and O'Donnell, 2005).
- The skill, experience and capacity to develop and innovate, that is owned by individuals (Chartered Institute for Personnel and Development, 2006, p.6).

There are undeniably a variety of definitions and ideas associated with the HC concept. By analyzing the existing literature, we noticed that despite the presence of some static definitions of HC limiting it to employee knowledge, skills and abilities, most of HC definitions are more dynamic, and include in addition to employee KSAs, a motivational and socio-interactive dimension. The latter approach views HC as a major source of innovation and strategic renewal. Our aim in this article is to go further by suggesting our own HC definition that comprises the following components:

- A cognitive component residing in employee knowledge, skills and abilities (KSAs)
- A behavioral component residing in employee willingness and ability to deploy those KSAs
- A fit component residing in the alignment of the cognitive and behavioral component with strategic imperatives
- A measurement component assessing HC's contribution to value creation residing in the appropriateness of the alignment between the cognitive and behavioral approach on one hand, and the strategic imperatives on the other hand.
- A flexibility component assessing the ability for HC to adapt to different business strategies and create value at the present and future time.

As a result, to leverage their human capital, we believe that organizations should ask themselves the following questions:

- Are my employees knowledgeable, skilled and able to perform the current required tasks
- Are my employees motivated and willing to deploy their KSAs to achieve stated objectives?
- Are my employees' KSAs and behaviors aligned with our strategic objectives?
- Are we ensuring that our employees will continue to display the necessary KSAs and behaviors to meet future (and perhaps different) strategic directions?

In sum, we propose that HC is all about combining strategic HRM and Human resource development (HRD) initiatives; Both HRM and HRD have an evolving role of aligning human resources with the organizational mission, to meet strategic objectives, and to impact organizational performance. Strategic HRM initiatives will help align employees KSAs with strategic imperative, will keep employees motivated by providing them with the right incentives and rewards to display their KSAs, and will align their behaviors with the organization's strategic objectives, while HRD initiatives will facilitate organizational learning, performance, and change through organized interventions and initiatives and management actions for the enhancing an organization's performance capacity, capability, competitive readiness, and renewal (Gilley and Maycunich, 2000).

More specifically, combining HRM and HRD initiatives will help employees become better at their tasks, their knowledge, their experiences and will unleash human expertise through organization development and personnel training and development for the purpose of leveraging the human capital as we defined above and improving performance.

We will examine in the next section the evolution of the terminology from HRM to HC and we will analyze whether the change is limited to the terminology or whether it goes beyond that to reflect a true change in HRM's roles and responsibilities.

5. HC and HRM

The HC concept is supposed to capture all efforts addressing people issues, not merely to serve as a new name for HR. it aims to build an understanding that business strategies have people implications,

which require their serious attention, investment, and action. We agree with Walker (2001) that it would be unfortunate if the human capital label were adopted by HR functions, without the broadening of scope, deepening of business integration, rigorous measurement, and accountability, or the development of needed consulting and leadership capabilities. It will then become merely a fad of the new century, rather than a valuable shift in emphasis.

HCM is currently one of the most controversially discussed topics in Human Resource research and practice (Scholz, 2007). It has attracted an increasing interest over the last ten years from the human resources profession, media, and consultancy research. However, of all functional areas within the domain of HRM, human capital management practices have received very little attention from researchers (Hayton, 2003). One reason for this may be that HCM crosses typical HR functional boundaries, and refers to the measurement and analysis of human resource "metrics" such as cost per hire, turnover costs, the effectiveness of training interventions, and indicators of overall HRM-system effectiveness such as human capital return on investment (Becker, Huselid, and Ulrich, 2001; Fitz-Enz, 2000).

A basic premise of human capital theory is that firms do not own it; individuals do. Firms may have access to valuable human capital, but either through the poor design of work or the mismanagement of people, may not adequately deploy it to achieve strategic impact (Wright and Snell, 2001). Uncertainty about an employee's commitment to the organization reduces the organization's willingness to make investments in human capital, especially if, as in many branches, the required skills are non-specific and transferable (Albert and Bradley, 1997). The challenge of HR is to develop systems of HR practices that create a synergistic effect rather than develop a set of independent best practices of HR (Becker and Gerhart, 1996; Lado and Wilson, 1994; Wright and Snell, 1991). This requires a changing mindset from the traditional sub-functional (selection, training, appraisal, compensation, etc.) view of HR to one where all of these independent sub-functions are viewed as interrelated components of a highly interdependent system. The interrelatedness of the system components makes the advantage difficult, if not impossible, for competitors to identify and copy. It also requires investing time and energy into developing systems and structures for integrating various HR practices such that they complement, rather than conflict with one another (Barney and Wright, 1998).

5.1 Human Capital and competitive advantage

Human capital has long been argued as a critical resource in most firms (Pfeffer, 1994). Recent research suggests that human capital attributes (including education, experience, and skills) and, in particular, the characteristics of top managers affect firm outcomes (Finkelstein and Hambrick, 1996; Huselid, 1995; Wright, Smart, and McMahon, 1995). Given the importance of organizational human capital, academics and practitioners alike have agreed that investment in human capital development is often a prerequisite to good financial performance and competitive advantage (Delaney and Huselid, 1996). However, the links between human capital and a firm’s financial performance has not yet been fully explored (Reed and DeFillippi, 1990). Thus, an important objective of this article is to address this link so that our understanding of human capital management can be advanced.

Economists have long known that people are an important part of the wealth of nations. Measured by what labor contributes to output, the productive capacity of human beings is now vastly larger than all other forms of wealth taken together (Schultz, 1961). However, in the business context, it is only during the last three decades that managers started considering people as key in a company's endeavor to realize and develop its business ideas (Hansson, 2001; Sveiby, 1990). Investments in personnel are as crucial for knowledge-intensive companies as an industrial enterprises' investments in tangible assets (Sveiby and Lloyd, 1987).

From the strategic human resource management view, assuming that not all existing knowledge and skills are strategic, the first step is determining what forms of human capital exist in the firm and how they can be a source of competitive advantage. Boxall (1996) suggests that human capital advantage refers to the potential to capture a stock of exceptional human talent "latent with productive possibilities". A second task is to develop employees and teams in such a way as to create an organization capable of learning within and across industry cycles.

Hall (2004) thinks of HCM as an umbrella that includes three primary components of corporate knowledge. The first is those human resources functions that influence workforce development. The

second is training, and the third is knowledge management (KM). The power of HCM, as described by Hall (2004), comes from the integration and coordination of all the programs and practices that have the biggest impact on competency and performance of the individual. This will require the breakdown of traditional departmental barriers, and the integration of the software that supports and automates the administration of these programs. Organizations should develop human resource systems based on collaboration to support the development of lateral relations, exchange programs, group-based rewards, team building and rotation, just to name a few (Lepak and Snell, 1999).

Pfeffer (1994) and Hamel and Prahalad (1994) were among the strong proponents of the contribution of human capital in a strategic context. The perspective, in general, draws from the theoretical arguments of human capital theories and the resource-based view of the firm. These themes make some important arguments about the value of human resources and the types of employment practices appropriate to nourish the human resource in an organizational context (Garavan, Morlet, Gunnigle and Collins, 2001).

5.2 HCM and the resource-based view

The resource-based view developed by the seminal work of Barney (1991) posits that organizational resources and capabilities that are rare, valuable, non-substitutable, and imperfectly imitable form the basis for a firm's sustained competitive advantage. Among various types of resources, the resource-based view accredits human capital as the most important type of resources a firm has (Pfeffer, 1994; Wright, McMahan, and McWilliams, 1994). Human capital, in particular a high level of competency and commitment, is a unique resource that creates performance differentials (Bontis and Fitz-enz, 2002; Noe, Hollenbeck, Gerhart and Wright, 2003). This is especially so for those firms operating in complex and dynamic competitive environments where the capability to rapidly acquire and assimilate new market and technological capabilities is the key to enduring advantage over competitors.

The process by which human capital creates performance differentials is subject to a firm’s specific historical contexts, characterized by human behaviors and interactions throughout the course of firm development, which are by nature complex and difficult to imitate. Thus, the unique historical context, causal ambiguity and social complexity make a firm’s human capital inimitable and non-substitutable (Barney, 1991; Black and Boal, 1994; Itami, 1987; Peteraf, 1993; Teece, Pisano, and Shuen, 1997; Wright et al., 1994).

Human Capital Theory (Flamhotz and Lacy, 1981) distinguished between general skills and firm-specific skills of human resources. General skills are skills possessed by individuals that provide value to a firm and are transferable across a variety of firms. Specific skills, on the other hand, provide value only to a particular firm and are of no value to competing firms. Because general skills provide equal value to all firms, one would expect that, given even moderately efficient labor markets, these would not be a source of competitive advantage for any one organization. Greater potential for sustainable competitive advantage stems from investments in firm-specific skills. These skills provide competitive advantage because they provide value to the firm, but they are not easily marketable by the employees who possess them (Barney and Wright, 1998). One can accomplish this through investing in constant training and development of employees to perform work processes and procedures that are specific to the firm.

In conclusion, the resource-based view represents a current paradigm on firm competitiveness and conceptualizes the organization as a collection of competencies and draws attention to issues of learning, HRD investment, knowledge accumulation and experience (Garavan, Morlet, Gunnigle and Collins, 2001).

6. Conclusion

The term HC goes back to economic theories: Theodore Schultz dates it back to the early 1960s, when it was used as a way of explaining the advantages of investing in education on a national scale - with the goal to improve agricultural output. Today, in the business discipline, the prevalence of human capital is set to increase as organizations become more focused on managing intangible assets, as senior management becomes more interested in the impact on bottom line results, as technology evolves and analysts and investors demand improved information relating to the management of people as a contributor to shareholder value (Whitaker and Wilson, 2007). In global competition, the information and knowledge economy's prerequisites increasingly focus employees'

performance on economic efficiency considerations. Why shift to the term "human capital"? HC signals a focus that is broader than the HR department and operational processes. Human capital is intended to capture all efforts addressing people issues, not merely to serve as a new name for HR (Walker, 2001). Moreover, HCM responds to the need of creating smart organizations by hiring the right people, giving them the right knowledge and providing them with ways to share that knowledge in order to benefit the entire organization (Hall, 2004)

The increasing acceptance of the HCM concept is helping to break down the boardroom barriers. HCM is certainly different from everything that came before Finn (2003). It encapsulates an organization-wide business-development goal, rather than a limited human-resources function. HCM is all about ensuring that the enormous potential provided by people is aligned with the mission and strategic objectives of the business, to maximize their value on behalf of the stakeholders Finn (2003). Human Capital is not merely a new name for HR. we strongly believe that it is the beginning of a new era for HRM, an era where HR is more strategic, more business oriented, and more flexible as shown in our proposed HC definition.

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Strategic Planning of Intangible Resources (SPIR)

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Abstract: Knowing and managing intangible resources is essential for the company to succeed in today's global competition. Yet, often companies either don't know their intangibles very well or do not use them strategically in support of what the company pursues in the markets. In today's highly competitive markets, it is imperative that companies 1) develop enough knowledge on intangible resources and 2) apply strategic management to their intangible resources in order to obtain superior financial performance as a result. In addition, companies should be able to generate databases that allow for the management process of intangibles to be secured in the long run.

This study attempts to provide a supported rationale of why companies need to develop the appropriate knowledge and pursue the practice of using intangible resources within a strategic framework. Our approach focuses on planning strategic intangible resources with the purpose of identifying the intangibles that are needed in the development of innovative projects. In addition, the Strategic Planning of Intangible Resources (SPIR) allows firms to measure the value of existing and future resources, not only the existing or past ones as in the old approaches. The firm should be able to apply a measurement method for resource utilization. Over time, the approach can generate a database of intangible resources and facilitate a framework of knowledge management (KM), which can be grounded in an inventory of knowledge (and other intangible) resources. The database may provide a base line for future plans.

This paper also proposes a parsing of diverse intangible resources that can be applied to a technological platform of information technology for management and planning purposes. The approach involves data collection in an ongoing and permanent fashion, and the management of the intangible resources in all areas of the company with focus on human capital, structural capital and relational capital. Such capital should be planned for use at the right time and for the right target.

Keywords: intangible resources, intellectual capital, strategic planning, firm competitiveness

1. Introduction

Intangible resources are the main sources of value creation and corporate competitiveness according to both streams of thought, economic and strategic (Bonfour, 2003). Values can be generated by individuals in different ways and at different life stages. For instance, work values relate to individual capabilities beyond qualification and experience. Similarly, values can be generated by organizations. For example, companies generate value by maintaining positive reputation, protecting their employees, making good products, offering suitable prices, and providing quality in their service. Intangible resources are formed by statics sources and dynamics sources where the dynamics sources are activities that generate knowledge and the statics are the own knowledge.

According to Bonfour (2000), there are five reasons explaining the growth of interest among investigators and experts in the subject of intangible resources:

- The fast growth of service activities, which contribute about 75% of GDP in most economies.
- The dematerialization of production, that is, greater investment in developing, distributing and marketing products than in manufacturing them.
- The continuous creation of value for customers.
- The recognition of knowledge as a main source of comparative advantage.
- The imbalance between market value and book value.

Several studies highlight the importance of intangible resources and their value in firm competitiveness. What is less common is the treatment of intangible resources as required resources to sustain firm strategies or an essential component of strategic planning. Strategic planning may not only include intangible resources but also identify the types and percentages of the intangible values that are needed to implement a strategy (often called *Analysis of Intangible Resources, AIR)*.

Some methods can be used to establish the contribution that can be expected from each intangibles resource, such as the contribution of intellectual capital. Intellectual capital, as an example, represents the knowledge stock existing in a firm in a particular time (Bontis et al., 2001) and intellectual capital management is used in high strategic thinking at some organizations (Wiig, 1997). In addition, typical strategic planning schemes include SWOT analyses, Strategic Choice analyses, and resource analyses, all of which may be needed to implement the company strategies. Often the analysis of resources does not distinguish between tangible and intangible resources, and/or does not identify the intellectual capital or intellectual capital management that the company needs to implement the strategy.

This paper addresses strategic planning where the resources are clearly identified as tangible and intangible and focuses on the intangible resources within the framework of strategic planning. We first address the process of SPIR to then examine three categories of intangible resources and link them to a) knowledge management and b) the company's core competences and its market competitive advantages.

2. Process of strategic planning of intangible resources (SPIR)

Strategic management involves the process of addressing the competitive challenges an organization faces. It intends to manage the "pattern or plan that integrates an organization's major goals, policies, and action sequences into a cohesive whole" (Noe et al., 2002). In fact, it integrates and coordinates a set of commitments and actions designed to exploit core competencies in order to gain competitive advantages (Hitt et al., 2003).

Strategic planning is a component of strategic management and focuses on the process of establishing the company's competitive advantage (Goetsch, 2006) and the strategic targets the company must pursue in the long (Cañibano, L. and Sánchez, M.P. (Eds.), 2004).

Strategic Planning of Intangible Resources (SPIR) involves the process to strategically identifying the intangibles resources that the company needs, particularly those of human, structural and relational nature in order to secure a competitive advantage position that is aligned with the strategic objectives and programs of the firm. Consequently, SPIR focuses on three categories of intangible resources: Human capital (HC), Relational Capital (RC) and Structural Capital (SC). Yet few companies have a clear appreciation of the current and required *stock* of specific intangibles (Heberden, 2006).

According to MERITUM (2002), *human capital* includes value, knowledge, culture, and competences of the employees of an organization; *structural capital* refers to the process, routines, information systems, image, patents, no patented know-how, and data bases; *relational capital* refers to the value of good citizenship that the company maintains with the outer world including clients, suppliers and partners.

After identifying the intangibles, strategic planning establishes a mechanism for measurement and control of resource utilization because companies are interested not only in knowing the value of their intangible resources but also in improving and using them. According to Carmelo-Ordaz et al (2003) to obtain a sustainable competitive advantage, companies must analyze the resources and capacities they posses in order to select strategies likely to offer best returns.

Figure 1 show the process involved in planning strategic intangible resources. The shaded area represents the strategic formulation of a traditional strategic plan and starts with the mission. According to Noe (2002), the mission is a statement of the organization's reason for being and the organization's goals relate to what the company aims at achieving in the medium to long term future. The company goals direct the strategic choices the company may have, moderated by the external and internal analyses. The external analysis identifies the opportunities and threats in the environment, including some technological, political, social, economic, and social factors. The internal analysis focuses on the market and the strengths and weaknesses of the company. The last stage in the shaded area is the strategic choice of resources, both tangible and intangible. Of course, our focus is on intangible resources including acquisition, implementation, control and monitoring.

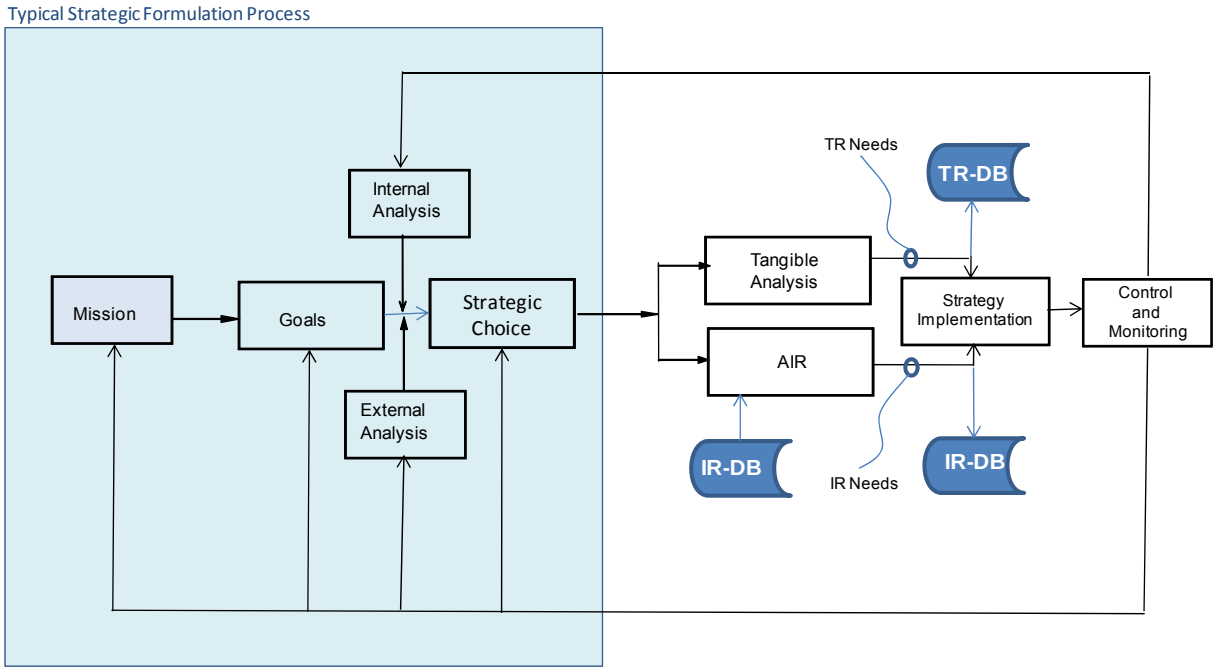

Figure 1: The process of Strategic Planning of Intangible Resources (SPIR)

3. Analysis of Intangible Resources (AIR).

We now focus on the identification and analysis of intangible resources for the company. The term "resources" is variously defined in the literature as the inputs or factors available to a company through which it performs its operations or carries out activities (Amit and Schoemaker, 1993; Black and Boal, 1994; Grant, 1995). Amit and Shoemaker (1993) call them stocks of available actors. Grant (1991, 1995) refers to them as stocks of factors.

An analysis of intangible resources starts with a list of intangible resources that are important to a company. Various authors have suggested lists of potential intangible resources, some of which can be identified as actual resources that relate to the strategic choices of the company (Carmeli, 2003; Hall, 1993; Petrick et al, 1999; Camelo-Ordaz et al, 2003; Hall, 1992; Heberden, 2006; Bordonaba and Palacios, 2001).

In the Table 1 the authors propose a basic list of Intangible resources in the three areas explained by MERITUM (2002): *Intangible of Human Capital* (IHC), *Intangibles of Structural Capital* (ISC) and *Intangibles of Relational Capital* (IRC). The basic list is coded with the first letters of each category name plus a correlative sequential number. The list was developed based on the identification of the main intangible resources that a company needs to develop their plans and it was obtained by the experience of the authors in their consulting works. The firm can use this basic list which is only a suggestion or can add or eliminate intangible resources as required by the own economic activity and the designed strategy.

An analysis of intangible resources types requires codification with the purpose of cataloguing and registering them in a structured data base and information system in order to facilitate measurement, monitoring and control as part of the company's strategic plan, the program and the budget. The codification also facilitates control of the stock besides keeping records, as some resources can be reused while others are discontinued and new ones adopted. The value of an intangible resource does not reside in its possession but in its use. Only resources that work benefit the company's strategy.

The AIR consists of three broad steps:

- Identification of IR strategic needs.
- Codification of IR strategic needs.
- Analysis of the existence to each intangible resource strategic need.

Table 1: Basic list of Intangible Resources types

Intangibles of Human Capital	Intangibles of Structural Capital	Intangibles of Relational Capital
IHC-001 Knowledge of the market	ISC-001 Information systems	IRC-001 Knowledge of the competition
IHC-002 Knowledge of the competition	ISC-003 Possesion of patents	IRC-003 Network of Contacts
IHC-003 Development of new abilities	ISC-004 Processes with Customers and Clients	IRC-004 Human resources keys
IHC-004 Trained workforce	ISC-005 Processes with Suppliers	IRC-005 Good workplace
IHC-005 Previous experience	ISC-006 Design of new processes	IRC-006 Brand reputation
IHC-007 Knowledge of strategy	ISC-007 Development of software	IRC-007 Control Activities
IHC-008 Know-How	ISC-008 Design of new positions	IRC-008 Customer relationship
IHC-009 Personal reputation	ISC-009 Policies of management	IRC-009 Distribution relationship
IHC-010 Ability to manage change	ISC-010 Data Bases	IRC- 010 Other Netowrks
IHC-011 Ability to innovate	ISC-011 Marketing Strategy	IRC-011 Company Reputation
IHC-012 Salesforce training	ISC-012 Prodcution Techniques of low cost	IRC-012 Customer Service
	ISC-013 Quality superior of the product	IRC-013 Trust
	ISC-014 Software Implementation	IRC-014 Strong personal and professional relationships

In figure 2 is depicted the AIR guide to get the IR strategic needs.

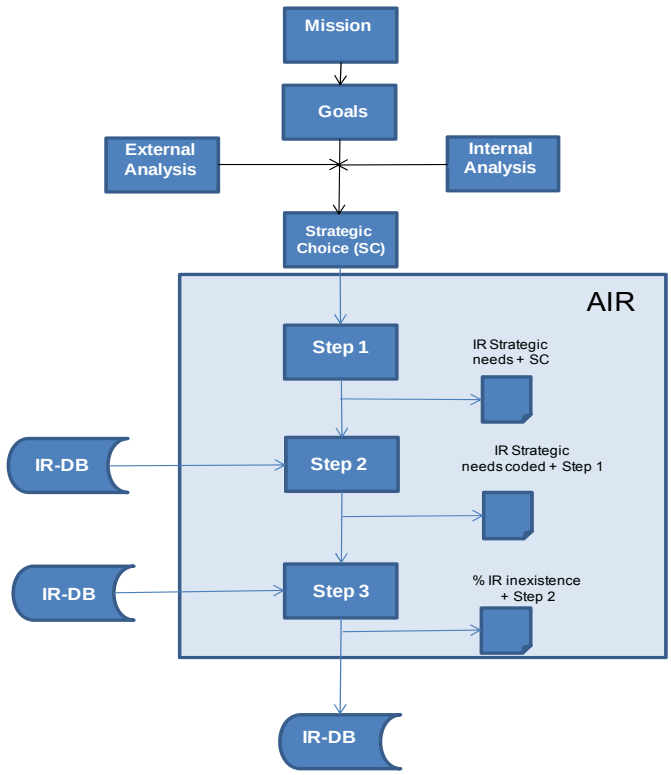

Figure 2. Analysis of intangible resources guide

Step 1. Identification of IR strategic needs.

Identify the IR needs to implement each the strategic choices. IR needs can be dynamics or statics IR to solve the strategic choice focus on intangibles. The next question must be asked for each strategic choice:

A) What are the intangible resources needed to carry out each strategic choice?

The output of this step is a list of intangible activities and resources needed to implement the strategic choice. This information is added to the information of strategic choice table.

Step 2. Codification of IR strategic needs.
Each need must be matched with one type of intangible resource inside each categories (IHC, ISC e IRC) mentioned in the basic list. The resulting output should be an intangible resources needs list for each strategic choice which is coded according with the ID types determined previously. The next question must be asked for each IR strategic need:

- B) Which the IR type code that best matching with each IR strategic need?

The output of this step is the list of IR strategic needs coded. This information is added to the information of step 1.

Step 3. Analysis of inexistence to each intangible resource strategic need.
Percentage of inexistence is the quantity of IR strategic need to be acquired or generated to satisfy the strategic choice.

For each intangible resource strategic need ask the following question:

- C) What is the percentage of inexistence to each coded IR strategic need versus the same IR type record in the IR-DB of the company?

For this question, it is neccesary to evaluate if the percentage of the IR strategic need is fully covered by the percentage showed in the IR-DB. It would be neccesary re-evaluate the percentage of IR strategic need if the percentage of the IR-DB belong to others strategic choices. The output of this step is showed in Table 2 and is recorded in the IR-DB.

Table 2. Final table example of IR strategic needs for a Strategic Choice

	Step 1	Step 2	Step 3
Strategic Choice	IR Needs (identification)	IR Types (Basic List)	% IR INEXISTENCE
Strategic target: Launching a promotional package	Excecutives training Selection of suplier of outsourcing Acquisition of hardware Development of Software Development of procedures Network of sales training Software Implementation Knowledge of Strategy	IHC-003 ISC-005 ISC-005 ISC-007 IHC-003 ISC-014 IHC-007	20 30 0 100 60 100 100 100

4. Data base of intangible resources for Knowledge Management (KM)

Companies often require “stocks” of specific intangibles (Heberden, 2006), and thus a data bank of the intangible resources, so that they can continue analyzing and storing data electronically. The saved lists of intangibles generate a “data base bank” (DBB) that in turn serves as an input to other applications like KM.

A registry is created in DBB for each identified intangible resource. The “stock of intangibles” can be increased or renewed in time, in tune with the evolution of the company’s management and the economic conditions of the context.
Moreover, the intangible that is registered electronically can be linked to the working people of the company with the purpose of feeding future KM. Because knowledge can become the most important intangible in the company, it may be necessary to develop a KM on the basis of the stock of

intangibles registered in SPIR. In this case, each element of the stock will be disentangled in order to reach a needed level of detail, like personnel involved, with a managerial purpose . To exemplify the idea, a brief example is shown below.

First level of the intangible resource

IHC-001 Knowledge of the market

Second level of the intangible resource

IHC-001-001 Market of product X

Who in the enterprise knows this?

The resulting outcome can be recorded as in Table 3.

Table 3. Example of a KM Detail

Name of the employee	Personal Knowledge (IR)
Joseph Ramirez	IHC-001-001 IHC-010 IHC-011

5. Integrating Intangible Resources in the Company's Overall Strategy: Core Competences and Competitive Advantages in the Market

The intangible resources and its framework of strategic planning must be integrated in the company's overall strategy for them to work. Some theories are at hand to make this possible. For instance, the Resource-Based Advantage Theory provides such a base. According to this theory, resources are the tangible and intangible entities available to the firm that enable it to produce efficiently and/or effectively a market offering that has value for some market segment(s). Intangibles are resources (Hunt, 2000). For instance, the skills of individuals (and, as discussed in the next section, the competences of organizations) constitute a category of intangible resources.

Following the same theory, a comparative advantage in intangible resources or competences created by the firm, can yield a marketplace position of competitive advantage (Hunt, 2000). Thus, what justifies the use of a resource is not inherent in the resource, it is related to the company's core competencies and these and other competencies are able to sustain a market position of competitive advantages. A resource, tangible or intangible, constitutes a source of competitive advantage considering the availability and the exclusive feature of the same (Rodriguez and Vásquez, 2002).

Core competences are capabilities and the capabilities can be intangibles that serve as a source of competitive advantage for a firm over its rivals. Some examples of intangible core competences include management (ability to envision the future of their industry, effective organizational structure), marketing (effective promotion of brand-name products, effective customer service, innovative merchandising), human resources (motivating, empowering and retaining employees), manufacturing, distribution, management of information systems, and research & development.

To identify core competencies that produce value, the firm must first know what customer value should be delivered to the customer through the company products, goods and servicies (Goetsch, 2006).

The SPIR indentifies and analyzes the intangible resources, some of which can become core competences of the company. Both, existing resources and new resources (which have to be generated or bought) are identified and analyzed with the aim of yielding a marketplace position of competitive advantage for the company. The criteria for determining whether an intangible resource can be a core competence is whether it is capable of producing a sustainable competitive advantage for the company.

In addition, four criteria for judging a firm's resources as competitive capabilities in the marketplace are supplied by the Resource-Based Advantage Theory of the firm: 1) Are they valuable? (do they enable a firm to devise strategies that improve efficiency or effectiveness?); 2) Are they rare? (if many

other firms possess it, then it is not rare); 3) Are they imperfectly imitable? (because of unique historical conditions, causally ambiguous, and/or are socially complex); and 4) Are they non-substitutable? (if a ready substitute can be found, then this condition is not met).

The table below presents some examples of IR that could be Core Competences:

Table 4: Intangible resource as a Core Competences

Intangible of Human Capital	Intangible of Structural Capital	Intangible of Relational Capital
IHC-008-001 Highly qualified professional equipment .	ISC-003 Possession of patents and copyright . ISC-012 Production techniques of low cost. ISC-013 Quality superior of the product .	IRC-006 Brand reputation IRC-011 Company reputation IRC-012-001 Direction to the client IRC-012-002 Contracts of distribution of long period .

6. Towards an Intangible Resources Management (IRM)?

Finally, we should note that the SPIR is a process that has to be developed and implemented by a special team. As Wiig (1997) noted, the management of intellectual capital is placed in a high strategic level of the organization. Similarly to the Traditional Strategy Planning, the SPIR is thought at the top level. Nevertheless the activities for managing intangible resources are new and need to be handled by an exclusive team.

Moreover, according to Andriessen (2004), the management of intangible resources is fundamentally different from the management of tangible or financial resources. This difference may justify the incorporation of a new area in the organization in charge of the analysis of intangible resources, the control of intangible stocks, the measurements, the report of values, the acquisition of new intangibles, and knowledge management in addition to the SPIR. The new area can be called *Intangible Resource Management*. According to Andriessen (2003), intangible resources are not managed properly, deserve more attention and should be managed differently than the other resources.

7. Conclusions

The company needs to focus on the intangible resources mainly because they have become necessary resources to sustain strategic choices in the long term. To do so, the company can plan and execute the strategic use of intangible resources or SPIR. The SPIR process includes the identification, analysis, electronic storage, and integration of the intangible resources into the overall company strategy. The latter step will make the work regarding tangibles strategic mainly because it integrates SPIR to the company's core competences in support of the market position of competitive advantages. A new area called Intangible Resources Management (IRM) would be in charge of the SPIR tasks including identification, control, improvement, and a report on intellectual capital.

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Measuring the Impact of Research Networks in the EU: Value Networks and Intellectual Capital Formation

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Abstract: Intangible asset management has largely focused on valuation of intangible assets rather than conversion strategies. Value conversion is the act of converting one type of value (financial or non-financial) into another form of negotiable value. Without a thorough understanding of how intangible assets are effectively accumulated and deployed, static valuation measures have limited practical value.Value Network Analysis (VNA) has been successfully deployed in many different types of organisations to address strategic and operational issues, including intangible asset growth and utilisation. It is not a valuation method, but it is an integrative modelling language that readily links to other business performance models, including intangible asset monitors. The method coherently links indicators from strategic macro models down through the levels process, technology and data integration.An empirical study in 2007 demonstrated that VNA is a useful method for describing intangible value conversion at a macro level. This research was an evaluation study for the European Commission to better understand the impact of research networks on Intellectual Capital formation and competitiveness in regions. At the levels of organisation, network, and region, value network patterns were linked to specific patterns or 'thumbprints' of anticipated Intellectual Capital formation.The practical implication of this work is that it provides a possible solution to one of the most challenging business issues in the intangibles economy: describing and monitoring the role of intangibles in value creation. Many acknowledge that approximately 80% of a company's value lies in intangibles, yet practical methods for managing intangibles are not widely used. This problem is especially intense in government, civil society and non profit organisations, and networks. In these cases value impacts are exceedingly difficult to describe in only tangible or financial terms. VNA offers a scalable method for understanding the dynamics of intangibles and value creation at virtually every level of complexity from shop floor to regions and global networks.

Keywords: Value networks, intangible value, value conversion, Intellectual Capital, regions, intangibles

1. Understanding value conversion

One of the most challenging issues at the organisational, network and regional levels today is describing and monitoring the role of intangibles in value creation. At the organisational level pioneers in Intellectual Capital have demonstrated that interventions and actions must be understood in both tangible and intangible terms (Sveiby 1997, Edvinsson and Malone 1997, Wallman and Blair 2000, Lev 2001, Eccles et al 2001). Much of the early work was focused on measuring or valuing intangibles as assets. Intangible assets include brand, employee know-how and competency, the effectiveness of the organisation's work groups and structure, the efficiency of the organisation's production and service processes, and quality of relationships with customers and suppliers.

More recently, researchers and analysts are attempting to demonstrate exactly how value is created from intangible assets. However, as Andriessen (Andriessen 2004) points out, intangible asset scorecards or valuation methods such as the Skandia Navigator (Edvinsson and Malone 1997) and the Intangible Assets Monitor (Sveiby 1997) do not adequately demonstrate cause and effect. Without a thorough understanding of how intangible assets can be effectively accumulated and deployed, static valuation or asset measurements hold little practical value (Allee 2003, Taug 2004).

The method described in this paper focuses on how intangibles accumulate and are deployed in business and organisations, in networks and in regions. Specifically it addresses how networks serve as mechanisms for value conversion, linking value network patterns to specific types of Intellectual Capital creation and utilisation.

Value conversion is the act of converting one type of value (financial or non-financial) into another form of negotiable value. In the securities profession value conversion is narrowly defined as the positive difference between the market price of a convertible security and the price at which it is convertible. We use the term value conversion in a larger sense as it relates to the managing and utilisation of intangible assets or Intellectual Capital. This usage is closer to how value conversion is handled in social exchange theory (Homans 1958.)

1.1 Intangibles as negotiable deliverables

To understand how intangibles create value, we must first understand how they go to market and are deployed in a business model. Intangibles can be converted into other forms of value as negotiable offerings or outputs. One can convert an intangible asset such as knowledge into the form of a product or service, thereby converting the intangible asset to a tangible output. Intangible deliverables in this sense include all unpaid or *non-contractual* activities that make things work smoothly and help build relationships. In contrast, tangible deliverables include anything that is *contracted, mandated* or *expected* by the recipient as part of the delivery of a product or service. Tangibles typically are directly connected with generating and delivering on revenue or funding. One also negotiates exchanges of intangibles for other intangibles such as information, benefits or intangible forms of support.

From this perspective intangibles can be considered to be *deliverables* and can be modelled as outputs and inputs. Economists rarely consider these intangible or 'bartered' exchanges in economic models as they usually are not calculated in financial terms. But whenever we negotiate any kind of exchange we are in an economic interaction, whether money is involved or not.

With an understanding that intangibles can also be deliverables then we can begin to address the question of exactly how intangible assets are converted into other forms of value or outputs in the business model. The conversion picture is complete when we also can accurately describe how specific value inputs in turn are used to increase both our tangible and intangible assets.

2. Using VNA to model how intangibles create value

Modelling value conversion requires moving away from static views of intangibles as assets into a more dynamic model of how intangibles create value. Some have attempted to understand intangible value creation as a type of value chain (Lev 2001, 2003). However, the value chain concept is fundamentally limited in understanding value as a dynamic system or model. As business or economic models *value chain, value stream* and *business processes* have their roots in the industrial age production line. Thus they are linear and mechanistic both in orientation and practice, based on a presumption of predictability and control.

In contrast Value Network Analysis is oriented toward a complex adaptive system view of value creation, specifically a living systems view of organisation. VNA understands value as an emergent property of human networks (Allee 2000a, 2000b, 2002). Value conversion occurs through complex interactions where people utilize their tangible and intangible assets to contribute goods, services and support to each other and gain value for themselves.

Sveiby reminds us that organisations are not real entities – they are constructed in a constant process by people (Sveiby 1994, 2001). "If one looks for an organization one will not find it. What one will find are events linked together. These sequences, their pathways and their timing are the forms we tend to make into objects or processes when we talk about organizations". Sveiby observes that these event sequences begin with Weick's response patterns or *double interacts*: "patterns in which an action by actor A evokes a specific response in actor B (interact), which is then responded to by actor A," (Weick 1979). The complete sequence is a double interact.

VNA more commonly uses the term *exchange* as one way of describing this double interact. An A to B action with *no* response would simply be an event or more specifically a single *transaction*. VNA models value conversion as it is executed by the active agents of that conversion – real people, who engage in exchanges of both tangible and intangible forms of value.

2.1 Growing interest in value networks

It has been well established that network analysis can be used to describe work groups, organisations, business webs and other purposeful networks where both tangible and intangible value exchanges support the achievement of specific outcomes and generate economic and social good (MacCauley 1963, Granovetter and Swedberg 1991). Interest in understanding business models as value networks intensified in the late 1990s as companies achieved rapid success through creatively weaving their business webs.

In a 1997 study VNA revealed the innovative ways companies such as Cisco, Amazon and eBay were operating from very different business models than most of their competitors – before they hit the

covers of business journals in any significant ways (Tapcott, Ticoll and Lowy 2000). The difference was how they using intangibles to build real network relationships. These companies as well as Facebook and Google are all based on a value network model or archetype. They have become engines of wealth and growth with multi-billion dollar valuations.

Early discussions about value networks were usually focused on supply chain, using frameworks, scorecards, and variations of supply chain models to describe supply chain networks (Parolini 1999, Bovet and Martha 2000). Benkler (2006) moved more solidly into a value analysis with his landmark book, *The Wealth of Networks*, but focused primarily on Internet-based social production models. Zuboff (2002) drew a bit closer to the network value question in *The Support Economy* with her brief discussion of intangibles in federated support networks.

Social Network Analysis (SNA) has been a valuable tool in the social sciences since the 1930s, and has been widely used in business to address a variety of questions about relationships and communication (Nohria & Eccles 1992). Several analysts are using SNA, both metaphorically and analytically, to try to understand networks as economic entities with some limited focus on intangible outcomes and exchanges (Cross and Parker 2003, Dawson 2003, Iansiti and Levien 2004). Although these efforts provide powerful insights into knowledge flows and relationships, they fall short in being able to demonstrate a direct linkage between network patterns and value creation or value conversion.

VNA has been applied to a wide range of business issues in global companies, start ups, government agencies and non-profit or civil society organisations. Part of its growing popularity is due to the fact that the basic modelling language and method can be learned in just a few hours. Thus it lends itself readily to being a management tool. At the Boeing Company (Boeing), for example, it is included as a method in their Lean+ Toolkit (Angers 2007). Also at Boeing, system dynamic techniques applied to value network modelling of performance dynamics in work was carried forward into a graduate-level course for Boeing employees. The ITIL handbook, a basic guide for the IT community, has included VNA as a strategy tool. More recently, companies like Boeing, Wal-Mart, SAP, and Telenor are focusing on both their strategic value networks and their internal value networks or 'process ecosystems' as well.

2.2 Basics of value network analysis

VNA determines the potential for value creation in internal and external networks by comparing tangible (contractual) relationships to intangible (informational or knowledge sharing) relationships, based on the assumption that creating value and achieving desired outcomes requires both contractual business relationships and informal innovation pathways represented by knowledge sharing and other types of mutual support.

An organisation consists of real people playing a variety of roles in different activities. Any role controls tangible and intangible assets or resources that support execution of the role. Those assets are used to create value outputs or deliverables that can be traded for other forms of value, whether financial or non-financial. Basically, each role initiates or offers a potential deliverable for trade that becomes a completed value *transaction* upon acceptance by another role in the network (Allee 2008).

A Value Network Analysis begins with describing contributing *roles* and *value transactions* visualized as a graph or map. Nodes represent roles, and directional arrows between nodes describe each critical tangible or intangible deliverable in the network. Typically solid lines indicate contractual, *tangible* revenue generating or funding related *deliverables* and their flow paths. Along with those, dashed lines show the critical *intangible* or informal deliverables such as knowledge exchanges and benefits that build relationships and keep things running smoothly. See Figure 1.

Analyzing a value network requires addressing three basic questions or analyses (Allee 2008):

- (1) *Exchange Analysis:* What is the overall pattern of *exchanges* and value creation in the system as a whole? How healthy is the network and how well is it converting value? Indicators used include classic network structural indicators as well as indicators regarding value flows, such as reciprocity.
- (2) *Impact Analysis:* What *impact* does each value input have on the roles involved in terms of value realisation? In other words, how well are inputs being converted to growth of financial and

non-financial assets? Typical categories of asset impact are financial, human competence, business relationships and internal structure (Sveiby 1997.)

- (3) *Value Creation Analysis:* What is the best way to *create, extend,* and *leverage value*, either through adding value, extending value to other roles, or converting one type of value to another? Value Creation Analysis basically addresses the question of asset utilisation. How well are assets being utilized to generate value outputs for other roles in the network?

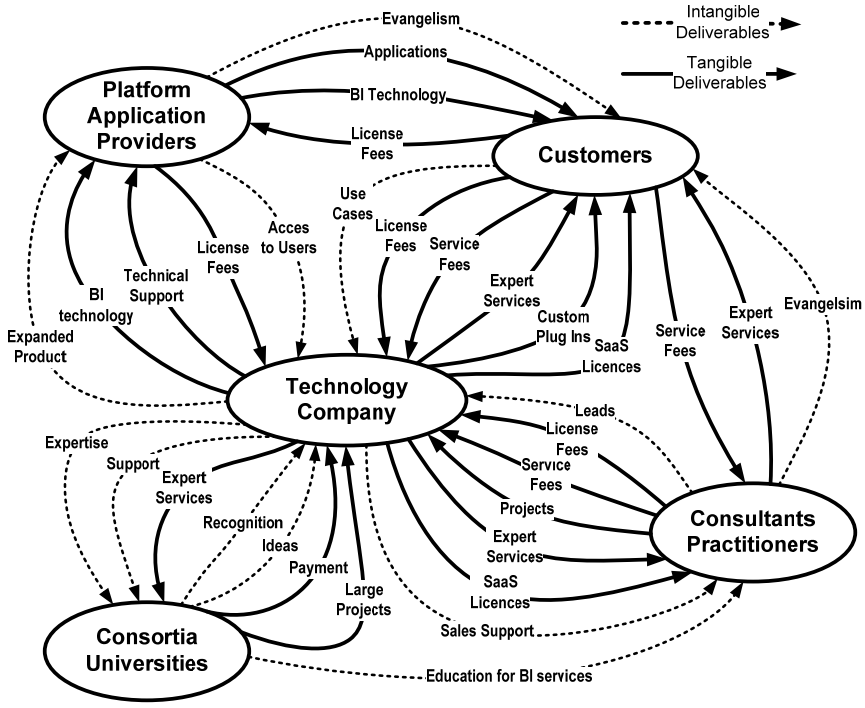


Figure 1: A typical value network graph – for the business model of a technology company

Impact Analysis and Value Creation Analysis use a spreadsheet type of assessment that essentially is an expanded Cost/Benefit Analysis. Both address value conversion by expanding assets and deliverables to include intangibles.

3. Modeling value conversion at the level of network and regions

Expanding the VNA method to assess large-scale networks and Intellectual Capital formation at the level of networks and regions requires finding good sources of data and determining intangible asset indicators that can reasonably be linked to value network patterns. Several developmental projects helped to lay the foundation for large scale VNA.

A study of mobile workers in 2006 used VNA to bring a unique role perspective to the needs of mobile workers and their usage of technology and the physical office environment (Venezia, Allee and Schwabe 2008). Data was collected by a survey that allowed insight into the roles and interactions of mobile workers in their internal and external value networks. A total of 557 respondents, representing 84 participating organisations, participated in the study. Findings identified the *type of value* being created, the *level of value* as perceived by the worker, and the *type of output* generated.

The survey provided subjective data for VNA, but non-subjective sources are also important. In 2006 Cisco Systems provided our researchers with proprietary monthly data from their customer interaction network database. Call content could be readily identified as being tangible or intangible in nature. This data was used to generate both value network visualisations and value network indicators as a test case for utilizing large data sets and addressing issues that are global in scope. Additional experience with web-based surveys and handling large-scale data sets was gained in work with Telenor and their Way of Work program (Allee and Taug 2007.)

Another key study in 2006 applied VNA to a national network of institutions and organisations involved in commercializing scientific discoveries in New Zealand under sponsorship of AgRearch, a government agency. There commercialisation activity was described as a series of phase changes in

a value network. A similar approach was applied to assessing the impact of innovation systems at the regional level in Europe.

4. Linking value network patterns to Intellectual Capital formation in regions

In 2007 an evaluative study "*Effectiveness of ICT RTD Impacts on the EU Innovation System"* was conducted for the European Commission, DG INFSO Evaluation and Monitoring Unit, by ALTEC SA and Edna Pasher PhD & Associates (Allee et al 2007a and 2007b) under the direction of Peter Johnston, Head of Unit, and Frank Cunningham, Evaluation Specialist. The aim was to assess how effectively EU ICT RTD and deployment initiatives are being exploited in European systems of innovation at member state and regional levels.

Four methodologies were applied to this question: Intellectual Capital Assessment, Value Network Analysis, the PACE toolkit (Project Assets, Core competences and Exploitable items) and macro-econometric Multivariate Statistical Methods. This empirical approach combined a quantitative elaboration of data available for all EU regions with a more in-depth analysis of 10 regions.

There were *three primary goals* for the evaluation: 1) to understand the effectiveness of networks of collaboration in facilitating knowledge transfer across regions and sectors; 2) to identify where and how the links between ICT RTD, technology diffusion and systems of innovation could be strengthened at the EU, Member State and Regional levels; and 3) to target where and how to strengthen the impact of EU ICT RTD and deployment initiatives by leveraging on Structural Funds programmes, co-ordinated public procurement and Information Society deployment initiatives.

4.1 Intellectual Capital assessment

For this evaluation a base set of Intellectual Capital indicators were identified and applied at both the regional and national levels, drawing from established practices in Intellectual Capital and the Skandia Navigator model (Edvinsson and Malone 1997). The Intellectual Capital (IC) framework provided a set of indicators based on five focal areas: 1) financial capital, 2) market capital, 3) process capital, 4) human capital and 5) renewal and development capital.

Starting from the EUROSTAT data, Intellectual Capital indicators were developed to profile 10 selected regions in terms of the local knowledge base, the structure of local industry and the presence of research and innovation networks within the region. The assessment was based on statistical data representing the five areas of the IC Framework collected from public sources. See Table 1.

Table 1: Regional indicators of Intellectual Capital used in the study

Indicator	Category Intellectual Capital
Human resources in Science and Technology (% of population)	Human Capital
Participation in Life-Long Learning (per 100 population aged 25-64)	Process Capital
EPO Patents per million population	Process Capital
Employment in Medium-High and High-Tech Manufacturing (% of total workforce)	Market Capital
Employment in High-Tech Services (% of total workforce)	Market Capital
Public R&D expenditures (% of GDP)	Renewal and Development
Business R&D expenditures (% of GDP)	Renewal and Development
Unemployment (% of total population	Financial Capital
GDP per Capital	Financial Capital

4.2 Linking value network patterns to Intellectual Capital formation

An analysis of FP6 data revealed network patterns of typical roles and interactions occurring across FP6 projects. From these basic patterns four specific types of purposeful value networks were identified and categorized as noted below. These categories were not predetermined or driven by instrument, but were a result of a direct analysis of project deliverables as described in project

documentation. Analysis of the actual described deliverables made it possible to assign an intended purpose for each project that corresponds to one of the four archetypes.

The value network archetypes are important for two reasons: 1) each archetype generates a Value Network Intellectual Capital Profile based on its typical deliverables and beneficiaries; and 2) The four value network archetypes each support a particular stage of innovation from conception to implementation in the form of commercialization or production.

It can be assumed that in regions where participation in any particular value network archetype is high then there would be a corresponding high performance in generation of Intellectual Capital at both the organizational and the regional levels corresponding with the project deliverables supported by that type of network. Thus regional Intellectual Capital creation can be linked directly with value network archetypes that are the intended outcomes of FP6 programs. Table 2 shows the distribution of value network archetypes across the 10 sample regions.

Table 2: Distribution of value network archetypes across the 10 sample regions

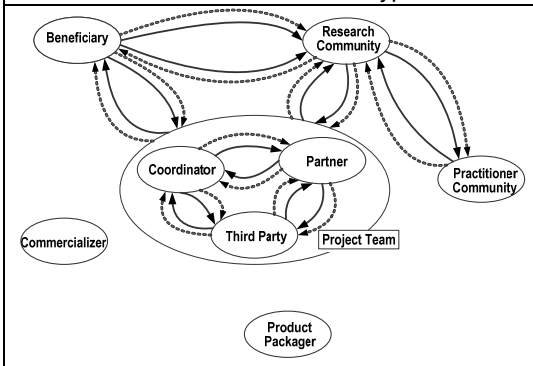
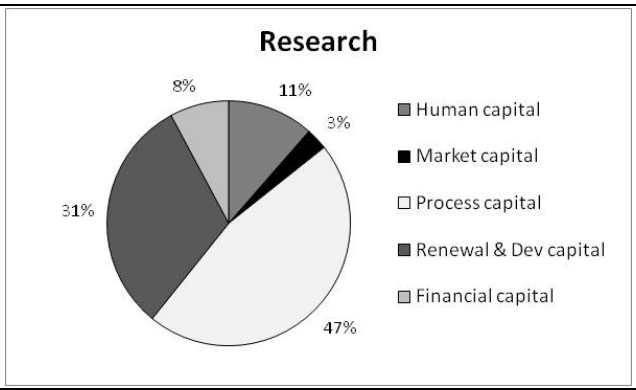
Value Network Analysis	All 10 sample regions
Total number of value network archetypes served (Max: 4)	3
Number of projects supporting archetype: Research	180
Percentage of projects supporting archetype: Research	69.77%
Number of projects supporting archetype: Community Building	60
Percentage of projects supporting archetype: Community Building	23.26%
Number of projects supporting archetype: Market Validation	18
Percentage of projects supporting archetype: Market Validation	6.98%
Number of projects supporting archetype: Commercialization	0
Percentage of projects supporting archetype: Commercialization	0.00%

The following descriptions and visuals have been greatly simplified in order to demonstrate the basic patterns of roles and interactions. Each value network archetype or pattern is shown with a 'thumbprint' graph of its anticipated IC formation for the 10 regions. Anticipated IC generation provides a foundation for comparative analysis with the actual IC indicators generated at the organizational and regional level. Analysis of these patterns over time potentially can surface the critical causal relationships between value network patterns and IC formation.

4.2.1 Research value network archetype

Most FP6 projects include descriptions of research activity or innovation exploration. The category of Research was chosen where the *primary* aim is to produce research results or an innovative product. The Research value network shown in Figure 3 consists of tangible and intangible exchanges between the project team (central node with sub-nodes), intended beneficiaries and the research community.

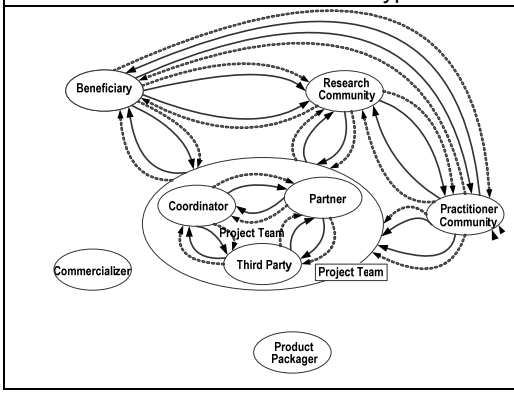
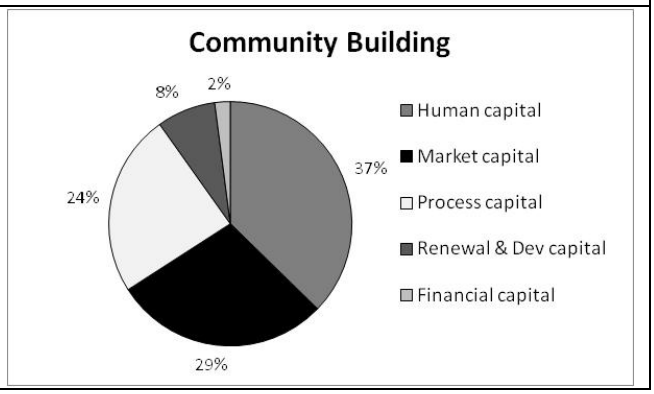
Table 3: Research value network archetype and anticipated IC creation for 10 regions

Research value network archetype	Pattern of anticipated IC creation based on actual deliverables
	

4.2.2 Community Building value network archetype

The category Community Building was chosen when the aim of the project is primarily coordinated action or building a network or a community of people sharing a common interest or common task. The Community Building value network shown in Table 4 logically builds on the efforts of a Research archetype, although it also could be a precursor to launching a research project. This network type consists of tangible and intangible exchanges between the project team (central node with sub-nodes), intended beneficiaries, research community and the practitioner community.

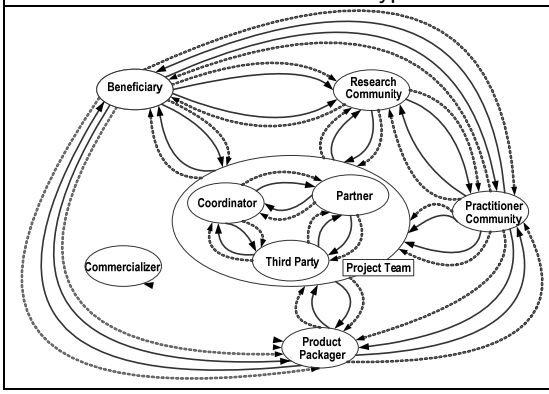
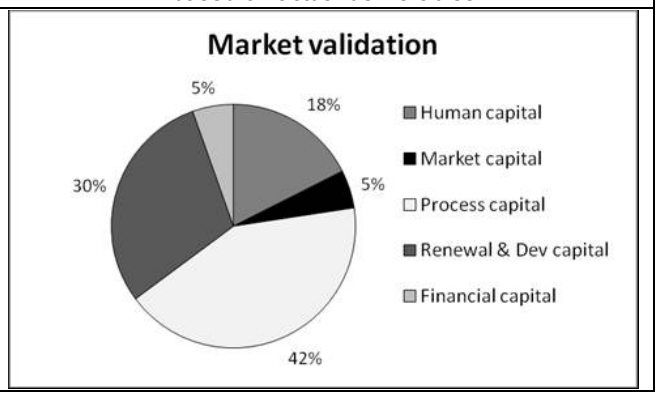
Table 4: Community Building value network archetype and anticipated IC creation for 10 regions

Community Building value network archetype	Pattern of anticipated IC creation based on actual deliverables
	

4.2.3 Market Validation value network archetype

The Market Validation category was chosen when the product or the result is well defined, and the project goal is to test and validate market or beneficiary readiness. The Market Validation value network shown in Table 5 logically builds on the efforts of a previous Community Building value network. This network consists of tangible and intangible exchanges between the project team (central node with sub-nodes), intended beneficiaries, research community, practitioner community and the product packager.

Table 5: Market Validation value network archetype and anticipated IC creation for 10 regions

Market Validation value network archetype	Pattern of anticipated IC creation based on actual deliverables
	

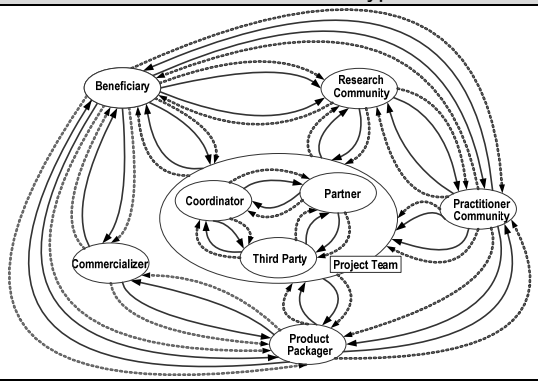
4.2.4 Commercialization value network archetype (visualization)

Commercialization involves actually bringing the product or result to the market or implementation through production and distribution. The Commercialization value network in Figure 6 logically builds on efforts of a previous Market Validation value network. This network consists of tangible and intangible exchanges between the project team (central node with sub-nodes), intended beneficiaries, research community, practitioner community, product packager, and the commercializer. It then 'closes the circle' through exchanges between the commercializer and the beneficiary. None of the 10 regions in the sampling had this archetype represented in their roles and deliverables.

4.2.5 Implications for value network archetypes and Intellectual Capital generation

Since the ICT-RTD programs are not designed to generate direct Financial Capital either for the participating organizations or the beneficiaries of specific projects, assessing financial impact requires indirect evaluation, consideration of value deliverables generated, and comparison of macro-economic data with archetype distribution.

Table 6: Commercialization value network archetype and anticipated IC creation for 10 regions

Commercialization value network archetype	Pattern of anticipated IC creation based on actual deliverables
	The 10 sample regions did not have a Commercialization value network

Data mining and project interviews confirmed that not only are there very few cases of organisations being active in both RTD and deployment networks, but there is also little evidence of ICT results having followed the entire value network pathway from invention to development, and from research to deployment/innovation. In-depth analysis of the 10 regions shows the great potential for these value networks to increase innovation capacity, diffuse innovation and contribute to Intellectual Capital formation at the Regional level. Even though the entire innovation process is not supported by current ICT RTD and deployment instruments, the potential for Intellectual Capital Impact and increased network cohesiveness at the organisational and regional level is significant.

While the EU project focused on regions, additional work is underway applying a similar assessment in support of global action networks. Global Action Network Network (GAN-Net) is sponsoring application of VNA to global networks of organizations working in sustainable finance, peace keeping and mass atrocities. This work will deepen the work of connecting value network patterns to Intellectual Capital creation and value conversion.

5. Conclusions

The 2007 EU evaluation demonstrates that research program interactions can be fruitfully represented as value networks, operating both at European and national/regional levels. Regional performance in terms of value created from FP6 project participations depends on the projects being used to improve value network patterns of knowledge sharing, cooperation and connectivity within a region, in addition to benefitting organisations taking part in the project. Value network patterns link to specific value conversion activities and Intellectual Capital formation for project partners as well as to the innovation capacity of the region as a whole.

The practical implication of this work is that Value Network Analysis provides a possible solution to one of the most challenging business issues in the intangibles economy: describing and monitoring the role of intangibles in value creation. Many acknowledge that approximately 80% of a company's value lies in intangibles, yet practical methods for managing intangibles are not widely used. This problem is especially intense in government, civil society and nonprofit organizations and networks. In these cases value impacts are exceedingly difficult to describe in only tangible or financial terms. VNA offers a scalable method for understanding the dynamics of intangibles and value creation at virtually every level of complexity from shop floor and business networks to regions and global networks.

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Pictures of Knowledge Management, Developing a Method for Analysing Knowledge Metaphors in Visuals

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Abstract: Knowledge management (KM) is difficult to pin down. It means different things in different organisations. The deliberate use of metaphors has been used to communicate what KM is about. This metaphorical communication can be even more enriched using visual as well as language mechanisms: "a picture paints a thousand words" suggests we can capture more resonances of a complex subject like KM through visuals than through a description alone. In addition, visuals are perceived to transcend the limitations of language, which can be an obstacle to communication. Yet, no method currently exists that we can use to identify KM metaphors used in visuals. This paper describes a search for a method to analyse metaphors used in visuals about knowledge management. The objective of the search was threefold: 1) identifying new metaphors for KM in visuals that can enrich KM theorizing, 2) developing a way to identify which visuals are the most powerful in communicating KM theory, and 3) improving the use of visuals as a way of assessing students studying KM. The paper concludes that analysing metaphors used in KM visuals is possible using a method that focuses on the dominant metaphors in a visual.

Keywords: Knowledge management, intellectual capital, visuals, metaphor, analysis

1. Introduction

Knowledge management (KM) is a complex topic involving people, relationships, systems and processes, language and knowledge, all of which in themselves are complex subjects. Various schools of thought have been proposed to describe the different ways of looking at knowledge management (Andriessen 2006). The meaning of KM changes for every organisation because each requires different things from it. Knowledge managers need to adapt the strategy to subtleties in the context (McKenzie & Van Winkelen 2004). Snowden (1999) has suggested that metaphors are powerful ways to communicate KM in context without the need to resort to complex formal definitions that struggle to capture the interdependencies and subtleties of the subject. This paper is about the explicit use of metaphor as a means of thinking about and communicating knowledge management ideas. The potential of metaphors for communicating and stimulating creativity may be further enhanced when combined with visuals. It has been said that "a picture paints a thousand words" so we may be able to capture more resonances of a complex subject like KM through visuals than through description alone. In addition, visuals are perceived to transcend the limitations of language, which can be an obstacle to communication. Pictures based on metaphors for knowledge management may be rich communication and thinking devices for business and education. This visual metaphor study is part of an endeavour to understand how to craft and interpret an effective visual representation of KM. The potential of visual metaphors is that inherent polarities and contrariness are processed whole by the right brain, rather than the left (where words are processed linearly). Split brain studies suggest that the right brain processes complex patterns holistically. As a result, visual metaphors for knowledge management might be helpful in exploring and communicating the complex interdependencies of knowledge management. The use of visual metaphors for knowledge and knowledge management is attractive in three different contexts:

- For KM researchers who use metaphor as 'thinking devices' to construct KM theories. Andriessen (2006) has identified that metaphors are an important ingredient in many KM theories.
- For KM practitioners who want to dialogue with people in organizations about KM and its application. For example, Moser (2004) has organised workshops on KM in which participants had to draw different metaphors for knowledge management. Three metaphors were identified: the metaphor of a library, the metaphor of the contested treasure, and the metaphor of a

canalisation system. The metaphors helped to reveal the differing perspectives of the participants on KM and bring out deeper, shared understanding.

- For KM education. An example can be found at Henley Business School in the UK. Over the past eight years, a data set of so called poster assignments where students are deliberately asked to communicate through visuals has been created. One small element of the final assessment of their KM studies, asks MBA students to prepare a poster that captures and communicates the essence of knowledge management in their organization to someone who knows nothing about this subject. The poster consists of a combination of visuals and text. The intention is that constructing the poster will stimulate the student to use both sides of the brain in making sense of the topic and applying it to his or her own situation.

The power of visual metaphor is that it can create multiple interpretations whilst providing a common and natural focal point for discussions around similarities and differences in interpretation. Visual metaphors are equivocal and when shared, this multiplicity of meaning might lead to alternative ideas and creative insight. However, if a picture says more than a thousand words, what is it trying to tell us? Answering this question is useful in all three contexts described above. For KM research it is relevant be able to capture in language some of the additional meaning embedded in visual metaphors for knowledge management. According to Andriessen (2006) the KM field needs new metaphors to unleash itself from industrial thinking. For KM practice, analysing metaphors in visuals is helpful because it can help us identify which visuals are powerful in communicating KM ideas and creating a shared understanding of how KM can be applied in a particular context. Having access to a set of proven rich pictures on KM could help KM practitioners in getting their message across in their organizations. For KM education the analysis of visual metaphors may help improve the process of assessing students studying KM. To achieve these objectives, a method for analysing knowledge metaphors in visuals is needed. Such a method does not yet exist. In this paper a method is developed that can be used to systematically analyse visual metaphors for knowledge and knowledge management. The method is tested against visuals from the Henley corpus of KM posters. The aim is to come up with a practical method that can be used in the analysis of visual elements in knowledge management in the three contexts described above. The paper is structured as follows. The first part describes a brief literature study to identify methods and methodologies for analysing visuals. The second part describes an initial design of a method, which was tested with one of the Henley posters. The test was not successful so a redesign was needed. This redesign is described in the third part of the paper. The paper ends with conclusions regarding the usefulness of the method and proposes an agenda for further research.

2. Literature review on methods for analysing visual metaphors

Metaphor research is an important strand in applied linguistic research (Cameron & Low 1999). One of the major developments in this kind of research is the analysis of metaphorical language in real discourse. Approaches have been developed to identify and classify metaphors used in texts (Andriessen & Gubbins forthcoming; Schmitt 2005; Steen 2007). Textual analysis has been used to identify metaphors used in knowledge management. Using a limited sample of three influential articles on KM, Andriessen (2006) identified 22 different metaphors for knowledge, including “knowledge as stuff, “knowledge as thoughts and feelings”, and “knowledge as an organism”. This textual analysis followed a two step approach. This approach has subsequently also been used to analyse metaphors used in texts on social capital (Andriessen and Gubbins, forthcoming). The first step in the analysis of metaphoric language is identifying when a word or phrase is being used metaphorically, which means (a) it can be understood beyond the literal meaning in the context; (b) the literal meaning stems from a source domain of sensory or cultural experience; and (c) this literal meaning is transferred to the abstract target area (Schmitt 2005). For example, in the phrase “to store knowledge”, the literal meaning of verb “to store” is to physically put something into safekeeping. This stems from an area of physical experience. However, this meaning is transferred to the abstract target area of knowledge. The Pragglejaz group (2007) has developed a similar approach that has the advantage that it offers a set of criteria by which analysts may identify a word’s literal meaning (which they prefer to call “basic meaning”).

The second step in the analysis of metaphoric language is the identification of the prominent conceptual metaphor from which the metaphorical use of a word or phrase arises. In the case of “to store knowledge”, the meaning of the metaphorical phrase can be understood because of the conceptual metaphor of “knowledge as stuff” from which the metaphorical use of the verb “to store”

arises. Sometimes it is difficult to identify the metaphorical concept of an individual word. However, by looking at the other individual metaphors surrounding the word, in most cases the source domain becomes clear. The aim in this paper is to discover and analyse metaphors in visuals. Since visuals can come in any shape and form and do not constitute a symbolic system of communication like language, there are two additional challenges when analysing their metaphorical content. These are similar to those faced by Cienki and Muller (2008) when they analysed the metaphorical content of gestures. First, analysing visuals involves the interpretation of a visual, and of the concept it might represent, in terms of a word or phrase. As with gestures, the relation between form and meaning is not conventionalised. Second, with pictures it is even more difficult than in the case of written text to label the proposed mapping from source to target domain, in the formula "target domain as source domain" as in the above example of "knowledge as stuff". Much more interpretation of the meaning of the visual is involved.

In the literature, there is little reference to concrete methods for analysing visuals and their metaphorical content. Schachtner (2002) has studied metaphors in images in his/her empirical study of the microstructures of medical practice. Through a combination of both qualitative interviews and drawings of thirty practicing doctors of medicine she shed light on the use of three metaphorical concepts on illness, disease and health: illness as a cause-and-effect chain that differs from the norm, illness as failed life-management, health as de-velopment. She found that metaphors are important structuring elements for the development of the diagnosis and treatment. Unfortunately Schachtner does not describe her method for analysing the drawings. Guillemin (2004) uses a similar approach in 'Understanding Illness: Using Drawings as a Research Method'. She studied drawings by patients in a research on menopause and heart disease. She argues that drawings offer a rich and insightful research method to explore how people make sense of their world. 'The use of an integrated approach that involves the use of both visual and word-based research methods offers a way of exploring both the multiplicity and complexity that is the base of much social research interested in human experience' (Guillemin 2004, p. 273). Like Schachtner, Guillemin used drawings as a research tool in addition to interviews. The interviews were crucial in the interpretation of the drawings. She stresses that interpretation of the drawings is not a value free activity. She quotes Rose (2001) who states that 'visual imagery is never innocent; it is always constructed through various practices, technologies and knowledges' (p. 32). The power of many forms of art to generate novel perspectives is rooted in this use of ambiguous and often unnamed imagery, so that the viewer can extract meaning unconstrained by words. It seems that there exists no ready available method for analysing metaphors in visuals that suits the purpose of this research. The literature does indicate that a combination of visual and text-based analysis is needed to determine the intended meaning of visuals. This was the starting point for an initial design of a method for analysing metaphors in visuals.

2.1 Initial design of a method for analysing metaphors in visuals

The initial design was based on the method for analysing metaphors in texts as described by Andriessen and Gubbins (Andriessen & Gubbins forthcoming). Minor amendments were made to make it suitable for visuals (see table 1):

Table 1: Paraphrasing Andriessen and Gubbins (forthcoming) to create a method for analysing metaphors in visuals

	Analysis of text	Analysis of visuals
1.	Identify the target area for metaphor analysis	Identify the target area for metaphor analysis
2.	Create sample of relevant texts	Create sample of relevant visuals
3.	Highlight all phrases related to the target area	Identify visual elements and components, checking: for visual elements not connected to other visuals whether visual is built up from smaller elements whether an element contains smaller components
4.	Identify metaphors Is the text used metaphorically? What is the source domain?	Identify metaphors Is the visual element used metaphorically? Is the visual element related to the target? What is the source domain?
5.	Cluster collective metaphorical concepts	Synthesise collective metaphorical concepts
6.	Count the number of phrases associated with each metaphorical concept	Count the number of visual elements associated with each metaphorical concept

The first amendment was made at step 3. In a text we can highlight all text related to the target area. However, a visual often contains several elements that first need to be identified. To tackle this problem three approaches were used: first, look for parts of the visual that are separate from other parts, second, look at whether the visual is built up from smaller elements, and finally, check whether the elements contain even smaller components.

Once the separate elements in the visual are identified, metaphors can be identified by looking at each element individually and asking ourselves: Is the visual element used metaphorically? Is the visual element related to the target? And, what is the source domain? The result should be a list of visual elements that are used metaphorically, and the source domain on which they are based. In step 5 source domains are grouped to identify the collective metaphorical concepts. Finally in step 6 the importance of each metaphorical concept is analysed by counting the number of visual elements that refer to a particular concept.

This initial design was tested against one poster from the Henley corpus (figure 1).

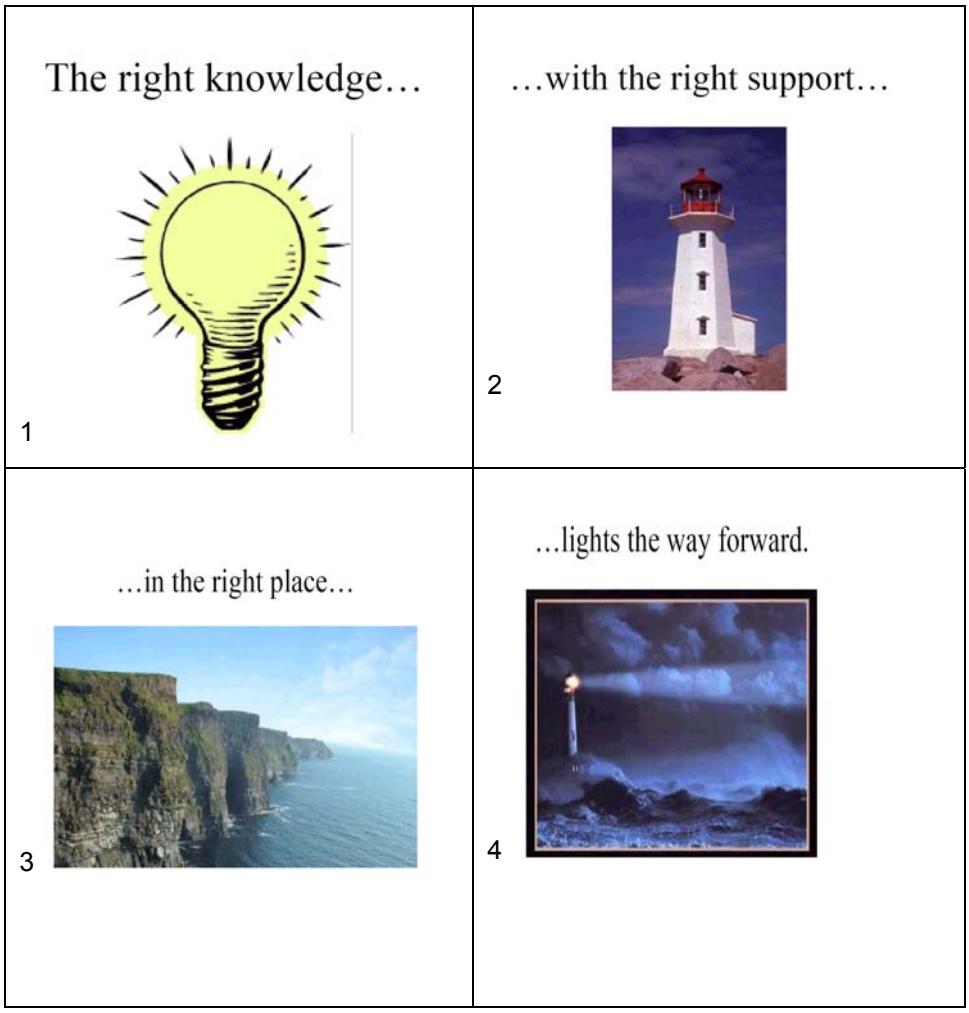

Figure 1: Poster that was used to test the initial design. (Poster created by Elizabeth Flux)

The poster was accompanied by a supporting text. The method developed by Andriessen and Gubbins {Andriessen, forthcoming 837 /id /d} was used to analyse the metaphors in the text which proved straightforward. However, analysing the four visuals proved to be much more difficult. The first problem was that it is not clear what constitutes a visual element. The first picture in the poster portrays a light bulb. This can be seen as one visual element, however it consists of a glass bulb and a screw and small stripes indicating light. It can also be seen as a piece of technology. The fourth picture is even more complex as it contains a lighthouse, a light beam, clouds, big waves, raindrops etc. The analytical procedure proposed in step 3 leads to a large amount of detailed descriptions and an abundance of visual details without any guidance as to what elements are really important. This leads to the second problem. By deconstructing the poster into visual elements and their components fragmentation prevents the researcher from seeing the “wood for the trees”. The overall meaning of

the picture was lost by focussing on the elements that it contains. The third problem was how to decide whether the visual is being used as a metaphor and to what conceptual metaphor the visual is referring. With visuals, the relation between form and meaning is not conventionalised so it is difficult to derive the intended meaning of the author. The intended meaning can be different from the perceived meaning of the analyst. What was helpful was that the poster was accompanied by a text describing intended meaning of the visuals, however, the method does not make enough use of this information when analysing the visuals.

This led to the conclusion that this way of deconstructing the visuals in an attempt to 'let the metaphor emerge out of the visual' was not the best approach. Using this method, the analyst has no guidance to interpret the visual and derive its meaning, let alone to decide on the underlying metaphor. The analyst gets 'lost in interpretation' and fragmentation. Deconstruction is suited to left brain verbal activity, right brain interpretation of the communicative power of the whole requires a newly designed method that starts with a holistic interpretation based on a systematic metaphor analysis of the accompanying text of the poster and overview of the visuals. This was the starting point of a redesigned method.

2.2 Second version of the method

What is needed is a 'search light' the analyst can use to help identify relevant visual elements and interpret them. The solution was to start the analysis by looking for one or more 'dominant' metaphors in the poster, both in the texts coming with the poster and in the visual elements of the poster. For example, a dominant metaphor in the poster in figure 1 is the *knowledge as light* metaphor, which is closely related to the *knowing as seeing* metaphor (Lakoff & Johnson 1999). The dominant metaphor can be found by analysing and counting the metaphors in the text and looking at the visuals with a 'bird-eye's view'. Using the *knowledge as light* metaphor as a guide helps us to identify the relevant visual elements in the poster (the light bulb as a whole and not its elements, the light house stabilised by the rocks etc.). With *knowledge as light* as dominant metaphor in figure 1, it is likely that we should interpret the second picture as a tower supporting the light. The physical support in the source domain of the light house is then used metaphorically in the target domain of organizations expressing the importance of supporting organizational knowledge through knowledge management. Using a dominant metaphor not only helps identifying which visual elements are important but also interpreting them. This approach leads to a method for analyzing metaphors in visuals as described in table 2.

Table 2 Second design of a method for analysing metaphors in visuals

1.	Identify the target area for metaphor analysis
2.	Create a sample of visuals
3.	Analyse the metaphors in the text: 3a. Highlight all phrases related to the target area in title of the poster, the visuals and the accompanying text. 3b. Is the phrase used metaphorically? 3c. What is the source domain?
4	Identify dominant metaphor(s) 4a. In the text by counting the number of phrases associated with each metaphorical concept 4b. In the visuals by looking with a birds-eye view at the visuals
5	Identify and describe visual elements that fit the dominant metaphor 5a. What elements in the visual are related to the source domain of the dominant metaphor? 5b. Is this somehow supported by the text?
6	Apply the visual elements in the source domain to the target domain and derive meaning 6a. What is the meaning of the visual element when applied to the target domain? 6b. Is this somehow supported by the text?
	Repeat 5 & 6 for all dominant metaphors
7	Identify and describe visual elements not yet covered by the dominant metaphors: 7a. Decide whether visual elements are used metaphorically 7b. Identify metaphor used 7c. Derive meaning

This procedure was tested against a second poster (figure 2). From analysis of the text and a bird-eye view on the visuals (step 3 & 4) it became clear that the dominant metaphor used in this poster is *knowledge as water.* 20 visual elements were identified in the posters that are related to the source domain of water (step 5). Step 6 resulted in a rich list of entailments of the water metaphor and related statements about knowledge (see table 3). Step 7 was not necessary as there were no visual elements in this poster that were not covered by the *knowledge as water* metaphor.

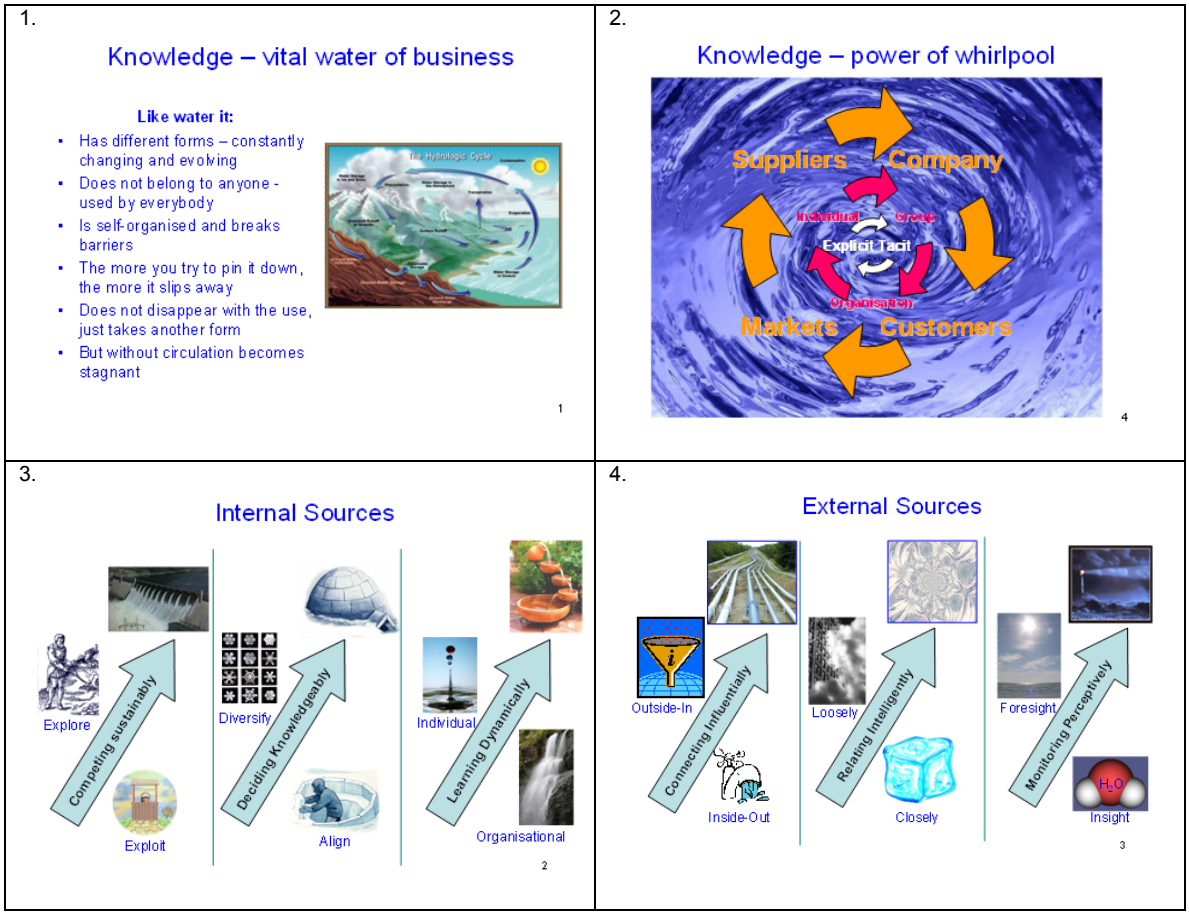

Figure 2: Poster #2 that was used to test the second design

Poster created by Sergej Todeush

As metaphors and visuals can mean different things to different people, the four authors of this paper decided to individually do the interpretation and compare the results of step 3 — analyse the metaphors in the text — and step 6 — interpreting the visuals by applying the visual elements in the source domain to the target domain. The purpose of this was to harvest as many interpretations as possible.

With respect to step 6 it was found that a picture does indeed say more than a thousand words. In an attempt to describe what they saw, the analysts created rich descriptions of the metaphors. Each analyst in part sees something different. This divergence gives insight into the array of entailments of a particular metaphor. However, it was important that the analysts has in-depth knowledge of the KM field. When mapping a characteristic of water to knowledge, knowledge of the KM is used to interpret the meaning of the mapping. In the end 30 entailments of the knowledge as water metaphor were identified. Ten entailments are presented in table 3.

3. Conclusion, next steps and discussion

This paper shows that trying to grasp some of that meaning in words can be done systematically by a group of analysts that have a background in knowledge management theory. The proposed method for analysing metaphors in visuals on KM produced a rich linguistic description of characteristics and implications of knowledge and KM based on the knowledge as water metaphor.

A next step would be to test how useful this result is in the three contexts identified: further developing KM theory, identifying what visuals are powerful in communicating KM ideas, and improving the use of visuals as a way of assessing students studying KM. The meaning regarding knowledge, knowledge management, intellectual capital and learning identified in these posters is not necessarily new or insightful. However for those new to KM, it may communicate more succinctly about the complexity of the topic. Further research is needed to check the results of the analysis with existing KM theory and

to test whether this meaning and the metaphor it is derived from is helpful is particularly valuable. Similarly, at this point, the overview of derived meaning does not necessarily indicate that the visual is powerful in communicating KM ideas. This must be tested with experts and non-experts. And finally, further research is needed to identify ways this result can be used in education. For example, it might be useful to have students apply the proposed method in a learning conversation. However as a mechanism for improving assessment one might suggest that the more recognised resonances integrated into the whole picture, the more the student has internalised the interdependencies of KM.

Table 3: Mappings from source to target domain in poster #2

Source domain: entailment of the water metaphor	**Target domain: Meaning regarding knowledge, knowledge management, intellectual capital and learning**
Water can transform in form: liquid, gas, ice	Knowledge can transform in form: tacit vs. explicit, individual vs. group vs. organisational
This is a cyclical process in which water is refreshed.	Knowledge conversion is a cyclical process from tacit to explicit to tacit in which it is refreshed
The more you try to pin down water, the more it slips away	Knowledge can not be pinned down. The more you try to manage it, the less it is of use.
Water does not disappear with use, it just takes another form	Knowledge is not consumed with use
Water flows can generate energy	Knowledge has potential energy (value). Knowledge management can help harnessing this energy through structural capital. Competitive power comes by releasing enough knowledge to the outside world.
Snow crystals come in many forms and their form is dependent on the initial conditions in which they are formed.	Knowledge is socially constructed and each person interprets and makes sense of the same events/experiences/information based on the context in which they absorb it.
Water falls in droplets	Individuals contribute small amount of knowledge to the organisation. This knowledge is dropped into a calm mental pond and it creates ripples, which if fed can spread- leading to individual learning. Like individual learning, little drops or insights can submerge in the pool and can be lost/wasted.
Water can be transported through a pipe system	Knowledge management is about purposefully channelling resources across the knowledge landscape through suitable conduits that get the knowledge to where it is needed, both inside and outside the organization.
Another form of water is steam. Steam is loosely connected molecules some of which are in transition from one state to another.	Knowledge billows through loose networks, spreads easily, fluid and changeable in configuration, but is hard to harness and apply.
A beautiful form of ice is in fern frost. The beauty of crystallising structures like frost is that it is rich in different patterns, spreads across surfaces more easily that chunks of ice, adapting to the surface it hits, but it is still more tangible	Knowledge management is about creating connections/ relationships that are flexible and rich. A unique mix of relationships create a unique pattern for the firm and act as a source of advantage. Fragile though, needs to change as the competitive dynamics change.

Inevitably, as both metaphors and visuals are multi-interpretable, the proposed method results in a description that is influenced by the personal background of the analysts. From a positivist perspective this would be unfavourable. However, from a social constructivist point of view the multiplicity of meaning that comes from different interpretations is beneficial, because when shared they might lead to alternative ideas and creative insight about the application of knowledge management. It would be interesting to explore the findings with the author of the poster to determine the extent to which these meanings were intentional. Previous approaches to analysing visuals did suggest that interviews can be an important part of the process and the accompanying written text was certainly helpful in this analysis. However, the very nature of metaphors would suggest that the author may well not be able to fully articulate their intentions. Of course meaning is lost in the process of putting a visual into words. A visual communicates meaning in a non-linear way using several metaphors at once. In one picture it can communicate connections and relationships that written language is unable to do. It is equivocal and may inspire different ideas in different people. A rich linguistic description of the metaphor can therefore not replace the visual. However, the aim of the paper was to provide a method that can then be used to better understand the potential multiple roles visuals can play in KM.

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In Search of Alternative Metaphors for Knowledge; Inspiration from Symbolism

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Abstract: Conceptual metaphors play a vital role in our ability to think in abstract terms like knowledge. Metaphors structure and give meaning to the concept of knowledge. They hide and highlight certain characteristics. The choice of metaphor when reasoning about knowledge is therefore of vital importance for knowledge management (KM). This paper explores the possibility of introducing new knowledge metaphors to the field of KM. Based on a 'wish list' of characteristics of knowledge they want to highlight, the authors choose to explore the *Knowledge as a Journey* metaphor as a new metaphor for knowledge. This results in new insights regarding knowledge sharing, acquisition, retention, and innovation.

Keywords: Knowledge, knowledge management, metaphors, symbolism

1. Introduction

Knowledge is an abstract concept. It has no directly visible referent in the real world. As such it is similar to other abstract concepts like "time", "love", or "organization". Yet, people are able to reason about knowledge and have been doing so for thousands of years, from the Greek philosophers to post-modern epistemology. In human evolution, our brain has developed this unique ability to reason and speak about abstract concepts. With the development of cognitive science we begin to understand how this is possible. There is increasing evidence that conceptual metaphors play a vital role in our ability to think in abstract terms. These metaphors are not simply 'figures of speech' but pre-linguistic mappings from one domain to another, hardwired in our brain (Johnson 2008).

Following Lakoff and Johnson's (1999) theory on embodied metaphor we assume that there is no alternative for reasoning about knowledge and knowledge management but to use metaphor. However, every metaphor highlights certain characteristics of knowledge and hides others. Andriessen (2008) has shown that the choice of metaphor can have a big impact on the discourse within an organization about knowledge management . In the same article he highlighted some of the limitations of the *Knowledge as capital* metaphor that underlies the idea of Intellectual Capital. In a knowledge-based economy where organizations head for a new and not yet describable economic landscape, there is a need for alternative metaphors. Knowledge innovation places organizations in a situation comparable to recent emancipation movements (black consciousness, feminism) looking for a new language and new emancipatory metaphors to express the journey to self-definition challenging externally defined images (Collins 2000). Andriessen and Van den Boom (2007) explored alternative metaphors for knowledge from Asian philosophies. An alternative metaphor, *Knowledge as energy,* was explored in (Bratianu & Andriessen 2008). However, more alternatives are needed to cope with the richness of the knowledge concept. Therefore this turns to the field of symbolism to address the question: *What alternative metaphors can highlight important aspects of knowledge and other intangibles that the IC metaphor cannot?* In a search for alternative metaphors it is important to distinguish between those metaphors that we use on a constant basis without realizing that they are metaphors and those metaphors that we deliberately choose to alter the discourse. According to Lakoff and Johnson (1999) the former are part of the "cognitive unconscious". In this paper we will focus on the latter and explore alternative metaphors for knowledge that one might use in a discourse on the role of knowledge is organizations in a knowledge-based economy.

Our paper is structured as follows. Based on recent work of Mark Johnson (2008) and others we first make a "wish list" of characteristics of knowledge we want the alternative metaphors to highlight. The characteristics are: knowledge is embodied, knowledge is largely non-conscious, knowledge is a continuous process, knowledge is enacting, knowledge is primarily based on bodily feelings and knowledge is human-bound. Then we turn to the theory of symbolism to gain insight into possible source domains for our metaphor. Comparing our wish list with the source domains from symbolism we identify an interesting candidate that we further explore: The Journey symbol. A *Knowledge as a Journey* metaphor can highlight the dynamic, contextual and social characteristics of knowledge. The paper concludes by providing examples of the *Knowledge as a Journey* metaphor. We indicate how it

may be used in an organizational discourse on knowledge and knowledge management. First we develop a list of characteristics of knowledge we want to highlight, based on a specific view of the world.

2. Characteristics of the target domain: knowledge

When reasoning about knowledge we use conceptual metaphors. Plato's idealist epistemology, reflected for example in his famous Allegory of the Cave, is based on the metaphor of *Knowledge as Light*. The movement from ignorance to knowledge is depicted metaphorically as an ascent from darkness to light (Lakoff & Johnson 1999); a road towards eternal, unchanging, and perfect ideas (Nonaka & Takeuchi 1995). Aristotle's realist epistemology is based on the common metaphors *Mind as a Container*, *Understanding Is Grasping*, and *Ideas are Physical Objects*. "When the mind metaphorically grasps the form (the physical structure) of the object perceived, it understands (via the metaphor the Understanding Is Grasping)" (Lakoff & Johnson 1999, p. 376).

For both Plato and Aristotle there is no separation between the mind and the world. This changed in the epistemology of Descartes who introduced the metaphoric view of the mind that represents in its "inner theatre" the objects existing in the external world. Descartes introduces a difference between subject and object. At the same time Descartes separates mind and body because the mind is distinct from the body and can exist without it. Using the *Knowing is Seeing*, *Mind as a Container* and the *Ideas as Objects* metaphors, Descartes asserts that ideas (knowledge) are objects in the mind —independent of the body— that can be seen by Reason.

The Cartesian dualism of subject and object and mind and body has been dominant in Western philosophical thought ever since. It has also been dominant in management theories about the organization as an orderly machine and in pedagogical theories about knowledgeability of persons as mental storehouses (Bereiter 2002; Mcmillan 2004). The underlying metaphors of *Mind as Container* and *Ideas as Objects* have also been highly influential in our thinking on knowledge and therefore on our thinking of knowledge management. As Andriessen has shown, the *Knowledge As Physical Substance* (Andriessen 2006) or *Knowledge as Stuff* metaphor (Andriessen 2008) has been dominant in Western knowledge management literature. The idea that knowledge is something that can be "stored", "shared" and "used" is deeply embedded in our knowledge management theories. The subjective, bodily, and tacit aspects of knowledge are largely neglected (Nonaka & Takeuchi 1995).

The Cartesian Split has been challenged by many philosophers including Husserl, Heidegger, Sartre, Merleau-Ponty, Wittgenstein, James, and Dewey. In his latest book, Johnson (2008) even claims that the Cartesian Split is not only problematic from a philosophical point of view but is also not supported by recent empirical findings from cognitive science. He has developed an embodied theory of meaning in which meaning is part of a flow of experience from a biological organism engaging in its environment. In his theory, meaning is not a static object (a noun). Instead Johnson describes meaning as a largely non-conscious "continues process of immanent meanings that involve structures, patterns, qualities, feelings, and emotions" (p. 10) from which some are coded in concepts and propositions in a conscious way. Meaning is no longer a static "thing" but a continues process. Johnson does not use the word "knowledge" in this context as knowledge is a noun that automatically refers to something static, while he wants to emphasize the process: "But if we reduce meaning to words and sentences (or to concepts and propositions), we miss or leave out where meaning really comes from. We end up intellectualizing human experience, understanding, and thinking, and we turn process into static entities or properties" (p. 11). For the same reason Savage (1996) prefers to speak about "knowledging" instead of "knowledge". In this paper we will be using the term "knowledge" because this is the common concept in the field of intellectual capital and knowledge management, however we will use it in such a broad way that it can possess process qualities.

We will use Johnson's embodied theory of meaning as our starting point for a search for alternative metaphors for knowledge. His theory is based upon the work of the pragmatic philosophers James and Dewey and is closely related to the work of Maturana and Valera (1998). This theory puts human cognition into a new light which has consequences for the characteristics of knowledge and therefore for the metaphors we use to reason about knowledge. From Johnson's theory we derive the following characteristics of knowledge. Most of these characteristics are not highlighted by the *Knowledge as Stuff* metaphor (see table 1).

Table 1: Overview of characteristics of knowledge we want the metaphor to highlight

1. Embodied	Knowledge is embodied. It is not only the result of a mind situated in our head but of the whole body.
2. Non-conscious	Knowledge is largely nonconscious in the sense that it is part of a mostly automatic and bodily process that we are not aware of.
3. Process	Knowledge is part of a continuous process of enactment between ourselves as biological organisms and the environment.
4. Enacting	Knowledge is the result of us discriminating objects, properties and situations within the flow of our experience from that environment. Those objects, properties and situations do not "exist" in that environment independently from us but they emerge "because of our perceptual and motor capabilities, our interests, our history, and our values" (p. 76).
5. Based on feelings	Knowledge is primarily based on bodily feelings. It constantly emerges out of our "felt sense" of the situation. "But the meaning is in what you think and feel and do, and it lies in recurring qualities, patterns, and structures of experience that are for the most part, unconsciously and automatically shaping how you understand, how you choose, and how you express yourself" (p. 79). When we put this felt sense in words we can never grasp its full meaning.
6. Human-bound	The distinction between tacit and explicit knowledge is false. Johnson refers to this dichotomy as the "felt sense" versus the "formal expression" and following Gendlin (1995) he states that these are two dimensions of one single ongoing activity of meaning-making. The formal expression can not replace the felt sense and the felt sense is always needed to distil meaning out of formal expressions. As this activity of meaning making is an activity of a human being, knowledge can not "exist" outside of human beings.

In order to highlight some of these characteristics in our reasoning about knowledge we need alternative metaphors. Knowledge metaphors can help us to understand the changes of ever time-bound landscapes of knowledge. Metaphors are tools of reason and meaning-makers, multiple, contextual, and to some extent public and negotiated, and thereby producing ever-new meanings (Maasen & Weingart 2000). In the next paragraph we call in the help of the field of symbolism to identify potential source domains that can be used as metaphors for knowledge.

3. Symbolism as a source of alternative metaphors

What kind of symbolic pattern or morphology could help us to provide the framework for using metaphors in interpreting and managing knowledge processes? Which metaphors allow knowledge workers to express themselves, and to experience deeper meanings and to unify knowledge experiences in terms of coherent, symbolic, structural worlds of meaning?

In the history of cultures and religions almost all objects from the mundane reality have been used to refer to symbolic meanings. It is valuable to sum up these possible carriers of symbolic meaning and to put these into a morphological and structural order. Academic disciplines whether it be in anthropology, sociology, archaeology or history find it hard to unlock the polyphony of visual and symbolic language in the history of mankind (Shore 1996). Yet, some attempts have been made to create an inventory of symbols and build a classification (Lurker 1978). Robin Coulter and Gerald Zaltman created a classification that illustrates the relationship among metaphorical expressions and conceptual, complex, (what they call) "deep metaphors", applying this classification to consumer theory. It consists of the following seven deep metaphors as agents for deep and profound messages (Coulter & Zaltman 2000) (see table 2).

Important deep metaphors in world mythology referring to knowledge and wisdom are the human heart (commitment), pearls (wisdom and transformation), snake (earth mysteries, wisdom or prophecy), sun (creative energy, vitality, renewed knowledge), and journey (intellect and truth personified, self-development) (Eliade & Apostolos-Cappadona 1985;Lurker 1978). When we compare these lists of metaphors with our list of characteristics of knowledge we want to highlight there is one metaphor that seems to encompass most, if not all, characteristics: the journey metaphor. A journey is bodily experience in which both conscious reasoning and non-conscious experiencing play an important role. It is a process in which a constant enacting takes place between the traveller and its environment. The felt sense of the experience plays an important role for the traveller in making decisions about where to go and what next step to take. The experience of the journey can never fully be grasped in words, in will always be human bound. In the next paragraph we will explore the metaphor of the journey by analysing the general structure journey stories have. This will lead to

an overview of characteristics of the journey that can then be mapped onto the target domain of knowledge.

Table 2: Overview of deep metaphors (Coulter & Zaltman 2000)

Deep metaphors	Metaphorical expressions
Physicality	Body references such as taste it; feel it; pick up, ingest, see my point, hurts me
Balance	References to equilibrium, balance, equalize or compensate; including both sides; images of scales, teeter-totter, balance beam
Motion or movement	References to moving (flowing, travelling, running or walking); references to action (doing something, getting going); keep moving, keep it going
Nature	References to nature, outdoors, natural world, wildness; chaotic, untamed; specific images of nature –rain forest, desert, woods; references to breeding, evolving, growing
Force	References to power, a powerful presence or a source of energy; references to the consequences of force (getting hit; slammed, impact)
Fight vs. Flight	References to war; fights, battles; choose your battles; avoid a fight; don't get involved; running away or hide from something
The ideal	References to the ideal object, situation, feeling; statements about one's ideal self; references to perfection, the perfect one

4. Characteristics of the source domain: The journey

In world mythology and literature, the entailments of the journey as a metaphor have been used in relation to knowledge. For example, many journey metaphors in world mythology and literature reveal the search for knowledge as self-development. In the "Great Learning" Confucius clarifies the voyage by which self-development is attained and how this journey is beneficial to serve the state and the society. The various stages of this journey set out by Confucius are: investigation of phenomena, learning, authenticity, integrity of purpose, self-development, family-discipline, local self-government, and universal self-government. The Neo-Confucian philosopher Shao Yung emphasizes that this search for knowledge involves a life-long process: "To become a sage learning consists in not stopping. Therefore Wang T'ung said that it is simply [a matter of continuing to study] to the end of one's life" (Birdwhistell 1989).

Among the Akan (Ghana) the search for knowledge is a life-long process and closely interrelated with the tradition and the community. The Akan do not automatically consider knowledge as the preserve of a particular group. The expression *the well travelled is more experienced than the elderly who has stayed in one place all his/her life*) captures this view about knowledge as a journey. In this regard the Akan views the "stay-at-one-place" person as being insular as compared with the travelled person who is said to be cosmopolitan. The metaphor of the knowledge search as a voyage reveals other interesting entailments. When travelling, the traveller meets other people from whom he or she may learn. When commenting on the oft-quoted Akan proverb *wisdom is not in the head of one person* the African philosopher Kwame Gyeke concludes that "(1) that other individuals may be equally wise and capable of spawning equally good, if not better, ideas; (2) that one should not, or cannot, regard one's intellectual position as final or beyond criticism, but expect it to be evaluated by others; and (3) that, in consequence of (4), one should be prepared to abandon one's position in the face of another person's superior ideas or arguments, or in the event of one's own ideas or arguments being judged unacceptable or implausible by others" (Kwame Gyekye 1995). These Ghanaian metaphors refer to knowledge, not as a thing but as a life-long search and process and a continued quest.

An illustrative example of a contemporary knowledgeable hero is Merry in Tolkien's Lord of the Ring. During his quest Merry learns from various cultures. In both Tolkien's trilogy and Jackson's cinematic interpretation Merry shows his strengths as a planner and a student of books. Merry is exemplary for the hero as a lifelong student, collecting information from other peoples and cultures, analyzing languages and topographic maps, biology and geography. Gaining new information gives Merry the ability to provide new answers and to tackle new problem situations, going through new experiences supplementing his previous knowledge. Sharing his knowledge inspires others to participate in his endeavours and wanderings. Merry is an exemplary knowledgable hero and role model demonstrating that the best actions and reactions are based on reason and that reason needs to be steeped in knowledge, not just getting together data and information, but the investigation of information combined with personal experience as the basis for a wise plan of action (Porter 2005).

Figure 1: The archetypical structure of a hero's journey (based on Campbell, 2008)

Many more examples of world literature could be given, but the essential point is that in the source domain, a journey has certain characteristics, which Lakoff and Johnson (1999) refer to as "entailments": a journey is a search, that has several stages: departure, initiation and return. The journey is a dynamic process; it takes time, maybe even a whole life; it involves moving from one position to another; it is a social event as you meet other people along the way; and it is about experiencing. The journey implies a transition to another world, facing tasks and trials, alone or with help of others. Having survived severe challenges and having acquired important knowledge, the hero must then decide whether to go back with this gift to the ordinary world and to transfer it to others, which faces him again with new challenges and difficulties, although he knows for certain that this new knowledge will improve the world. Further characteristics of the journey can be found by looking at the story archetype of a particular and often used journey: the hero's quest. Joseph Campbell, researcher in the field of comparative mythology and comparative religion, outlined the concept of a story archetype of the hero's quest, omnipresent across all cultures, (Campbell 2008). Campbell delineates the following stages along the hero's voyage in search of knowledge and wisdom: departure, initiation and new landscape, and return (see figure 1).

Very few narratives include all of these stages. Some narratives may have as a focus only one of the stages, while other narratives may deal with the stages in a somewhat different order. Central, however is that the three sections of departure, initiation and return are often clearly perceivable. In the next paragraph we apply the characteristics of journeys described above to the target domain of knowledge and analyse what new meaning this can generate that we can use for knowledge management.

5. Applying the Knowledge as a Journey metaphor

The journey metaphor is an apt and appropriate vehicle of meaning to trigger complex and multifaceted changes in knowledge processes in organisations. The quest for knowledge is not a travel along linear lines, but consists of several stages: departure, initiation and new landscape, and return with many paradoxical opposites: refusal to the call, helplessness and the need of someone else's support, passing barriers, facing trials, returning and being met with distrust and opposition by others. Knowledge is not a given and a prearranged body of data and information, but a discovery-like process with hindrances, obstacles, reluctances as well as positive stimuli: denial that the current and familiar position no longer holds, stepping out of the box, leaving one's position and the current knowledge environment, persuasion by others and the need of help from others, breakthrough experience of something completely new. A structured mapping of the characteristics of journeys to the target domain of knowledge can be found in figure 2.

Applying the metaphor of the hero to individual and organizational learning in schools, Brown and Moffett conclude that a fundamental tenet of the hero's journey is its reinforcement of experience-based learning. Heroes in search for new knowledge discover that insight and understanding are impossible if we limit our learning to the study of someone else's knowledge. Despite the complexity of human learning at the individual and collective level, too often educators cling to the behavioural-rational paradigm of learning as neat, controllable, and programmable, presuming a discrete cause-effect linkage between teacher input and student output around a body of declarative knowledge. This old paradigm serves factory-like and assembly-line types of organizations. However, in this era of rising complexity, metaphors in general and the hero's journey in particular can provide us with vital pathways to individual renewal and organizational empowerment. The various phases of the hero's journey, -divided into: innocence lost; chaos and complexity; heroic quest; gurus and alliances; trials, tests and initiations; insight and transformation- can people and organizations offer collective symbols when they themselves threatened by the enormity of change and transformation in current societies (Brown & Moffett 1999).

The journey metaphor unveils that gaining a new view and vision of the world is difficult, as it is not automatically and immediately incorporated into conscious and accepted competences of the surrounding group. This has important consequences for knowledge management. We highlight and summarize specific consequences of the *Knowledge as a Journey* metaphor for knowledge sharing, knowledge acquisition, knowledge retention, and knowledge innovation.

- Knowledge sharing:

  One of the challenges of the journey is that the hero does not conceal his hard-won knowledge for personal advantages. Contrary to defensive attitudes as "knowledge is power", "not invented here" and human reluctance to seek advice from others, the hero narrative unveils that human factors and motivational aspects are the real obstacles of knowledge sharing in organizations. At the same time the metaphor highlights that the full content of knowledge can never be shared, like the whole experience of the journey can never be communicated by words. However, telling stories about a knowledge journey can contribute to the transfer of knowledge. The journey metaphor reinforces the potential of storytelling as a KM instrument (Denning 2000).

- Knowledge acquisition:

  Having acquired knowledge in non-familiar situations and in different contexts, the hero returns to his homeland in the awareness that knowledge obtained for different purposes may be helpful in totally different contexts. The journey metaphor higlights that non-familiar tools may elicit innovative developments, given that people acquire new knowledge by conquering organizational barriers, by entering new connectionist ways of business performance and by looking for new knowledge connections - across a variety of borders and disciplines. However, the journey metaphor also highlights that on his return, the hero is often confronted with disdain and condemnation. This also happens with people that bring new knowledge to the organization, for example newly hired staff that bring in their experience from other contexts. For knowledge management it is important to be aware of this mechanism of refusal of new knowledge and to support new employees in their attempt to bring new knowledge and innovative ideas to the organization.

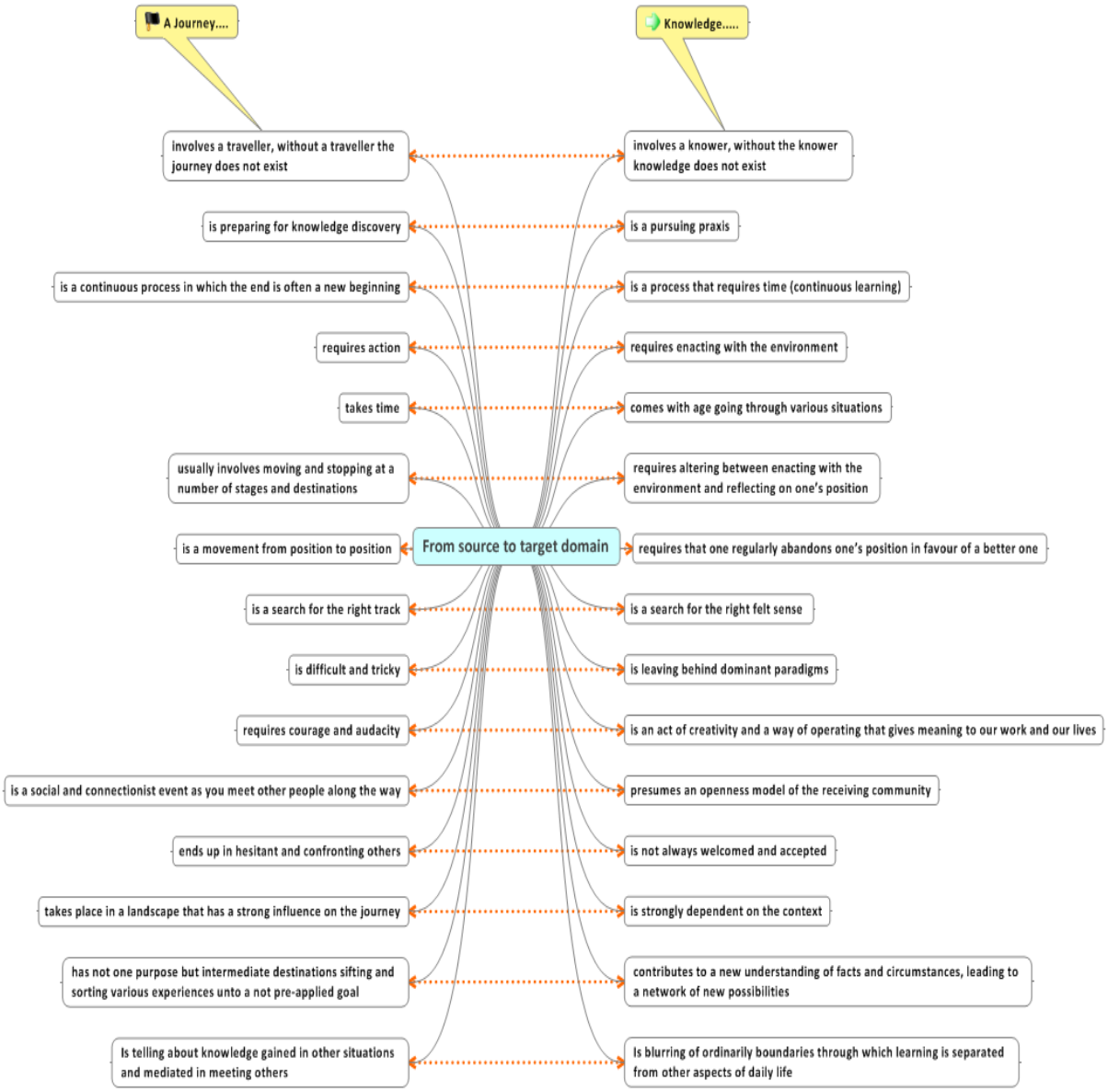

Figure 2: Mapping from the source domain of the journey to the target domain of knowledge.

- Knowledge retention

  In the hero's journey, the hero receives a call for adventure which can be compared with when qualified workers look out the window and see new opportunities outside of the organization. So in a way, the journey metaphor deals with the problem of how to capture knowledge when it walks out the door. The hero leaving for his journey symbolizes the loss of critical knowledge by managers and executives retiring and exciting from the company. However, the metaphor also highlights that the journey itself will produce new and potentially valuable knowledge for the hero. From a KM perspective the challenge is to capture this new knowledge for the benefit of the organization the person is leaving. The old employer should try to learn from the transition his former employee is making. One way to do this is to support the transition through coaching by a senior figure, just like in the hero journey where the hero meets a caring senior figure who offers tools and advices for his mission. So, paradoxically as it may sound, organizations should invest in employees who are leaving by coaching in order to learn as much from the transition as they can.

- Knowledge innovation

  The journey metaphor highlights the fundamental notion that innovation is not just the introduction of new knowledge, but a non-linear and complex process that involves discovery, barriers, trails, monsters (failures), and the combed competence of connectionist people from various

backgrounds. It also highlights that it requires people to quit isolated and remote islands of knowledge, to discover the unknown and to welcome interdependent relationships between various internal and external partners and stakeholders, including outsiders, in the innovation process. As a consequence, knowledge innovation can not be managed in the traditional, planning & control sense of the word. Instead, knowledge innovation can only be encouraged and supported by allowing people to go on a journey of discovery, by providing them with coaching from senior, experienced people, and by giving them the opportunity to meet other and new perspectives and opinions. In addition, management should encourage the voicing of different perspectives and meanings instead of trying to provide one fixed meaning to the organization. Knowledge innovation results from the confrontation and reconciliation of various perspectives, meanings and opinions.

6. Conclusion

In Western knowledge management common used metaphors for knowledge entail an analytical mode of cognition in which verbal information is processed serially, sequentially, logically, and rationally. When using alternative deep metaphors like the journey metaphor, knowledge management can be enriched by a relational and synthesizing mode of cognition, where knowledge processes are perceived as simultaneous structures and patterns. Such alternative metaphors also provide insight into the structure of a system by integrally and comprehensively focusing on the whole and overall meanings instead of details only. The use of new knowledge metaphors may lead to the highlighting of different knowledge-related issues in organizations and may inspire to new, unorthodox solutions and recommendations.

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Financial Valuation of Intangibles With Real Options: Is a Real Option?

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Abstract: The major role of intangibles resources, in particular knowledge-related resources, in generating competitive advantage and creating value in business, together with the evident limitations of the information provided by the stock markets, has, from the 1990s on, stimulated research into the identification and evaluation of such resources in companies. As most attempts to implement intangible valuation models have been made in large firms, research into valuation methods and models applicable to small and medium enterprises has been to a great extent neglected. Likewise, little work has been done on comparing the potential for the practical application of the methods developed, when the need to establish their validity and applicability is quite evident.
This situation moved us to produce the present report, designed to verify the degree of applicability of the method of financial valuation developed by Rodríguez-Castellanos et al. (2006a, 2007) for real options of intangible valuation in the Basque region of Spain. In our view, this study makes a relevant contribution to the literature on the valuation of intangible resources. As far as we know, it is the first paper to verify the practical utility of a financial valuation method for intangible resources that includes the possibility of valuating the real options associated with it, by directly asking CFOs from a representative sample of firms for their opinions. Furthermore, rather than choosing companies from a single sector or specific technological area, the companies canvassed worked in all industries and varied widely in size, which enabled us to make comparisons differentiated by size and sector.From the results it is clear that the method may be directly applied only in a few of the companies considered, as just one of every five firms was capable of identifying intangible-related options and approximately half of these were not in a condition to provide estimations for some of the necessary inputs. Fewer evident difficulties in applying the method were found in large companies, which usually devote more resources to identifying and analyzing their intangibles. In other cases, a preliminary phase of analysis and diagnosis would be required before the method could be applied practically.

Keywords: Real options, intangibles, core competence, financial valuation, intellectual capital, intangible valuation

1. Introduction

Intangible resources, particular knowledge-related ones, are important in the generation of competitive advantages and value creation in business (Hall, 1992; Teece, 1998), and, in the 1990s, the obvious limitations of the information provided by the stock markets stimulated a line of research into the identification and valuation of firms' intangible resources. Among other benefits, the growing knowledge and understanding of intangibles and their valuation helps to reduce information asymmetries on the market, improve the way companies manage their intangibles, make resource allocation more efficient and give better guarantees when obtaining financing.

However, most attempts to implement intangible valuation models have so far been made in large companies, with research into evaluation methods and models also applicable to small and medium enterprises being largely neglected. And, as Andriessen (2005) points out, articles comparing the potential for practical application of different methods is scarce, which is perhaps surprising when the need to establish their validity and applicability is clear.

These considerations persuaded us of the need for the present paper, which is part of a broader research programme carried forward in tandem with members of the Basque-based *Management and Finances Forum*. Taking as reference the method for the financial valuation of intangibles developed by Rodriguez-Castellanos *et al.* (2007), which combines the discount of cash flows with the real options approach, and considering exclusively the latter feature, its degree of applicability is tested for the valuation of the intangibles of firms in the sample.

1 The present paper contains the results of the University-Business Research Project (UE05/A24), financed by the University of the Basque Country and the Management & Finance Forum that is an association of financial managers from the leading companies in the Basque region.

From the results it is clear that the real options-based evaluation method could be directly applied in relatively few firms, as only one in five proved capable of identifying options associated with their intangibles and approximately half of these would not be in a condition to provide estimates for one or more of the necessary inputs. Consequently, in most cases a preliminary phase of analysis and diagnosis would be essential before putting the method into practice.

The rest of the work goes as follows. Section 2 reviews the main contributions concerning the financial valuation of intangibles. Section 3 summarizes the intangible evaluation method used as reference for the present paper. Section 4 presents the methodology and selection of the sample of industries used. Section 5 provides the results of the empirical study and section 6 presents the main conclusions.

2. Financial evaluation of intangibles

The 1990s witnessed the emergence of a current of research, which we might usefully call "measuring", that concentrated on the valuation of intangibles. Basically, measuring consists in two tasks: one being the attempt to identify intangibles and put them into a structured order; and the other is the search for indicators that enable us to measure them. These indicators are mainly ratios, which is why the measuring of intangibles has been approached basically as an activity of a non-monetary nature. Edvinsson and Malone (1997), Kaplan and Norton (1997) and Sveiby (1997) all make interesting contributions here.

Subsequently, efforts were made to measure in monetary terms the contribution of each constituent element of companies' intangible resources, in what we might call the "financial valuation" of such resources.

According to the methodology used, the principal methods developed here fall into three groups:

- methods based on the assumption of efficiency in the stock markets, which includes Caballer and Moya (1997) and Rodov and Leliaert (2002);
- methods based on flow discounts, including Andriessen and Tissen (2000), Gu and Lev (2001), Andriessen (2004) and Rodríguez-Castellanos *et al.* (2007);
- methods based on the theory of options, including Pakes (1986), Newton and Pearson (1994), Kogut and Kulatilaka (2001), Bose and Oh (2003) and Rodríguez-Castellanos *et al.* (2007).

All of them have advantages and drawbacks[2], which makes the search for simple, true methods and models for economic and financial valuation of intangibles a difficult business. The method for the financial valuation of intangibles proposed by Rodriguez-Castellanos *et al.* (2007) comes within this frame, combining as it does flow discounts and the real options approach.

3. A method for financial valuation of intangibles as real options

3.1 Benchmark method

In the present research we took the method of financial valuation of intangibles proposed by Rodríguez-Castellanos *et al.* (2007) as a reference for the empirical analysis. The model in question is based on a specific taxonomy that distinguishes between "intangible assets" and "basic competencies" as in-house value generators.Under this method, intangible resources are considered to be resources with no physical support and may be either "intangible assets" or "basic competencies." Intangible assets are coded, i.e. they are resources for which the capability of appropriation, or the yields they generate, is regulated by the company by a contract or other type of legal instrument, for example patents, licences, trademarks and software. Basic competencies are groups of skills developed by the company that generate a significant value or benefit for the client, and which therefore permit the company to maintain a sustainable competitive advantage (Hamel and Prahalad, 1994).

The method seeks to identify intangible resources and quantify them in monetary terms, on the basis of the fact that intangible business value is essentially to be found in the basic competencies of the company, as Andriessen and Tissen (2000) and Andriessen (2004) point out, which is why it is principally oriented towards the latter. Basic competencies, which in general usually refer to

2 Rodriguez-Castellanos *et al.* (2007) provides a review of a range of methods for the financial valuation of intangibles.

typologies of knowledge, are classified in the categories of the kind of intellectual capital to which they impart momentum: human capital, structural capital and relational capital.
The method:

- is based on cash flow discount models and on real option valuation models, the choice of the specific valuation model being determined by the temporal dimension of the yields associated to the basic competence. In other words, a distinction should be made between the competencies currently affecting company earnings (valuation as basic project); the ones that are expected to affect them in the future (valuation as real option) and, finally, the ones that partake of both characteristics simultaneously.
- takes account of objective, standardized information from the financial statements and other company documents, and the perceptions and opinions of company CFOs, thus maximizing the information available for valuation.
- is suitable for evaluating intangibles in large companies and small enterprises not quoted on the stock markets, and/or for firms that do not have large databases.

The present paper analyzes exclusively the degree of applicability of the method of valuation of intangible resources as a real option.

3.2 Basic competencies as real options

A basic competence incorporates real options if their possession or current availability can influence future net earnings, either because it permits the acquisition in the future of other assets or competencies, or because it facilitates the implementation of investment projects in the future (the *underlying asset*). What need to be identified are the assets, competencies or projects that the actual possession of the competence under consideration will permit the company to acquire or undertake in the future.

A series of elements should be established to facilitate the valuation of the competencies considered as real options. Although, for simplicity's sake, the type of real options that are going to be considered in principle is relatively uncomplicated (European call options) and the method of valuation to be used derives from Black and Scholes (1973)'s famous proposal, characterizing a competence as option is not easy, and much less easy is estimating the parameters that will permit its valuation.

The first parameter in the case in question corresponds to the future date on which the new asset or competence can be obtained, or on which the new project may be implemented; the idea is to estimate the time needed for the new asset, competence or project possibility to be developed. In conventional options terminology, it is the *date of exercise* of the option.

Similarly, an estimate is needed of the costs required to acquire the new asset, to generate the new competence or undertake the new project in the future. At the moment the option is exercised, the acquisition of assets or competencies, or the start of a new project, must have some cost, must require a payout; otherwise the value of the option would simply be the current value of the underlying one. So the cost or expenditure required to exercise the option, i.e. the *price of exercising*, has to be estimated.

Likewise, it should be possible to estimate the effects of the new asset or competence on net business earnings and their sustainability. That way the *value of the underlying asset* may be calculated, i.e. the expected value, at the moment the new competence, the new asset or the new project is exercised. To that end it's necessary to estimate the expected effects on the company's future net cash flows and for how long they will continue, so that, suitably updated, they provide the value expected.

Finally, a decisive element in the characterization of an option is the degree of risk associated with it. The existence of uncertainty about the current and future value of the future asset, competence or project is one of the fundamental features of the value of the options. *Volatility* is an essential element in the valuation of options, although estimating for real options is not easy, given the nature of the underlying assets considered.

4. Methodology and sample selection

4.1 Preparing the questionnaire

The research team prepared a draft questionnaire and carried out a pre-test with the cooperation of members of the Basque Management & Finance Forum. We held semi-structured interviews with the financial managers from eleven Forum member firms, the idea being to test and improve the questionnaire's validity before sending it to the selected companies.

The definitive questionnaire[3] comprised 20 questions divided, according to the desired objective, in three sections:

- 1. Questions 1 to 7: were designed to establish the importance of the financial valuation of intangibles for companies in the Basque Country, and the reasons why, and to determine how far companies have identified their basic competencies.
- 2. Questions 8 to 13: provided information on the applicability of the model of valuation of company intangibles as a basic project.
- 3. Questions 14 to 20: analyzed to what extent the real option-based valuation of intangibles is suited to company possibilities.

The present paper is limited to an analysis of the last section.

4.2 Selection of population

The study concentrated on firms in the Basque region of Spain, using selection and segmentation criteria based on company size and the sector it worked in.

We chose the Basque Country for its distinguishing features. Located in the north of Spain, the region is what is known as an "autonomous community", with legislative powers in certain areas, fiscal autonomy and its own government with. With a population of just over two million, it accounts for about 5% of the total Spanish population. Despite a lack of natural resources, the Basque Country is one of the relatively few regions in Spain with a major industrial and business tradition, although, as a result of the economic crisis of the 1970s and 80s, heavy industry went in a substantial decline, leaving today's SME as the basic backbone of the Basque business world. In the meantime, a commercial and services sector (also largely comprising SME) has flourished, currently providing jobs for 60% of the active population (Rodríguez et al., 2003).

The relevant information was obtained from the SABI database. Of the initial population of 44,637 companies, we excluded micro businesses, i.e. companies with fewer than ten employees or billing less than two million euros a year, as being too small. This reduced the population under consideration to 3,477 companies.

In segmenting by size, we chose the first of the three criteria most often used (number of employees, turnover and total assets), as we believe this criterion is more stable over time and less subject to situational factors[4]. In line with this criterion, the population was subdivided into 2,451 small, 813 medium and 213 large companies.

Companies were classified into sectors with the aid of the National Classification of Economic Activities (*Clasificación Nacional de Actividades Económicas*), revised and approved by Royal Decree 330/2003 dated 14 March 2003 (CNAE-93 Rev. 1). The present paper took account of all industries, as there were no justifiable a priori reasons for leaving any particular one out.

With a view to guaranteeing a minimum of observations in each subgroup into which the population was divided, companies were grouped into four large sectors: (1) Primary, (2) Industry, (3) Construction and (4) Commerce and Services. In line with this criterion, the population was subdivided thus: 34 firms in the primary sector, 1,371 in industry, 447 in construction and 1,625 in commerce and services.

[3] If you wish the questionnaire we can send it to you.

4 Under this criterion, firms with between 10 and 49 employees are *small*, *medium* companies have between 50 and 249 employees, and companies with 250 employees or more are *large*.

4.3 Obtaining the sample

From this population, we obtained a random sample of 517 companies, giving a level of confidence of 95% and a level of maximum error of ±4%. Every effort was made to guarantee a minimum of observations for each company size and sector to reach acceptable levels of confidence and error. Table 1 shows, for the criteria of size and sector, the number of questionnaires answered and the levels of error giving a level of confidence of 95%.

Table 1: Distribution of sample by size and sector

SECTOR	Population	Questionnaires answered	Sampling Error (α=5%)
Primary	34	18	± 16,1%*
Industry	1,371	184	± 6,7%
Construction	447	118	± 7,7%*
Commerce and services	1,625	197	± 6,5%
SIZE			
Small	2,451	241	± 6,1%
Medium	813	222	± 5,6%
Large	213	54	± 11,5%*

*In this subgroups we have tried to contact with all the population

A call center carried out fieldwork from 20 November 2007 to 14 January 2008, with average of 2.6 contacts with companies that responded. Prior to the telephone interviews, a letter of introduction was sent to 1,500 firms with the questionnaire enclosed, addressed to the CFOs or, to the person who performed this function in the company.

The answers received were subjected to a descriptive analysis, including the use of non-parametric tests depending on the characteristics of each question in the questionnaire. As the results for the third section of questions are presented as qualitative distributions, in virtually all cases the statistic χ^2 was used in contrasts.

5. Results

5.1 Future development of new assets or factors for competitiveness from current intangibles

As noted above, the third section of the questionnaire begins by asking about the possibility of some intangible resource having an additional value because it includes real options. In other words, subjects were asked if at least one of the key factors for the competitiveness of their firms could facilitate the development of new assets or competitive factors in the future.

70.2% of the subjects surveyed considered that there were options in their intangibles, but 69.1% of them said they were incapable of identifying them. In short, just 21.7% of all subjects surveyed considered that options existed and was capable of identifying them. These results cohere with the scarcity of literature existing on the knowledge and use by top financial management personnel of the real options approach applied to the analysis and valuation of business investments.

67.2% of small companies considered their intangibles could in the future permit the development of new assets or competitive factors, the proportion rising to 80.6% for medium enterprises and 70.4% in large companies. However, in each of these groups, only 27.8% of the small ones, 31.3% of the medium and 44.7% of the large firms were capable of identifying these future opportunities. Therefore, just 18.7% of all small firms, 25.2% of medium enterprises and 31.5% of large companies considered there were options associated with their intangible resources and were in a position to identify them, the differences due to size being significant to 10%. This result highlights the fact that large companies know more about their intangibles, which might, as Salojärvi (2004) suggests, be due to them having more resources available to identify such intangibles and manage them.

Companies whose basic competitive factor is linked to structural capital tended more to say that there were options associated with such capital (80.7%), as opposed to those whose main intangible was associated with human capital (73.5%) and relational capital (65.4%). Furthermore, the greatest proportion (35.4%) saying it was capable of identifying the options associated with intangibles came in the first group, as opposed to 28% in the second group and 26.4% in the third. These differences are

significant to 10% between structural and relational capital, there being no detectable significant differences in the other comparisons. We think that this difference may be due to the fact that large companies, i.e. the ones most capable of identifying options, give more importance to structural capital, perhaps because they have a greater need to generate mechanisms for transferring the knowledge and competencies that individuals possess to the other members of the firm.

The rest of the analysis only took into account the answers from the 118 firms in the sample that were actually capable of identifying such options.

5.2 Need for new investments for developing new assets or competitive factors

In our model we considered, in general terms, that some investment would be required for the new asset or intangible resource to actually come about; consequently, it would be a call option. This is why we posed the question of whether it would be necessary to make further investments to develop new assets or competitive factors. Although 92.4% of the subjects surveyed in this subgroup considered new investments would have to be made, only 46.8% of them was capable of saying how much, without there being significant differences depending on any of the segmentation criteria (size, sector or type of intangible resource). Only a minority, 13.5%, of CFOs that considered options existed (379) was capable of identifying them and of establishing their exercise price. This figure, equivalent to less than 10% of all firms surveyed, underscores the difficulty in using an options approach directly in the valuation of intangibles.

5.3 Time required to develop new assets or competitive factors

Next we asked about the most probable length of time needed to develop the new resource. Although 11% was incapable of determining the time needed, the majority (55.9%) reckoned it would be less than 3 years, while 32.2% envisaged a period of three to five years, and only one company estimated a period of more than 5 years, having been incapable in the previous question of determining what investment would actually be required. These results show a high degree of immediacy in the emergence of new opportunities associated with their main intangibles.

Human capital-associated intangibles needed more time to develop new competitive factors, as 47.6% of the firms whose basic competitive factor was linked to this type of intangible considered that a period of 3 to 5 years would be required, as opposed to 23.5% of firms with a basic competitive factor linked to structural capital and 31.8% of companies in which this basic factor is associated with relational capital, the difference between the first two being significant to 10% only. This result may be due to the fact that, as a number of research papers have shown (Rodríguez-Castellanos *et al.*, 2006), human capital usually affects the results of firms indirectly rather than directly, through its action on structural and relational capital, which makes it reasonable to think that the generation of new resources in human capital requires more time. No statistically significant differences were observed when we analyzed the answers to this question on the basis of company size or sector.

5.4 Determining the yields generated by new assets or competitive factors

Increases in sales (83.9%) and a reduction in operating costs (61.9%) were the principal results of the new resources developed from current intangibles, should the new asset or competitive factor actually materialize. Only 29.7% thought there would an increase in the sale price and 49.2% expected a reduction in non-operating costs.

The new resources emerging from intangibles deriving from structural capital would generate a reduction in operating and non-operating costs in the view of 85.3% and 61.8% respectively, and from Table 2 it is clear that structural capital is most closely related to internal aspects of the company. However, the only statistically significant difference, in this case to 1%, depending on the type of intangible, comes in the answers concerning a reduction in operating costs.

Table 2: Improvements generated by new intangible resources according to type of intellectual capital

	ΔSales	ΔSale Price	∇Operating costs	∇Non-operating costs
Human capital	76.2%	38.1%	52.4%	52.4%
Structural capital	85.3%	14.7%	85.3%	61.8%
Relational capital	88.6%	36.4%	47.7%	36.4%
TOTAL	83.9%	29.7%	61.9%	49.2%

The value of the new resource developed from the current intangible is determined by the yields it is capable of generating, which is why company CFOs were asked if they were capable of determining in some way the amount of such yields and the time such yields would be obtained. 45.7% would be capable of determining these yields, the percentage being greater in large companies than for SME, 64.7% as opposed to 42.6%. The results confirm that large companies know their intangibles and associated elements a lot better. It also confirms the greater difficulty in quantifying the yields in companies where the principal intangible is linked to human capital, with 33.3% of answers being positive, whereas more positive answers were received for intangibles linked to structural (47.1%) and relational capital (50%). In none of the criteria were the differences in responses statistically significant.

5.5 Sustainability and variability of yields generated by new assets or competitive factors

Only firms capable of estimating yields answered the last two questions, which brought the subsample down to 54 companies.

Of the firms that were capable of determining such yields, 29.6% stated that these benefits could be achieved for less than three years, 31.5% reckoned on yields lasting from three to five years, and 27.8% envisaged a period of more than five years. While these terms were shared uniformly when the answers were considered as a whole, Table 3 shows a tendency for longer yield periods when the intangible with which the options were associated is itself linked to human capital, with the tendency reversing towards shorter periods for structural capital. The differences in yield times envisaged depending on the type of intangible were significant to 10%.

Table 3: Sustainability of yields from new intangibles depending on the type of intellectual capital

	<3 years	3-5 years	>5 years	Impossible to say
Human capital	0%	42.8%	28.6%	28.6%
Structural capital	50%	31.3%	18.7%	0%
Relational capital	22.7%	22.7%	36.4%	18.2%
TOTAL	29.6%	31.5%	27.8%	11.1%

The last question referred to the future volatility of yields the new resource might generate from the present-day intangible. 44.5% of subjects questioned would be capable of estimating the variability of these yields using quantitative methods, 37% using a Likert scale, and just 18.5% would either not be capable of doing so or did not answer. It is interesting to see the high percentage of those surveyed capable of estimating this parameter, possibly the most difficult of all, as they accounted for 81.5% of all those who said they were capable of estimating the amount of the yields generated by future assets or competitive factors. But the firms that gave a positive reply to this question were also the ones that showed greater knowledge of their intangibles, and only accounted for 8.5% of the companies in the sample.

6. Conclusions

The first noteworthy aspect was the high percentage of CFOs surveyed who accepted that options existed within their intangibles (70.2%), while only 21.7% said they would be capable of identifying them. This capacity to identify options in their intangibles was greater in large companies and in those whose basic competitive factor was linked to structural capital. When these CFOs were asked to quantify the investment required to materialize the potential new asset or competitive factor, it became clear how difficult it is to use the options approach in the valuation of intangibles, as less than 10% of the subjects surveyed felt they were capable of doing so.55.9% of the companies estimated they would need less than three years to develop the new opportunities associated with their principal intangibles, while 88.1% of subjects surveyed felt that it would not take more than 5 years, which gives an idea of the high degree of immediacy in the emergence of such new opportunities. The time required to develop the new competitive factors is shorter when the intangible with which the options are associated is itself linked to structural capital, while it is longer for intangibles associated with human capital.

Likewise, the new resources developed from present competencies would have to do principally with increases in billing and in the reduction of operating costs. It is interesting to note that companies whose main competence is structural capital-related tend to think that the new resources would probably lead to a reduction in operating and non-operating costs. Large companies are more

capable than SME of quantifying the yields generated by the new intangible resources, while companies whose main intangible is human capital-related encounter the greatest difficulty in quantifying such yields. In any case, only 10.4% of the subjects surveyed said they would be capable of identifying options in their intangible resources and of quantifying the yields the corresponding underlying asset would generate.This last, smaller group of CFOs also gave their opinion on the sustainability and variability of such yields. Opinion was shared fairly uniformly about yields lasting from around three to five years, although longer terms were considered when the intangible with which the options are associated is itself linked to human capital. A high percentage of subjects surveyed said they were capable of estimating yield volatility, without there being statistically significant differences regarding the type of intangible or the sector or company size.

To conclude, it is worth noting that the method of valuation considered, in its real option mode, could be directly applied in only a few companies. There are fewer obvious difficulties in applying the method in large companies, which usually devote more resources to identifying and analyzing their intangibles. We deduce that in firms that have not sufficiently developed the analysis of their intangibles (most often the case in SME), a preliminary phase of analysis and diagnosis would be required before the method could be applied.

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Alignment Between the Business Strategy and the Software Processes Improvement: A Roadmap for the Implementation

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Abstract: Currently, Information Technology (IT) has a strategic role in organizations. In order to be competitive, software companies need to invest in improving their software procedures. However, some companies delay or postpone investment in the improvement of software procedures due to misunderstanding on how such implementation can be successful. For this reason, the strategic alignment is fundamental for the investments in improving processes of software are perceived by effective results in the organization business objectives. Recent surveys show that a success factor of investment in information technology is the alignment between IT and organization strategies for competition. Therefore, the actions for the improvement of the software products and processes, for a better achievement of the organization business objectives, must be related to competitive market strategies. This paper describes the process of developing a roadmap for the support planning and implementation of the strategies of software companies. The roadmap allows to interpret of strategic objectives, to model performance indicators and to analyze the investments in processes of software. The Balanced Scorecard (BSC) and the Practical Software Measurement (PSM) are the basis of roadmap proposed in this paper. The BSC is a management system based on indicators that are driving performance, providing the organization business vision, present and future. The model PSM defines formal the measures to be used and how to conduct the measurement process. Based on these grounds the roadmap basis was developed. This roadmap has been evaluated and improved through action research, developed in a specialized software company in financial segment. The implementation of the methodological stages resulted in the definition of strategic map and its development studied in the organization. The capacitance in management requirements has been prioritized as an action-plan to minimize the lack of definition of scope identified in the process. The final outcome of this study is a roadmap which allows the implementation of strategic alignment of business and the improvement of processes in software companies. The approach strategy to apply action research has enabled the refinement of the proposed roadmap, the learning of the participants and the improvement of the application of method itself. The application of the action research also stimulated the team's commitment. The active participation of stakeholders was fundamental to finalize this study and obtaining the results. The proposed study showed that the investment in management requirements training leaded directly to the increase of the organization billing. This way, has registered how investments in intellectual capital relate to the strategy and the performance of the company.

Keywords: Business strategy; software processes improvement; BSC; PSM; action research

1. Introduction

According to the Ministry of Science and Technology (MST), countries such as China and Indian are establishing closer relations in software area to ensure the border countries more favorable for outsourcing in the technology sector. In addition, reports of the MST shall inform that the volume of investment in software world tends to increase in the coming years. However, the export of software from Brazil is still very small (MST, 2005). In this scenario, the organizations Brazilian software look for reference models for the improvement of processes with the aiming at implementing models of quality in the international market in order to competitiveness and the export of software.

The Information Technology (IT) vision as competitive strategic weapon has been discussed and emphasized, because not only maintains the operations of existing business, but also allows become feasible new business strategies (LAURINDO, 2003). The software companies, as a matter of competitiveness, seek to use techniques and tools most modern, presenting higher productivity in the development of systems, which causes a direct impact on efficiency of this activity (LAURINDO, 2000). The author affirms that investments in technology are addressed to the business, that is, the new software is developed to take account of the business. The need for software is more evident generating opportunity of business for the producers in that segment.

In search of competitiveness, software companies need to invest in improving their processes. However, some companies delay or postpone investment in procedures for the improvement of software due to lack of understanding on how such implementation can be successful (GUERRERO & ETEROVIC, 2004).

For this reason, the strategic alignment is fundamental for the investments in improving software processes are perceived due to effective results in the objectives of the organization business.

Arise then the following questions:
How can be done the alignment of the strategy and investment in improvements in software processes?
How to plan and implement the strategies adopted?
How to analyze the results of investments in improving software in order to maintain or to continue with investment?

The bibliographical research aiming to obtain answers for these questions issues directed studies for the Balanced Scorecard (BSC) because:

- The BSC is linked to business strategy;
- The BSC is process-based;
- The BSC links vision and strategy;
- The BSC allows creation and linkage of organizational scorecards;
- The BSC supports both qualitative and quantitative information;
- The BSC encourages dynamic communication.

The text is divided into 5 sections. Section 2 introduces the concepts and theory that to bring subsidies for understanding the paper context. Section 3 shows the methodology applied. Section 4 describes the results and how they were analyzed. Finally, the section 5 shows the conclusion for this paper.

2. Theory references

The concepts allow to understand and to support the context of this paper. The concepts of software companies define the coverage area this research. The BSC (Balanced Scorecard) was applied as a reference model in the unit of study. The PSM (Practical Software Measurement) was used in the definition of the measurement procedure. The PMBOK (Project Management Body of Knowledge) was used as reference for the plan of implementation of action-plans.

2.1 Software companies

Sommerville (2004) classifies companies which operate on software sector as "provider services" or "products developer".

In accordance with the British Department of Trade and Industry (DTI, 2004) that market can be divided in undertakings providing services of software (for a customer only) and software products developer (for more than one customer).

The software products include:

- Applications, including applications vertical, horizontal, content, collaboration, productivity and applications for customers;
- Development of applications, including data management and infrastructure, tools of access to information, tools of development of applications and middleware;
- Systems infrastructure including networks and systems management, security and storage software and network serverware.

The software services include:

- Consultancy in processes and solutions for business and Information Technology;

- Integration of systems, including the development customized of applications, support applications "package", systems integration "package", support for the use of hardware, integration of systems of hardware and training in Information Technology;
- Outsourcing of business processes, of information systems, maintenance of network, management of applications and infrastructure services.

2.2 BSC – Balanced Scorecard

The model of Kaplan and Norton (2004) – the Balanced Scorecard (BSC) – is a tool which reflects the mission and the strategy of the undertakings in a comprehensive set of measures of performance. The name adopted seeks to reflect the balance between objectives of short and long time, financial measures and non-financial, indicators of trends and occurrence between internal and external performance (KAPLAN & NORTON, 2004).

The measurement system shall make explicit the relations between the objectives and the measures in the various perspectives to be managed and validated (KAPLAN & NORTON, 2004). The sequence of cause and effect must permeate all four balanced scorecard perspectives. This sequence of cause and effect ensures a linkage between the perspective objectives to reflect the relationship of cause and effect assumed in the formulation of strategies. They define the strategic map as a generic architecture for the strategy description of manner coherent, integrated and systematic.

The authors affirm that the development of strategic map takes place in general to the individual (top-down). In order to achieve the objective ROCE (Return on Capital Employed) must start the perspective of learning and growth in the improvement of employees capacity. Consequently, it causes an improvement in quality of the processes ands promotes deliveries in time and increase the loyalty of customers.

2.3 PSM - Practical Software Measurement

The PSM is the model has been established and it is being up to date by renowned professionals Software Process Improvement as John McGarry, David Card and Beth Layman. The PSM has been used as a basis for drawing up the Process Area Measurement and Analysis of CMMI (PSM, 2006). The PSM was officialized through the standard ISO/IEC 15939 – Software Engineering – Software Measurement Process Framework.

The PSM is a model for the structure of the measurement activity in a software project (CARD, 2003). In practice, the PSM defines how to specify measures to be used and how to administrate the measurement process. These objectives are achieved through two models: the Information model and the Procedure model.

The PSM Information model is a structure for measures definition to be used in a project. The model defines the following concepts:

- Attribute – Property relevant from the information needs point of view;
- Method – Operation that maps the attribute to a scale;
- Basic Measure – value resulting from the method application to an attribute
- Function – algorithm that combines two or more basic measures;
- Derived Measure - value resulting from the application of the function;
- Model – Algorithm combining measures and decision criteria;
- Indicator – estimate or evaluation that provides a basis for decision making.

The PSM process model guides the administration of the measurement activities in a software development project. The procedure involves the following sub-processes:

- Plan measurement – Including the identification and prioritization of information needs activities; measures selection and specification; projects integrate measurement procedures. The PSM defines the information in the following categories: term and progress, resources and cost, size and stability of the product, product quality, process performance, technology effectiveness and

customer satisfaction. The PSM includes tables that show the correspondence between the categories of information, concepts measurable and candidates measures;

- Execute measurement – covers to collect and to process data activities, analyze data, produce recommendations;
- Guarantee measurement – Including to assess measures activities, to evaluate the measurement process, update the basis of experience, identify and implement improvements;
- Establish and support the commitment.

2.4 PMBOK - Project Management Body of Knowledge

According to the PMBOK (PMI, 2000), a project is a temporary achievement with the purpose of creating a not equal product or service.

Project is an achievement requiring organized effort, aiming at the development or maintenance of a specific product. The product may include hardware, software and other components. Typically, the projects have cost, cost accounting and own schedule delivery (FIORINI, 1998).

The PMBOK is a guide called "Project Management Body of Knowledge", which describes the knowledge summation and improves the practice of the Project Management (PMI, 2000). The PMBOK standardizes the terms used in the Project Management. It is a material generic used to manage projects of all the areas of knowledge, that is, both for the construction of a building as for the software production.

The PMBOK was created by PMI (Project Management Institute), an association of management projects professionals since 1969. This association created in 1986 the PMBOK first version. According to the PMBOK, the goal of project management is to achieve exceed the of stakeholders needs and expectations. However, to meet or to exceed these needs involves a swing between the various demands competitors in relation to scope, time, cost and quality (objectives of the project); Stakeholders needs and expectations differentiated; requirements identified (needs) and requirements not identified (expectations).

The PMBOK organizes the projects management processes in five groups, each containing one or more processes:

- Initiation Processes – Project or stage authorization;
- Planning Process – Definition and refinement of the best alternative objectives and selection to achieve the project objectives;
- Execution Process – to coordinate people and other resources to execute the plan;
- Control Process – to ensure that the project objectives are being achieved, taking corrective actions when necessary;
- Closure Process - to formalize the project acceptance or stage and to close in an organized manner

The PMBOK processes are organized in nine knowledge areas : Integration, Communication, Quality, Scope, Cost, Time, Risk, Human Resources and Acquisition. Each of the areas has their processes, entries and exits, tools and techniques and it generate documents or deliverable items as results from the process.

3. Methodological approach

This paper methodology starts with a bibliographic survey for the understanding of concepts. The result of this bibliographic research was a theory framework used for the development of a general activities map. This map refinement created to the roadmap basis to align the business strategy and the software processes improvement.

The macro-planning was elaborated to organize the action research stages implementation. The stages of a action research are flexible and provide the implementation of a cyclical sequence of stages in according of circumstances and the dynamics of the research group in relation to the

situation investigated (THIOLLENT, 2005). The quantity of cyclical sequences to be implemented was defined in macro-planning to achieve the paper objective.

The representation of sequence cyclical in the scheme implemented receives as entry the macro-planning and the roadmap basis. Comments records and lessons learned have allowed the roadmap basis refinement. The application action research approach has enabled the gradational roadmap refinement, the participants learning and the method application improvement. At the end of the cyclical sequences implementation was obtained the final roadmap.

3.1 Selection of the analysis unit

The criteria recommended for the implementation of BSC were considered to select the analysis unit appropriate, that is, a strategic business unit with sales, operations, marketing and services activities, which has own customers and financial performance measures.The company focus of this research operates in the Brazilian software market since 1993 and it has representation in the international market since 1998. It has six business units have their own products and services with customers and independent strategic objectives. Strategic Products was the unit selected. This unit offers software solutions as the financial market products. It established in his strategic plan to offer solutions which take into account the resolutions established by the Central Bank as the Operational Risk. The criteria established by the company for choosing the analysis unit were: importance representative for the organization, expectation of growth and the goal of increasing customer satisfaction.

3.2 Action research planning

The team defined to administrate and to implement of this research was composed of: one researcher, one executive director and three coordinators.The participation of the author as researcher was possible due to the long relationship with the company. The performance provided since the preliminary planning until to finalize the research.The following activities were planned in order to obtain the research team commitment:

- Execute the kickoff meeting of the research;
- Clarify the objectives, strategy and the goals of the research;
- Show the roadmap basis;
- Validate the responsibilities and activities of each team member;
- Define the communication plan, clarifying the form of dissemination of results, means to be used and frequency of meetings.

Two action research cycles has defined in the macro-planning:

- BSC implementing cycle;
- Action-plan implementing cycle. It was prioritized the implementation plan the of the CMMI (Capability Maturity Model Integration) Requirements Management.

The action research plan and the schedule were prepared to obtain research team commitment. Status reports have been showed to organization stakeholders.

4. Results

The cycles of action research has been carried out according to the activities detailed in Table 1. Table 1 shows the roadmap steps and activities for implementation to the alignment of the business strategy and the software processes improvement. This table has been adjusted to the end of the action research cycles.The results are described below:

- Meetings need to be prepared and executed objectively, avoiding lengthy discussions without effective results. The focus is very important to better use of the time spent by the participants;
- The decisions have distributed to all participants before the next meeting. This was perceived as seriousness of the research and strengthened the participants commitment;
- Use of previously formatted document has contributed to the meetings objectivity;
- The access to the organization strategy information has motivated the team. The organization has strategies, but there is failure in the communication;

- The BSC model has contributed to the identification of points to detail in organization business plan;
- The concepts about BSC mission, vision and strategic objectives should be strengthened, because has generated many doubts and questions;
- The BSC implementation contributes to verify the organization institutionalization policies;
- The BSC activities and stages allow to understand the concepts and consequently to refine of strategic map and indicators;
- The PSM concepts allow to validate the measures and critical analysis;
- The involvement of the people responsible for integration between the data collection and management systems must occur in the same time of the critical measures definition. This activity is critical to the BSC implementation;
- The Requirements Management implementation has provided increase in the staffing maturity. This action has provided the necessary information to contract client renegotiation. The team realized the benefits of the Requirements Management and they have been motivated to maintain the process practice;
- It has mapped alignment between investments in software process improvement and the company strategic objectives through the results observed in the implementation of the Requirements Management. The requirements change management has allowed the contract client renegotiation. The renegotiation has increased the company billing. That is the financial perspective objectives.

Table 1: Proposed roadmap

Stages	Activities	Product
1.Indicators Architecture Definition	1.1.Select the appropriate organizational unit -Identify a unit which allows innovation, operations, marketing, sales and services	Business Unit characterization
	1.2.Identify the relations between the business unit and the corporation to: - Understand the organization mission and strategy; - Identify financial objectives (growth, profitability, cash flow, volume of extraction); - Identify internal and external policies (safety, environment, staff, quality, price competitiveness and innovation)	Organizational Structure Alignment about organization policies
2.Obtain the consensus about strategic objectives	2.1.The first interviews series for: - Identify the market growth, competitive environment, competitors and technological innovations; - Align BSC concepts about mission, vision and strategy; - Obtain initial organizational strategy information; - Guide the strategy translation in operational objectives tangible; - Map the stakeholders; - Identify potential conflicts (strategic aspects, objectives, personnel or interfuncional)	Organization strategy Alignment about concepts of BSC, mission, vision and strategy
	2.2.Execute a synthesis session for: - Prepare a preliminary list of objectives and measures - Map personal conflicts and organizational points (resistance); - Classify the objectives in the four perspectives; - Verify that the objectives preliminary list shows the unit strategy; - Verify that the objectives in the four perspectives are interconnected in the cause and effect relationship;	Preliminary List of objectives and measures Preliminary Strategic Map
	2.3.Executive Workshop - In the first stage - Show a preliminary list of objectives and measures - Discuss and complement objectives and measures	Strategic Objectives for each perspective Critical success factors and measures list

Stages	Activities	Product
3.Choice and preparation of indicators	3.1. Subgroups meetings: - Refine the strategic objectives description; - Align concepts about indicators (PSM); - List the objectives indicators; - Identify the information sources; - Identify critical relations among the indicators	Strategic Map and correlation analysis of the strategy scorecard
	3.2.Executive Workshop - In the second stage. Discuss about: - The vision, strategy, objectives and indicators	Refined Strategic Map and correlation analysis of the strategy scorecard
4.Elaboration of the implementation plan	4.1.Develop the implementation plan for: - Formalize the targets and indicators; - Define the data collection; - Define the communication periodicity ; - Identify the action-plans; - Prioritize action-plans; - Obtain the current state of the action-plans	Implementation plan Indicators measurement list Indicators measurement roadmap (based on PSM)
	4.2.Executive Workshop - In the third stage. - Validate the Implementation Plan - Validate preliminaries action programs to achieve the targets	Refined implementation plan Action-plans planning (based on *PMBOK*)
	4.3.Conclude the Implementation Plan - Define integration with implementation plan and organization management system; - Define agreements about BSC revision (process, responsible and periodicity)	Refined Implementation Plan

As previously mentioned, this table has been adjusted to the end of the action research cycles.
The definition of indicators is a significant importance in of the organization strategy implementation, because an inappropriate choice could lead to wrong results. According Shibuya (2007), the BSC implementation suggests the performance indicators identification for which they are constantly evaluated and monitored by all those involved.

This roadmap proposed contributes to a constant and regular analysis of the proposed targets, allowing a control broad and objective. In this way, people involved may analyze the results that are actually being achieved by the organization.

CARD (2003) proposes the integration of PSM with the BSC comparing the list of categories of information with the four perspectives presented by Kaplan e Norton (2004).

In stage 3 of Table 1, are identified critical success factors and the critical measures. The proposal is to use the model PSM process in the definition of indicators.

This roadmap proposed applies the PSM process in the indicators definition that must be monitored by the organization.
The BSC model recommends to generate and to monitor performance indicators, but there is no details on how to implement this task. The PSM describe activities to be carried out for the drawing up the measurement plan. It is one of the main contributions of this research.

5. In conclusion

The plans of action planning, using the PMBOK concepts has been standard the design. Thus, the time and cost criteria have been used to prioritization in order to elect the Requirements Management implementation.

The PSM has oriented the indicators definition and monitoring. The concept of BSC indicator is different from PSM concept. There is the relationship between the BSC indicator and the PSM need for information. The basic measure concepts and the PSM indicators have guided the monitoring indicators definition.

The action research results demonstrated the BSC efficacy in alignment between investments in software processes and business strategy in a software company. The internal processes perspective has guided to seek effectiveness with revision process

The research result has shown that investments in process improvement are related with the financial perspective and the client. Investment in software processes improvement has increased the customer satisfaction. The failure to comply with the scope has been identified. The monitoring change requests have provided information to renegotiate contracts. The confidence has increased between the supplier to the service and the customer, because the relationship has matured.

The company focus of this research has not enabled to show the values renegotiated. However, it has analyzed the investment in the Requirements Management implementation in financial perspective. The result is that for each US$ 1.00 invested have been recovered US$ 2.50. The investment has provided a actual return on the organization billing and it has been accompanied by high administration of the company through the strategic map.

The strategic map has been efficient, because it has showed how the investment in management requirements training leaded directly to the increase of the organization billing.

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The Role of Corporate Wellness Policy in Developing Intellectual Capital in a Paper Factory

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Abstract: In an Intellectual Capital (IC) framework, the role of a Corporate Wellness Programme (CWP) was studied from a multidisciplinary approach in a paper industry company of 350 employees. In eleven years follow-up setting, the associations of physical activity, smoking, self assessed working ability, perceived health, sick leave days, body mass index, CWP participation activity, company climate, job satisfaction and motivation were studied in respect to the company's CWP-policy. Different standardized questionnaires were utilized in the data collection. Also qualitative methods were applied in evaluating the CWP-policy in relation to IC. In a cross-sectional and follow-up setting, several findings with respect to IC were made regarding physical activity in general and activity in CWP in particular. Findings were relatively strong concerning Human Capital, indicating that health, wellness and work efficiency related indicators are positively associated with physical activity, while other life style patterns were of minor importance. In respect to Structural Capital, activity in CWP showed positive associations with company climate, job satisfaction and job motivation. In the qualitative analysis, the importance of CWP was emphasized both by management and employees. In the paper industry, where the management's and employee's roles are traditionally more or less predetermined, CWP offers a good tool in developing Structural Capital. "Where else could I get to know the workers except in the volleyball field" says the CEO. Overall, CWP was seen to be an integrated part of Structural Capital, in addition to its important role in health promotion. The CWP was built in Case company with persistent management's support and professional inner marketing. With networking activities and fitness events these reflected positively in Case company's Relational Capital. Wellness matters were taken into account in recruitment procedures, which in turn effected on the quality recruits. The results indicate what role corporate wellness policy can have in developing a company's IC.

Keywords: Structural capital, corporate wellness, human capital, policy, participation, relational capital

1. Theoretical framework

The phenomenon of Intellectual Capital (IC) have been developed from two perspectives; one focusing more on human and inter-relational elements (see, for example, Edvinsson & Malone 1997, Roos & al 1997, and Sveiby 1997) and one focusing more on the financial elements of IC (see, for example, Brooking 1996, Stewart 1997). After an intensive discussion in late 1990's a consensus was reached in practitioner-oriented guidelines (see, for example, Meritum 2001) which define IC as Human Capital (HC), Structural Capital (SC) and Relational Capital (RC).

In IC literature, many deep human factors are missing despite the fact that HC is considered one of the main elements of IC (Sveiby 1997). HC is usually defined as being constituted of numerical profiles of employees, the education and competence of employees and the commitment and motivation of employees. Certain personal facts, such as absenteeism because of sickness, work ability and wellness figures are mostly missing (Hussi 2005), although some early steps have been taken in that direction (Ahonen 2000). Figure 1 presents an interpretation of IC drawn by the authors.

Measurement of IC is considered important for example to improve internal management and external reporting; and to help an organization in strategy formulation (Johanson et al. 2007, Marr et al 2003, Andriessen 2004). In this study several measurements and qualitative methods were utilized to explain the associations between CWP policy and the employee's wellness habits and a company's IC.

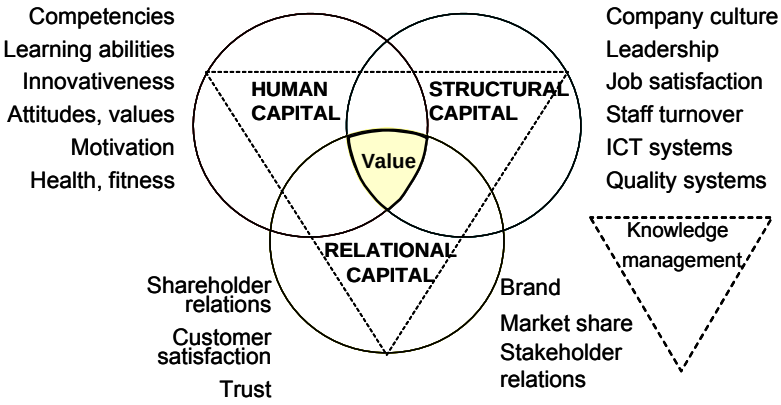

Figure 1: Merging of three types of capital with certain elements of each capital

The concept of a Corporate Wellness Program (CWP) as a scientific phenomenon has been studied mainly in the areas of medicine and behavioural sciences focusing on changes of individual behaviour and health outcomes. Several comprehensive meta-analyses in different areas have been carried out; see, for example, Chapman (2005) and Aldana & al (2005). Chapman (2005) reported a summary evidence of CWP for average reductions in sick leave, health plan costs, workers' compensation and disability costs of slightly more than 25%; which amounted an average savings-to-cost ratio of 5,81. Aldana & al (2005) found that program participants averaged three fewer missed workdays than those who did not participate in any wellness programs. Discussions on the narrow range of indicators in employee wellness has been aroused e.g. by Roslender & al (2006) and Aura (2006, p. 212). Wellbeing was seen to offer the possibility of new knowledge and value in the field of IC.Corporate Wellness is relatively large business (several billion euros globally), which focuses mainly on health promotion and decreasing health related costs of a company. In this study, the phenomenon of the interaction between CWP, life style habits on the one hand and Intellectual Capital and its different elements on the other was examined through HR-type measurements and follow-up in a paper factory.

2. The purpose of the study

The purpose of this study was to examine the connections and associations between CWP-policies and Intellectual Capital and its three components. As background variables employees' life style patterns were investigated. To find new perspectives on the development of IC two research question were phrased:

- Q 1. How are employees' life style habits related to Intellectual Capital?
- Q 2. How is a corporate wellness policy related Intellectual Capital?

3. Methods

Case company (later CASE) is operating in the Finnish paper industry sector as a part of the special product group of a large conglomerate with 350 employees (355,2±16,4 in years 1995-2006). The organization of CASE is based on three business units and a light supportive team, which works in co-operation with conglomerate supportive functions. The declared values of CASE are customer care, openness, readiness for change and continuous development. Above all is profitable business, and the basis is competent personnel. The mean age of the personnel was 42,5 years during 1995-2006, moving between 41,4 and 43,3 in different years. 35-40% of the employees were women.The wellness questionnaires were delivered around the worksite by the WFP activators during one week in November in 1995, 1999, 2001, 2002, 2003, 2004 and 2006. In all years, except 2001 and 2002, the entire personnel were the target group; employees absent from the worksite during that week were excluded. Reasons for not being in worksite were sick leave, holidays, business trips or rehabilitative courses.

Table 1: The samples for questionnaires in different years. Numbers in parentheses represent response rates

		1995	1999	2001	2002	2003	2004	2006
Case A	questionnaire as a part of CWP-development with all employees or random samples	96 (45%)	220 (77%)	sample 60 (77%)	sample 68 (85%)	193 (74%)	224 (80%)	251 (72%)

In the WHO's (World Health Organization) charter health is expressed in functional terms as a resource which permits people to lead an individually, socially and economically productive life (Johanson et.al. 2007). In this study perceived health was questioned according to WHO's standardized Likert style 5-point rating scale question: "How would you describe your health at the moment?" with alternatives "good" (5), "fairly good" (4), "average" (3), "fairly poor" (2), and "poor" (1). To further create a company level indicator, a fraction of subjects giving answers 4 and 5 were calculated as "Good Health".

Work ability is a concept widely used in Finland, and spreading all over the world (Johanson et.al. 2007). It may be understood as 'how good is the worker at present, in the near future, and how able is he/she to do his/her work with respect to the work demands, health and mental resources'. Ilmarinen & Tuomi (2004), In assessing work ability, a personal assessment was used. The final section of the WAI questionnaire (Tuomi *et al.* 1998) was utilized to get "WAE" (Estimate your current work ability compared with the lifetime best so that 10 = the best work ability you ever have had and 0 = inability to work at the moment). To further create a company level indicator, a fraction of subjects giving answers from 8 to 10 were calculated as "good WAE".

Sick leave is an essential part in absenteeism, which has been one of the main interests in the research into CWP (Chapman 2005). According to Revicki *et al.* (1994) self-reported information on sick-leave days and the employer's register were in substantial agreement. In this study subjects were asked to provide the total number of sick leave days during the last year. The time period was pointed out clearly by expressing the year in question. The results were presented in averages of the sick leave days.

A Psycho-social questionnaire was implemented in CASE in 2003 and 2004. The questionnaire was an application of QPSNordic questionnaire (Dallner *et al.* 2000). Eight questions focusing on organisational culture, work unit climate, mastery of work, commitment and job satisfaction were chosen (for details see Aura 2006).

The anthropometrical data contained the subject's height (in centimetres) and weight (in kilograms), both of which were simply requested from the respondents and not measured. Body mass index was calculated, BMI = weight (kg^2) / height (m).

Smoking was questioned with two questions; do you smoke regularly or not?, and How many cigarettes (cigars, pipe, etc) do you smoke in a day? Smokers fraction % of employees was given as a result.

Questions on physical activity were asked separately concerning fitness activities and commuting activity. Based on the amount and intensity of exercise, four physical activity groups were determined: passive, active lifestyle, health related physical activity and fitness-sports (for details see Aura 2006). To calculate a company-based Physical Activity Indicator (PAI) the fractions of health-related physical activity- and fitness-sports groups were summed.

Specific questions were asked to find out the activity of employees in Worksite Fitness Programmes (WFP). The Worksite Fitness Programme Indicator (WFPI) was determined to be the fraction (%) of employees who regularly took part in WFP activities. Still, the Worksite Fitness Program Event Indicator (WFPE) was determined to be the fraction (%) of employees who took part in WFP events arranged by the employer.

Qualitative methods were used in this study to more deeply explore certain phenomena, such as the nature and contents of CWP in the CASE, and interviewees' opinions and attitudes toward activities in CWP. To achieve these goals, semi-structured interviews were utilized (Bryman & Bell 2003, Silverman 2005).

3.1 Corporate wellness programme in CASE

In CASE, the wellness actions had begun in early 1980's in a framework of Maintaining Work Ability (MWA). At that time, the role of occupational health care was essential and the actions carried out ranged from occupational health care examinations to development of working postures. With regard to physical wellbeing, MWA activities began in the early 1990's, when a special "Fitness team" was

founded to develop and implement a thorough physical activity programme. The Fitness team, which is still operating, consists of multi-professional experts and representatives of labour units.

The scope of CWP activities is obviously company specific. In CASE, the scope of CWP shifted from experts responsibilities to superiors' and employee's responsibilities toward the end of the follow-up period. In that phase WCP activities were outlined to include job satisfaction and working climate, control of absenteeism, rehabilitation, utilisation of experience in work, health-enhancing physical activity and WFP activities.

The Worksite Fitness Programme was an essential part of CWP in CASE. The basic elements of CASE's WFP are the internal marketing network, qualitative sports services from beginner's courses to competitive tournaments, and communication material (posters, leaflets, Fitness Passport).

To strengthen the SC of CASE – at that time unconsciously – a WFP activator network was founded in 1995 to implement more effective internal marketing of WFP to employees. At that point, 20-25 employees from all units were selected to act as voluntary WFP activators. In 1999 the number of activators was reduced to 10-12 to strengthen their work. At the same time, a new approach for WFP, "Physical activity for productivity" was launched. In this, WFP was marketed for superiors as a possibility to increase work unit productivity. This deeply work related campaign did strengthen still more SC of CASE.

One trademark of CASE's WFP has been the regular, large "WFP festival" events carried out in the autumn. These WFP festivals are events for the whole family, containing activities such as pony-riding, recreational sports, entertainment and refreshments. The WFP festivals have been very popular, usually 40-60% of employees have attended these festivals. The effects of the WFP festivals on company spirit cannot be underestimated. They served also as a mean to develop RC through some important stakeholders, families.

The expenses of CWP activities were rather constant during the closing years of the follow up (2001-2006). Costs were divided into costs of occupational health care (230-270 €/employee/year), general MWA activities (55-65 €/employee/year), costs of staff training (850-900 €/employee/year) and for expenses of WFP, which were in the range of 230-270 €/employee/year.

4. Results

Overall changes in wellness parameters are shown in table 2. Good Health indicator rose significantly from 1995 to 1999 (Mann-Whitney's test, Z value = -2,26, p<0,05). In work ability a significant fall was seen from 2002 to 2003 (Z value = -2,24, p<0,05). Physical Activity as determined by PAI after the WFP started in 1995 was at its highest in 2001 and at its lowest in 2004. PAI increased from 1995 to 1999 (23,2% to 42,1%) statistically significantly (Z value = -3,22, p<0,001). The increase from 1999 to 2001 (42,1% to 61,3%) was also significant, Z value = -2,68, p<0,001. These changes were, at least partly due to the increased WFP services provided by the employer. Activity in the WFP was high during the whole follow-up period, excluding 1995 when the WFP was in its beginning phase as a health-enhancing worksite fitness programme. Activity in WFP events did increase from 1995 to 1999 (Z value = -2,221, p<0,05).

Table 2; Fluctuation of wellness parameters during the follow-up period

Year	1995	1999	2001	2002	2003	2004	2006
Good Health	57	*	70	78	82	73	75	80
Good WAE		79	91	87	*	72	75	82
sick leave, days/year	6,9	7,9	6,6	5,0	8,5	7,9	7,0
WFPI	25	38	44	45	47	51	52
WFPE	31	*	44	47	52	55	62	57
PAI	23	***	42	***	61	46	47	39	41
smoking	24	27	21	18	24	23	24

* p < 0,05, *** p < 0,001

In CASE's business area (basic industry), the main interest and goal in CWP was reducing the sick leave level, particularly among blue collar workers. No evidence of the effect of physical activity or other elements on sick leave amongst blue collar workers was found in either the follow-up, nor in the

cross-sectional designs. In years 2004 material the excess body weight (high BMI) was related to sick leave days in a regression analysis (R^2 = 6,7%).

4.1 Perceived health

In CASE, general physical activity patterns were the second subject with respect to perceived health. At the individual level, regression analyses were carried out for the years 1999, 2003, 2004 and 2006. In the multiple regression analyses, age group, gender, collar, amount and intensity of physical activity, body mass index, smoking (amount of cigarettes smoked in a day) and activity in WFP were independent variables, and perceived health as a dependent factor. Results showed a wide range of life style habits, which were associated to perceived health. In a follow-up setting, physical activity and perceived health changed in a parallel pattern among white collar employees, see Figure 2.

Table 3; Results of the regression analysis related to perceived health.

year 1999	coefficient	t value	p value	F-value	p value	R^2
Regression coefficients						
Constant	3,186	11,83	0,000			
IPA	0,128	3,16	0,002			
CA	-0,018	-2,89	0,004			
AG	-0,137	-2,916	0,004			
APA	0,001	2,517	0,013			
				14,67	0,000	22,3%
year 2003						
Regression coefficients						
Constant	4,148	9,58	0,000			
IPA	0,099	2,82	0,005			
AG	-0,128	-2,95	0,004			
BMI	-0,030	-2,230	0,023			
APA	0,001	2,18	0,030			
				12,44	0,000	22,0%
year 2004						
Regression coefficients						
Constant	2,518	11,14	0,000			
IPA	0,223	6,22	0,000			
				38,66	0,000	16,1%
year 2006						
Regression coefficients						
Constant	4,672	11,32	0,000			
IPA	0,151	4,44	0,000			
BMI	-0,047	-3,93	0,000			
WFPI	-0,281	-3,35	0,001			
				16,72	0,000	18,6%

IPA = intensity of physical activity (no activity =2, light activity =4, moderate activity =6, rigorous activity = 8); CA = amount of cigarettes smoked in a day; AG = age group (1 = under 30 years, 2 = 30-39 years, 3 = 40-49 years, 4 = 50-59 years, 5 = over 60 years); APA = amount of physical activity minutes in week; BMI = body mass index [weight (kg^2)/height (m)], WFPI = activity in Worksite Fitness Programme (1 = active, 0 = not active)

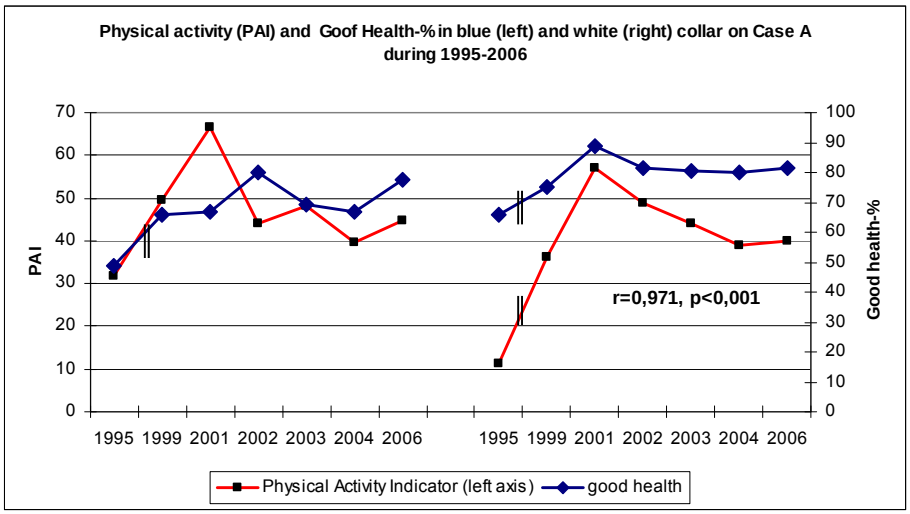

Figure 2: Physical Activity Indicator (PAI) and good health values in blue (left) and white collar workers (right) during 1995-2006

4.2 Work ability

At the individual level, regression analyses were carried out in 1999, 2003, 2004 and 2006. In the multiple regression analyses, age group (AG), gender, collar, amount and intensity of physical activity, body mass index, smoking (amount of cigarettes smoked in a day) and activity in WFP were independent variables, and self assessed work ability as a dependent factor. In years 1999, 2003 and 2004 only the intensity of physical activity was found to create a statistically significant coefficient in the regression analysis, where as in 2006 the amount of exercise formed a statistically significant coefficient in the regression model.

Table 4: Results of the regression analysis related to work ability

year 1999	coefficient	t value	p value	F-value	p value	R^2
Regression coefficients						
Constant	6,64	14,61	0,000			
IPA	0,257	3,45	0,001			
				11,89	0,001	5,6%
year 2003						
Regression coefficients						
Constant	6,38	13,38	0,000			
IPA	0,268	3,56	0,000			
				12,66	0,000	6,6%
year 2004						
Regression coefficients						
Constant	6,75	14,80	0,000			
IPA	0,222	3,07	0,002			
				9,42	0,002	4,4%
year 2006						
Regression coefficients						
Constant	8,07	58,23	0,000			
APA	0,002	2,64	0,000			
				6,97	0,009	3,1%

IPA = intensity of physical activity (no activity =2, light activity =4, moderate activity =6, rigorous activity = 8); APA = amount of physical activity minutes in week.

The follow-up showed relatively parallel changes in PAI and WAE, especially among white collar workers. The correlation coefficients between PAI and WAE were r=0,550 (p=ns) and r=0,840 (p<0,05) for blue and white collar workers respectively.

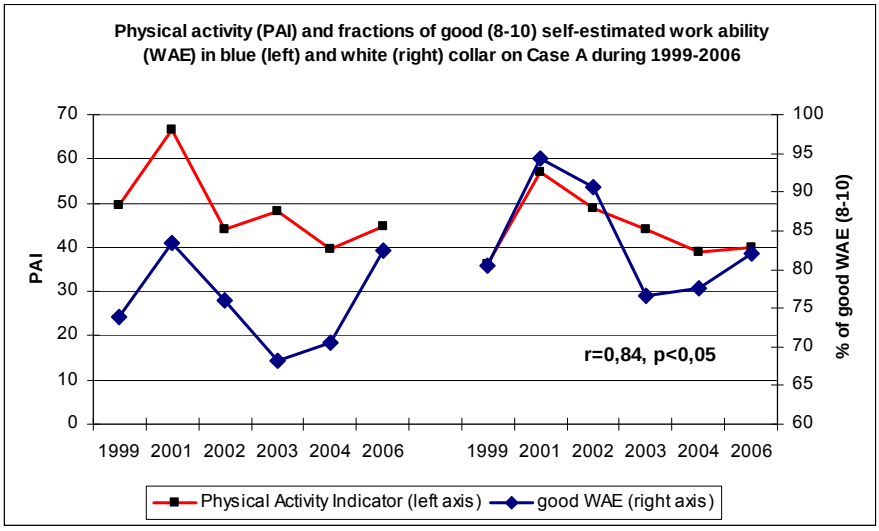

Figure 3: Physical Activity Indicator (PAI) and good work ability in blue (left) and white collar workers (right) during 1999-2004.

The psycho-social questionnaire (Dallner et al 2000) executed in 2003 and 2004 were used to evaluate the relations between CWP activities and elements of Structural Capital.

Regarding general physical activity (active enough in respect to health vs. not active enough) a statistically significant difference was found among male blue collar employees where the “active enough”

subgroup had greater inspiration to give their best in their work than the "not active enough" subgroup (t=-2,25, p<0,05). This single finding is, however, quite impressive from the point of view of employee commitment and thus SC. In 2004 males active enough for health gave better estimates in "How often do you feel you have a good working efficiency?" than males not active enough for health (t=-2,32, p<0,05).

Activity within the WFP showed some differences in results. For the whole staff (t=2,24, p<0,05) higher WFP activity was associated with higher estimates of work unit climate. The same result was obtained when blue collar employees were divided into two subgroups on the basis of activity in WFP events (t=2,82, p<0,01). Male blue collar employees active in the WFP considered that they received help and support more easily from their immediate superiors than employees not active in the WFP (t=2,13, p<0,05). These results received a spontaneous explanation from one female WFP activator when she shouted *"Oh, men have all kinds of games to play together with their bosses. In the office we have male bosses – and we never have physical exercise together!"*

Based on these results, it can be concluded that WFP have had some importance for the work unit climate and employee–superior relationship, especially among blue collar employees. This gives amplified value for WFP – it is not only for activating people to be physically active, it is also company spirit.

These finding were supported by interviews; community spirit or climate was seen important by both employees and managers. An employee in CASE responded: *"Worksite sports are important for the spirit and co-operation between people. A good example was our local "Tour de France", where eight people cycled round the great lakes and another eight to ten guys served as assistants to those enthusiasts. That was real company spirit!"* The CEO of the same company emphasised that *"For me personally, company sports are actually the only way of getting to know our people, it is a value in itself for me as a manager to be with our employees. In this industry, you can't underestimate the importance of the picture the employees are getting from you.* And further, *"In corporate sports, it is important that people do things together, they plan and sport together. That's essential for our company spirit."* In addition, an employee from CASE stated: *"The role of WFP is that you get to know people better."*

The HR manager pointed out the importance of CASE's WFP as the local PR function and recruitment. He stated: *"We are active within the local "Fitness Network", it is good to know other people working in the field of WFP and that is also important for our reputation. Besides this co-operation with other companies, the role of our WFP has risen in importance in the recruitment sector; all people who are applying for a job from us know that we have a good WFP system – and that is why they all seem to be physically very active. Maybe they think that active people are in the front line when we select our staff – and they are not so wrong in that!"* And further he commented: *"And a positive attitude to physical activity is one of the criteria when we recruit people. This is officially agreed with worker's unions and instructed to superiors."*

5. Discussion

We argue, that it is important to realize that corporate wellness policy activities can be seen and used as part of the company's policy to promote its Intellectual Capital. Employees' life style habits showed positive associations for elements of Human and Structural Capital (research question 1). Wellness policy and operative wellness program were connected on several statistical and qualitative findings in supporting both Structural and Relational Capital (research question 2).

In CASE, the CWP policy did strengthen CASE's Intellectual Capital during this study. In the beginning, in the mid 1990's, CWP had the role of basic occupational health and competitive sports activity among employees. During the late 1990's and 2000's, the situation changed towards more work related and employees' responsibility emphasizing activities. In policymaking, the best example would be the campaign "Physical activity for productivity" which aimed (and succeeded) in enhancing superiors' support for WFP-activators.

Professional internal communication material was an essential part of CASE's WFP during those years. The value of this material to employees' knowledge cannot be underestimated. Over the years 2002-04, the PAI trend has been decreasing, although employees' activity in WFP has increased constantly. This should have had more effect on SC instead of HC. One aspect of CASE's WFP policy

is the positioning of physical activity habits as a part of recruitment activity, which in turn secures future HC.

In CASE, as probably in most industrial plants, the role of modern Human Relation functions has been often quite small. Production is planned and managed mainly by engineers and phenomena like Structural Capital is considered less important. In CASE, it can be claimed that the WFP program "Team in Shape" was a strong element in building SC. With a degree of caution, it can be even said that WFP was the only SC activity between blue-collar workers and management during 1995-2003. In 2003, the company climate measure showed such bad figures that some activities were promoted. Those activities resulted in, amongst other things, the measure "magnitude of fluent activity" and alongside this, yearly employee-superior discussions began. The results of the psycho-social questionnaire gave some support to this conclusion; in 2003 (when no SC action had yet begun) activity in WFP affected blue-collar employees' commitment and relationships with superiors. In 2004 (after SC actions had begun) no such relation was found. This would emphasize the importance of WFP in respect to SC at least in this type of factory-like company

In CASE, using qualitative analysis, the importance of WFP was found to have some relevance for RC as well. Manager M1 highlighted the role of physical activity (WFP events) in collaboration with managers in the conglomerate as well as the role of spectator in sports events with customers. Manager M2 focused on the importance of WFP in the local reputation of CASE, which in the case of an old fashioned basic industry company would be rather relevant. The positive influence of WFP on employer reputation could be seen also in the recruitment processes, *"all jobseekers knew we have a good WFP system"* as M2 said. And further he commented: *"And a positive attitude to physical activity is one of the criteria when we recruit people. This is officially agreed with worker's unions and instructed to superiors."*

CASE invested considerably in internal communication as a part of the WFP. A professional media agency was responsible for these activities, which resulted not only in excellent internal WFP material, but also some external media material. CASE has become locally known for its excellent WFP activities. It can be concluded that WFP is an essential part of CASE's Relational Capital, especially when it concerns local PR and even reputation as a good employer.

An overview of the associations between physical activity patterns as well as CWP policy are drawn. Based on the results obtained and conclusions drawn, the associations between physical activity and CWP policy in the framework of IC are be presented in Figure 4.

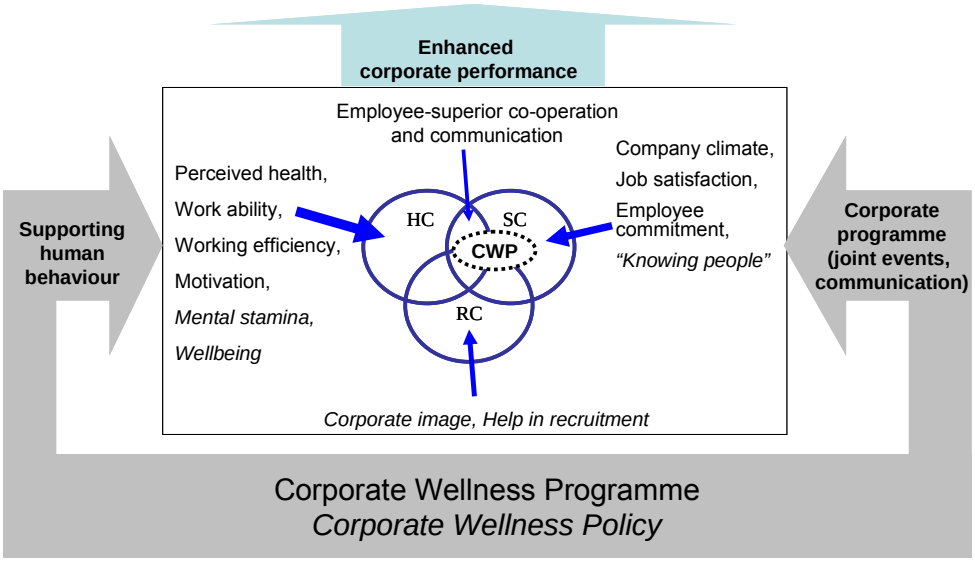

Figure 4: The main findings of the associations between physical activity and CWP and Intellectual Capital. Findings printed in *italics* are based on qualitative findings

In Figure 4 the findings regarding the importance of individual physical activity habits are shown to influence HC. Other effects presented in the figure are associations between CWP-activities and SC. In Figure 4 CWP is depicted as a part of IC: Organising and implementing CWP are to a large extent functions of SC. A CWP will, however influence and interact also with HC and RC.

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Cultural Capital as a Driver for Performance in Higher Education

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Abstract: This paper reviews how awareness of certain manifestations of organizational culture can enhance performance in institutions of higher education. Based on findings from PhD research on the identification of manifestations of organizational culture in relation to performance in higher education, and the work of for instance Scott (2002), Yokoyama (2006) and Becher and Trowler (2001) a classification of manifestations of organizational culture is made. This results in a framework, which encompasses manifestations of organizational culture in relation to performance within Dutch Universities of Applied Sciences. This framework is reviewed in the context of national policy documents on performance in higher education in general and universities of applied sciences in particular. Furthermore, the framework was analyzed by means of semi-structured in-depth interviews with employees of these universities and policymakers within higher education in the Netherlands, observations and a document analysis. By triangulating the data a picture of how manifestations of the organizational culture contribute to performance and in particular which manifestations that were was revealed. The dawn of the 21st century has shed further light on higher education. The two main treaties (Bologna and Lisbon) of the late 20th century brought an unprecedented wave of change in higher education. The times when national and even local institutions and policymakers could establish their own strategies and policies in order to provide higher education appears to be over. The key words for higher education in this era are; diversity, flexibility, within a European framework, stimulating participation, knowledge production, sustainable social and economical environment and higher education as a global marketplace. All the external, environmental factors are affecting higher education. In total five manifestations of organizational culture were identified. In the light of the external pressure on HEIs one manifestation, collegiality, is further analyzed and appeared to be a strength in day-to-day operations of HEIs.

Keywords: Organizational culture, manifestations of organizational culture, collegiality, performance, higher education

1. Introduction

A positive relation between organizational culture and organizational performance is the, a priori, assumption of this study. This relationship, the impact of manifestations of organizational culture on performance is empirically investigated within the field of higher education and so also in institutions offering higher education, from now on to be referred to as HEIs. Although in this paper an attempt is being made to take a broader view of higher education, the account is inevitably influenced by the fact that the author is Dutch and has a learning and working experience in higher education for more than two decades. A Dutch centric bias therefore is unavoidable. Obviously, one can argue whether this is an advantage or burden.

The essence of this study is to provide an insight in the impact of organizational culture on the performance of HEIs within the Netherlands. The intention is, with the outcomes of this study, to explore awareness by the management of HEIs, and management of Dutch Universities of Applied Science in particular, of the influence and value of organizational culture on performance. This paper will conclude with a sketch on higher education in the neo liberal era.

The last decade has witnessed an increasing pressure, and at the same time an invitation from governments and society respectively to grant more autonomy to HEIs. Autonomy granted in the broadest sense of the word, for example policy-wise. Institutions could develop their own curricula for specific market segments, but also from a controlling - governance and performance - point of view. HEIs became less and less dependent on the (local) government in how they could allocate and spend their financial resources. When organizations are examined from a performance viewpoint, the focus is usually on financial performance. This study does this to a certain extent as well, but goes further by examining specific performance indicators for HEIs contextually. Performance indicators are too often expressed in hard figures. Rankings, numbers and percentages only, are responsible for providing an insight in how well, or not, HEIs are doing. Tempting, but nevertheless misleading. These figures, as probably is the case with more figures, are far less reliable once printed in colourful and glossy reports, magazines and brochures, then one would expect. Reasons for this can be found in the immense variety of criteria used in order to count and rank institutions and the way institutions

themselves count and present their figures. Probably, all in their best attempt, but often resulting in an ambiguous morass of figures.

So, instead of only focussing on financial indicators this study aims to contribute to the appreciation of organizational culture towards performance in higher education: culture does matter, especially related to performance. Unravelled manifestations of the culture of HEIs are converted into cultural capital driving performance thoroughly different.

2. Methodology

This study has a strategy of inquiry that is qualitative in character and uses an anthropological perspective in the data gathering process, which comprises an in-depth study with a focus on the relationship between organizational culture and performance. This spectrum is approached holistically in order to unravel manifestations of organizational culture and identify which manifestations are considered to be important within HEIs. The study uses multiple sources of data such as documents analysis, observations and in-depth interviews. Keywords are insight, discovery and interpretation of how organizational culture 'lives' within HEIs and how the manifestations of that organizational culture relate to performance. The paradigm of this study is interpretative and social constructivistic in character and it follows an emic perspective, aiming to learn as an insider.

This (qualitative) approach to organizational culture also follows Schein (1985, 1991, and 1992). Schein's approach to organizational culture is largely inspired by anthropological sources and ways of working. From his definition of culture we learn that the focus is on how members of a certain group solve problems which they have to deal with collectively in their work. By emphasizing problem solving abilities, culture is made a dynamic process with a clear function. Schein's emphasis on the necessary in-depth understanding when deciphering an organizational culture raises questions from scholars with a more quantitative approach to the phenomenon. Disputes arise about objectivity, subjectivity and generalizability when scholars from the different paradigms study organizational cultures. This study respects a wide range of methods (in-depth interviews, observation and document analysis) but focuses on gaining an in-depth understanding of manifestations of organizational culture without the need for a theoretical generalization.

Below follows a brief discussion of methods which were used, and how the data are analyzed.

In-depth interviews. The interview comprises of two parts, first the completion of a questionnaire followed by an open interview. The notes were collected, structured and coded. The questionnaire was processed manually and summarized.

Observation. Although the observation process was initially be unstructured in character themes and categories were used related to the central research question and consequent research questions. This resulted in a description mainly of behaviour and quotes of members of HEIs. The outcomes of this phase are mainly used illustratively.

Document analysis. During the study strategic plans of a selection of HEIs, visionary reports of governments on higher education, reports on Bologna, Lisbon and beyond, brochures and more written material was studied. Parts of this were used to construct the literature review and other parts were related to the outcomes of the fieldwork.

3. Higher education in the Netherlands

This part presents an overview of the sector of higher education, and its main characteristics, within the Netherlands. First light will be shed on the European dimension of higher education, before zooming in to the sector of higher education in the Netherlands.

Higher education in the Netherlands is central in this study on organizational culture and performance. Central, because higher education faces a more profound set of challenges than ever before – globally, nationally and regionally. Universities and colleges, operating within this system, are required to meet the increasingly complex needs of a diverse student population, to address the agendas of lifelong learning and social inclusion, carry out high quality research, and enhance their contribution to economic development and the vitality of communities (Young, 2004). Also central, because no form of education faces more pressure to commercialize than higher education. HEIs experience more and

more competition, and more criticism of the quality of their work, than ever before. By 2001, Europe had the drive to harmonize the varying structures of higher education by making them more transparent and compatible. This was done under auspices of the Bologna Declaration, which started in 1999. With the Bologna Declaration, HEIs face a stiffer competition, through transparency, across Europe as the 40 participating countries unify their higher educational systems (Tysome, 2005). By 2006, 45 European countries inside and outside the European Union have joined the process and reforms as initiated by the Bologna Declaration (Witte, 2006). Governments provide and delegate more autonomy to HEIs whilst at the same time the pressure and impact of accreditation bodies increases, assessing the quality of higher education, often on behalf of the government. In time, this may lead to fundamental changes in the structure of these institutions, their organizational culture, market and perhaps in what they teach and how. It leaves no doubt that higher education is indeed a global enterprise, and although significant differences still exist among nations and continents, Green et al. (2002) issue in this context that the three main environmental forces; technology, globalization and competition are very much the same. Obviously, there is a combination of forces, both internal and external affecting HEIs, but technology, competition and globalization can be considered, according to Green et al. (2002), as the forces driving HEIs for changes. 'They interact with each other, so that technology intensifies competition as well as enables globalization; similarly, globalization fosters competition. It is impossible to consider one of the three without introducing the others' (Green et al., 2002: 7). It is clear that the external environment influences HEIs. In terms of organizational culture Schein (1985, 1991, 1992 and 2001) refers to this as the adaptation to the external environment (opposite the internal integration) and states that organizations with their constant drive to adapt to the outside world are open to change. This study does not discuss scenarios for growth and/or future. As some predict that whole university campuses will be demised (Drucker in Green et al*.,* 2002), or that face-to-face teaching will be replaced by on-line learning and that perhaps teaching is replaced by conducting research only, on all levels of education. These external environmental factors create a need for internal awareness.

With the implementation of the annual Dutch Plan for Higher Education and Research (HOOP 1998), higher education was directly confronted with the perceived tension of parameters as performance, efficiency and improvement of the institution on the one hand and quality assurance and enhancement on the other (Beltman, 2001). HEIs were more intensively assessed on quality and funded on the basis of their performance. These reforms were very much driven by the government (in the name of the Minister of Education Ritzen at that time). This resulted in a rather technocratic and administrative approach to the implementation instead of addressing the notion of organizational culture. This study gives organizational culture not only a prominent position but will provide an insight in how values, beliefs, and assumptions about the way of working will be more effective. Culture does matter in relation to performance.

The higher education system in the Netherlands is based on a three-cycle system, consisting of a bachelor, master and PhD (Nuffic, 2004). The three-cycle system was officially introduced in the academic year 2002/2003 and was implemented earlier and more comprehensively than most other nations adopting the Bologna Declaration (Witte, 2006). The Netherlands has a binary system of higher education, consisting of universities of applied sciences (HBO), providing study programmes in the applied arts and sciences, and university education (WO) providing academic, research-oriented programmes of study. HEIs in the Netherlands are governed by the Higher Education and Research Act since 1993. Altogether some 350,000 students are enrolled in universities of applied sciences and some 205,000 students at universities (Marginson et al., 2007).

4. Theoretical framework

This part covers a literature review and addresses organizational culture and organizational performance. The literature review provides insight in the analysis of the underlying process of which and how manifestations of an organizational culture influence performance. Do organizations with certain cultural manifestations perform better than their peers? This applied to the context of higher education raises questions like; what manifestations of culture, in relation to performance, are considered important for members of HEIs that influence their performance?

Organizational culture as a concept has been widely discussed within management literature. The application of the concept by Peters and Waterman (1982) made organizational culture a useful and viable tool to managers. Reading their major publication in 1982, In Search of Excellence, one could

learn that when organizations acknowledge their culture, success would be on the doorstep. With the development of cultural theory and research we have learned that organizational culture can be of influence to performance (Hofstede, 1980; Deal and Kennedy, 1982; Kanter, 1989; Koot and Hogema, 1990; Denison, 2001 and Flamholtz and Kannan-Narasimhan, 2005). These researches have also shown that simple promises of culture being the key to making profits are difficult to validate and in some cases of the organizations used in the research of Peters and Waterman (1982) not reliable. Where in Search of Excellence (1982) Atari, IBM, Wang and Xerox are referred to as America's best-run corporations some of them did face financial troubles a year after the publication and others completely disappeared.

The literature review provided many different approaches towards unravelling and understanding an organizational culture. These approaches are anchored in various Schools of Thought, which delineate different methodologies in order to unravel the construct. The number of existing definitions of (organizational) culture does not add value to clarity, transparency and usefulness of the construct. The range of definitions varies from defining single components to that of a holistic phenomenon, including culture being the 'collective programming' (Hofstede, 1994) to the often heard 'the way we do things around here'.

This study mainly follows Schein's (1985, 1991 and 1992) definition of organizational culture. Schein because he explicitly raises the functional analysis of organizational culture and relates this to the work of one group. What culture does in Schein's view is, to solve group's problems of surviving and adapting to the external environment on the one hand and integrating its internal processes to ensure the capacity to continue to survive and adapt on the other (Maslowski, 2001). Schein further compares the formation of a culture with the process of group formation. Every group develops an identity, what he/she refers to as the shared patterns of thought, belief, feelings and values, which results from the shared experience and common learning within that group.

The definition of organizational culture which this study follows is from Schein (1985, 1991 and 1992): *A pattern of basic assumptions that a given group has invented, discovered or developed in learning to cope with its problems of external adaptation and internal integration, and have worked well enough to be considered valid, and, therefore, to be taught to new members as the correct way to perceive, think, and feel and in relation to these problems (*Schein, 1991, p.9).

Schein also recognizes subcultures, which can be clarified through the three perspectives (integration, differentiation and fragmentation) of Martin (2002). Tennekes (1995) issues another strength of Schein's approach to organizational culture: Schein considers basic assumptions, in relation to their environment and in interaction with the nature of the world and human interaction within, as the core of a certain culture, this whilst others often see defined values more as a basis of a culture. So, this study considers organizational culture as a dynamic process instead of a static phenomenon. When one aims to unravel an organizational culture Schein (1985, 1991, and 1992) issues that an anthropological perspective is very useful, but above all an iterative clinical way of working.

5. Organizational performance

Organizational performance is often reflected in (performance) indicators. The relevant performance indicators for this study are validated through the literature review and the aim is to refer to standard measures and scales, in order to maintain transparency and support the reliability and validity of the empirical part of the study. Examples of performance indicators are financial indicators or the perception on the financial performance, probably resulting in studying growth and market share over a certain period of time. Another indicator is the position the institute has within certain rankings and the number of accreditations (over a defined period of time). Although one should be careful when comparing different rankings, this because of acceptability and culture a nation has towards rankings and the variety of indictors and scales used. The assessment of quality in higher education is mainly done through accreditation. There are a number of organizations accrediting educational institutions. Some are a direct initiative from a Ministry responsible for education, some are more market-driven, or a combination of the two. A major force that drives accreditation bodies is the principle of benchmarking; according to a set criteria (mostly) peers measure whether, and to what extent institutions meet these criteria and are allowed into the arena of accredited institutions. This approach can be compared to the process of identifying a suitable merger partner. Tangible criteria, like market

share, income and profit are initially assessed, usually by means of due diligence, a process that occurs before legal contracts are signed for the merger. Specialists are going through the target organization's accounts and other records, to ensure that all is in order. HEIs are assessed, mostly on a five to seven-point scale, on dimensions like library, learning and ICT facilities, number of staff involved in research, student intake and progress ratios, salary performance of graduates, number of international members of faculty, composition of teaching, research and doctoral ratings often determined by the number of faculty's publications added with the vision, mission and future strategy of the institution. This is a rather quantitative approach without an assessment of the intangible assets. The emphasis is often on hard facts, whereas the more so-called 'softer issues' as image, identity and organizational culture are usually left out.

6. Outcomes of the study

Preliminary findings show that when manifestations of organizational culture are embedded within a strategic context of universities of applied sciences, the perceived performance increases. A collective way of thinking and caring for the institute - 'we' belong - often results in (better) motivation, opportunities, freedom and trust to fulfil the needs and tasks. Internal as well as external. With regard to the internal needs it should contribute to the creation of a scholarly culture, and so provide solutions to external stakeholders like industry, public sector and higher education itself. With the strategic context is meant that these manifestations of the organizational culture should not only be addressed by management but effectively used in the operationalization of their strategic plans. If so, this will lead to renewal (innovation) of the organizational structure (structure follows culture) and finally contribute to the reputation of the institute.

The data gathered are triangulated and presented as such. The data appears in words and not in numbers. An overview of the data is presented in Table 1 and are processed, reduced and made ready for use. Although the five manifestations of the organizational culture are contextually and holistically unraveled this paper will further focus on the manifestation 'collegiality'. This is not due to a certain hierarchy amongst the manifestations in relation to performance, but mainly a focus because the current external pressure HEIs face requires a bottom-up rethinking of higher education. This in the context of performance of HEIs brings collegiality more in a spotlight.

Table 1: Manifestation of organizational culture

Manifestation of organizational culture	Brief explanation
Collegiality	Refers mainly to value and trust among (direct) colleagues. Without hierarchy professionals work together in order to perform in (good) teaching and/or research. Colleagues use each other as peers and the absence of supervision/hierarchy enables them to create professional value which contributes to (better) performance.
Tight – loose control	Refers to the level of internal structuring of the HEI and to what extend the planning and control cycle is leading the entire operation. This manifestation is often referred to in a management context. Tight refers to behavioural aspects of for example how strict management preaches cost-conscious, organizes meetings and appointments are made. Tight control appears to be of value in staff departments. On the professional level (only) autonomy counts and (academic) freedom - loose control - contributes straight into a better work relation and thus performance.
Up and down stream trust	The identified level of trust from professional level to the senior management in terms of 'do we trust them above us in doing the job in order to facilitate us right' and from the senior management the belief 'can they do the job they are here for'?
Diversity	The, not to be wished, opposite is McDonalization of higher education. No standard majority of students and staff. The research and educational programmes on offer should be a mixed portfolio in order to attract 'the mass' into higher education.
Internal – external focus	How do we see our institute itself and how do we want to be seen? This manifestation expresses the need and perceived necessity to either profile the institute in the outside world or focus on the well-being of the internal processes.

7. Analysis and discussion

Fieldwork provided a direct insight and understanding of manifestations of the organizational culture and why they were considered as important in relation to performance of HEIs. An understanding mainly on the basis of how day-to-day elements of working within HEIs were manifested within cultural values. Performance in this context mainly concerned recruitment, quality assurance (often expressed in NVAO-accreditation) and financial indicators. In a drive to perform better, in combination with the changing external environment is probably input for professionals to cooperate more intensively together. This is why out of the identified five manifestations of organizational culture collegiality is further discussed below.

All respondents were fully aware of the financial implications of the performance indicators. Collegiality appeared in discussions on how to gain optimal funding for school/faculty. Interesting is that the majority of the respondents viewed this way only from their own school/faculty perspective and hardly anyone from the institutional level, with the exception of the Vice Chancellor and Pro-Vice Chancellor's (President and Vice President) level. The road to gain optimal (research or projects) funding is for members of HEIs (school and/or faculty level) a matter of mutual trust. Trust in terms of capability and professionalism, in other words collegiality as a professional value. The perspective to reach the same objective from Vice Chancellor and Pro-Vice Chancellor's level (or equivalent) is more a managerial value, based on a rigorous planning and control cycle, top-down monitored in order to reach targets as set on corporate level.

In this context Yokoyama (2006) fairly states that a drive to performance has an influence on the organizational culture of HEIs. She presents collegiality on a (bi-)dimensional scale and although applied to research funding the impact of collegiality appeared to be valid to other aims funds needed to be raised. She brings up this dimension in relation to a level of bureaucracy and managerialism. This results in the following table (2) which is applied into the context of this study and provides an integrated view on Yokoyama's works on the effect of a drive to performance.

Table 2: Characteristics of collegiality, managerialism and bureaucracy based on Yokoyama (2006)

	Collegiality	**Managerialism**	**Bureaucracy**
Locus of power	School/faculty	From (Pro-) VC or equivalent to senior management of school/faculty (2 layers)	Central or local administration
Value	Academic community's value (freedom)	External stakeholders' value	External stakeholders' value (good governance)
Management	Trust informality, minimal hierarchy	Lack of trust, strategy formality, hierarchy	Prescription formality, hierarchy

It appears that Yokoyama (2006) recognizes that collegiality is based upon academic value and trust between academics. The locus of power is often on school/faculty level, where minimal hierarchy fuels the scholarly culture.

It is not the case that on central, Vice Chancellor and Pro-Vice Chancellor's level (or equivalent) level, collegiality amongst 'their' academics is not valued, but improving efficiency, cost effectiveness in relation to performance is much more emphasized. This brings collegiality in the midst of the dimension academic capital value versus financial capital value.

8. Conclusions

This study has indicated that cultural capital, specifically on the professional level fuels performance of HEIs. It is important to explore manifestations of organizational culture by looking closely to the external environment of HEIs.

The consequence when management of HEIS 'only' considers numeric data in order to plan and control towards performance is a narrow focus on a process and an undervalued attention for content and its carriers, the students and professionals. They are pivotal for success and should both be seen as clients. This is not to suggest that financial performance indicators are not important when reviewing the performance of HEIs, but it is the combination of both hard, quantifiable facts and the more invisible qualitative stimuli as manifestations of organizational cultures that influence performance. What is important is that senior management more clearly presents and discuss the external environment to these professionals. This probably will increase the level of trust between

these two entities and raises awareness and motivation, mainly on professional level, to literally get together, and 'fight' the enemy. Or in nicer words, create and find opportunities, derived from the external environment, and perform better accordingly. Performance should explicitly be seen (by the senior management) in the context of academic work; teaching, learning and research. The increased importance of academic capital, to a large extend valued through cultural capital should obviously not lead to academic capitalism. When one confronts the external environment with the (internal) cultural factors one would be able to portray how higher education can fulfill needs and ambitions as defined in the external environment.

When commercial organizations are confronted with turbulent factors from the outside world an often heard strategy is back to core business. What are we good in and why do we do it anyway? Perhaps it is time for HEIs to follow this pattern and ask themselves what gives them their raison d'être? The fundamental birth of HEIs – universities originates in the need for a community of students and scholars engaged in higher education and research. One place, physically and virtually where students, researchers, teaching staff produce and share knowledge. This place is characterized by minimal hierarchy and maximum trust, where basically everybody can participate in bringing, getting and sharing responsibilities for better research, teaching and learning. This place is mainly funded, and thus governed, by the (local) government, however, industry and the public sector, also referred to as the market, are a decisive factor in strategy formulation and stimulation and requesting, at the same time, knowledge production. Obviously, capital in an economic context remains an important input factor, but with the added value, the output of these communities, academic capital is created and so can input, throughput and output of HEIs structurally serve society at large and meet great ambitions as formulated in the Lisbon convention and stimulate (knowledge) economies.

This macro perspective neatly fits the function of the cultural capital on a more micro level, within HEIs. The universe of HEIs in this sense does not differ from industry and/ or commercial world. The external environment, and its requirements, needs to reflect to and balance with the internal organization.

Although governmentally funded and governed policies and strategies for HEIs should comply with market principles. Restructuring academic cultures should be given more priority, mainly in order to fulfill needs as described before and/or survive, however this should not lead towards a McDonalization of higher education. A 'commodification' of academic practices threatens the learning, teaching and research ambitions of HEIS and are too relevant and important for the social and economical environment. When the unravelled manifestations of the culture of HEIs are converted into cultural capital the drive to perform will be thoroughly different.

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Managing Intellectual Capital in Hungarian Universities – The Case of Corvinus University of Budapest

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Abstract: The quality of higher education is a key element of international competitiveness. The changes of higher education on the market draw the attention of Hungarian higher education institution to acknowledging the increasing role of knowledge resources. Responding to the recent changes, several European universities have began to measure systematically their intellectual capital, but well-developed models – except the Austrian case – are still not available. Aiming to identify the main characteristics of measuring and reporting the intellectual capital we carried out a research in Corvinus University of Budapest (CUB) based on the method of document analysis and executive interviews. Our paper sets three research aims: 1) First, by examining and systematizing the practice of external and internal reporting system at CUB, we give an overview of the content and method of intellectual capital management of a higher education institution. 2) Second, we identify the existing information on the different element of intellectual capital found in the reporting. 3) Third, we examine the existence of such any integrated management and reporting method like the Wissensbilanz-model used by the Austrian universities

Keywords: Higher education, Intellectual capital, reporting

1. Introduction

Recent reforms in Hungarian higher education, in accordance with the so-called Bologna directives, aim at stimulating competition among institutions, reshaping the governance of universities and colleges and strengthening performance and management accountability. As consequence of these and other changes on the higher education market (e.g.: more heterogeneous audience, diversified program-portfolio, appearance of for-profit research centre as competitors etc.), the Hungarian institutions face higher competition. This emphasizes greater consciousness on performance and knowledge resources when performance measurement and management techniques are partly or completely non- or misunderstood in Hungarian academia.

Besides, there are additional general changes in the organizational life: many researches have discussed the increasing role of intangible assets in the value creation process – especially in knowledge-based institutions. Universities being such organizations should be also aware that their performance and competitiveness depends even more on the management of its knowledge resources, so they need relevant information about them.

Responding on the recent changes, several European universities have striven to measure systematically their intellectual capital and the performance of their lecturers and researchers, characteristics of their partnerships and formal structures. In the practice we can find a lot of methods focusing specially on monitoring the non-material resources in the higher education, but well-developed and tested models – except the Austrian universities and research centers – are still not available.

Originating from this requirement mentioned above, our analysis examines the situation of a Hungarian higher educational institution from the aspect of management and monitoring tools used for tracking intellectual capital. Assuming that the Corvinus University of Budapest (CUB) – being one of the leading universities in Hungary that conducts both educational and research activities – illustrates the aspects of the Hungarian and the Central- and Eastern-European comprehensive research universities well. In our research we used the case study methodology. It was also an important factor of our choice that as associates of CUB we have had greater opportunity to understand the operations better and deeper. Moreover, it has been assumed that at CUB, as one of the leading regional higher educational institutes, we can find state-of-the-art management practices –

which are conductive to develop and maintain the new intangible asset-based competitive advantage and management attitude in this sector as well – with higher probability.

During the cognition and description of the intangible practices of Corvinus University of Budapest we have done mainly document analysis and executive interviews. By using these analyzing methods we would also give a criticism of the university's management, controlling and reporting system, mainly based on the criteria given among 'universal' recommendations, but also taking specific factors of higher education into consideration.

Based on the abovementioned management problem the most important goals of our research can be summarized as follows:

- Analyze and systematize the recent intellectual capital management practices at the Corvinus University of Budapest;
- Identify the existing information on intellectual capital found in the reporting system –both in external and internal reports;
- Examine of the existence of any integrated management and reporting methods like the Wissensbilanz-model used by Austrian universities.

Through analyzing only a case organization we should however emphasize that we are not able to conclude general observations and direct recommendations neither on the whole management system of the Corvinus University of Budapest nor the intellectual capital management practices of other higher educational institutions. The previous aims or aspects require former and multi-sided analysis which taken not only at CUB but also at other universities in the region.

2. Literature review: theoretical and methodological background of the analysis

2.1 Definition of intellectual capital

In the literature there is no universal definition in the realm of management studies for the collective word of non-material resources. Thus, they are frequently referred as intellectual capital, although many different explanations and definitions exist. Since our goal is not to provide a detailed introduction of these explanations, hereby, we are only highlighting the most important ones that bring us closer to our own approach of understanding intellectual capital:

- Frequently, those resources are called intangible assets that have no physical-material or monetary shape or existence but still they bear value for the organizations (based on Kaufmann – Schneider [2004]; Arbeitskreis IWR [2001]).
- Gu and Lev [2001] emphasize the role of context and declare that knowledge resources do not necessarily mean value, but they turn into values that support and integrate into the wealth and value producing processes. The authors look at R&D, marketing- and advertising, HR and IT practices as the most important sources of non-material assets.
- In another definition the intellectual capital refers to the assets in the company that are based on knowledge. This approach emphasizes the (internal) attributes of employees' knowledge and experience, organizational structure and processes or the informational systems of a company. Among the outside factors the brand value and customer loyalty and trust can be highlighted (Brennan – Connell [2000]).
- Edvinsson and Sullivan give us a similar definition when they declare the intellectual capital as knowledge that can be converted to value (market results or company earnings) (Pfeil [2004]).
- The RICARDIS research, supported by the European Union, is analyzing the role of intellectual capital among small- and medium size enterprises focusing on R&D. Here, the knowledge capital means the organization's human capital, structural and network capital and the business operations related to these (RICARDIS [2005]. p.4).

The list of definitions could have been continued (see among others: Bontis et al. [1999]; Mouritsen et al. [2003]) but even reading the abovementioned ones it can be concluded that all of them provide a rather global explanation and setting which makes their application less feasible and valuable in empirical researches. The latter one calls for a deep analysis of the subject matter, most researcher builds a definition for intellectual capital by defining categories of its substantial elements.

A well-known categorization can be found in the works of Sveiby, who divided the intangible wealth of organizations to the following three groups:

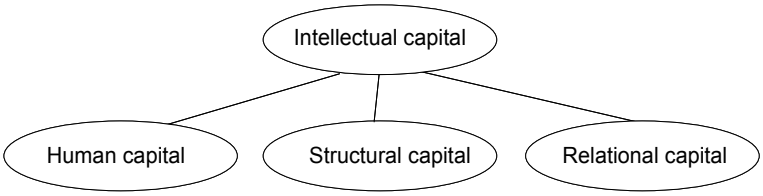

Figure 1: Categorization of intellectual capital (based on Sveiby [2001a] and [2001b])

Beside Sveiby's approach numerous other categorizations exist in the literature (e.g.: Stewart [1995]; Bontis [1996]; Brooking [1996][1]; Arbeitskreis IWR [2001], Edvinsson [2002]), which do not provide a standard framework for understanding intellectual capital as well, but help us to get a hold on the underlying characteristics of it. However, the detailed explanation of the aforementioned concepts is not the main purpose of this study.

In our research we define intellectual capital as the organizational and individual knowledge elements and the potential for creating value that derives from the internal and external relations and connections of the organization. In our specific analysis we are using Sveiby's categorization, with regards to the fact that in the academic environment and among the Hungarian settings sometimes the implementation of new sub-categories or the use of different weighting of the elements may seem reasonable. We have to emphasize that the Austrian model of Wissenbilanz – which have been the basis of our research – also uses the same categories, with minor differences in weighting or allocation of elements.

Table 1: Our research-explanation of intellectual capital

Elements of intangible assets	**Content, meaning and feature of category**
Human capital	Human capital includes the education, knowledge, ability, competency, motivation, commitment and willingness for growth and learning processes of the employee basis.
Structural capital	Structural capital consists of the attributes of internal business operations including the processes, internal cooperation and organization culture.
Relational capital	In the narrow sense it stands for the external relations of the organization – since the student related data shall not be considered here, but among the outputs – however, the student satisfaction, pass/fail ratio and even the quality and quantity of the students' foreign study experiences can be included.

2.2 The Austrian Wissensbilanz-model as the starting-point of our analysis

Because of the previously discussed tendencies, the institutions of higher education call for a firm and structured conduct when dealing with non-financial values. The crucial ingredients of competitiveness are development, flexibility and the appropriate management of the core competencies. In the case of the universities – being a "knowledge-producer and user" organization – without the information on intangible resources the previously mentioned competitiveness is impossible or ultimately difficult to achieve. The measuring and status of intangible assets (ratio, quality, critical areas, trends of change etc.) and its descriptive analysis, besides the effective usage of these pieces of information and the structured command of knowledge management is growing in importance and challenge. As an answer to this challenge many alternative reporting and management tools have surfaced besides the mainstream business toolkit that were specifically designed to focus on universities and research institutions.

As a starting-point of our analysis we have chosen a similar model, namely the widespread method used at the Austrian universities and research institutions called Wissensbilanz. The following reasons have supported our decision:

[1] See in: Roslender – Fincham, [2001]; Kannan – Aulbur, [2004].

- Austria and Hungary are neighboring countries, so the universities of these countries can be interpreted as competitors to each other.
- The Austrian regulation prescribes reports in standardized structure and format (sections, measures, topics). This formalized method can serve as a basis to compare performance of different universities.
- The aim of Wissensbilanz is to provide proper reporting towards the state, and the external partners, however it is able to inform the management about the features of non-materialized resources.
- The Wissensbilanz is capable of displaying non-financial factors besides the financial ones. The frequent evaluation of the measures and the integration of the non-financial elements becomes a reality, trends and tendencies or cause and effects can be discovered. Through this, the internal management efforts can be utilized on a higher level.

In the Austrian Wissensbilanz-model the measurement of intellectual capital is implemented by an indicator-based system (see detailed: Wissensbilanz-Verordnung [2006]). These indicators are defined in line with the university's strategic objectives and the governmental agreements and highlight those areas in which the institution has to develop significantly to fulfill the set of requirements. Besides the strategy, other specific topics appointed by the regulation (e.g: students having part-time jobs besides studies, parents raising their children, quality insurance development or continuing education of the employees) could be measured in the model, too. The relationship between the measured performance elements and dimensions of Wissensbilanz-model are shown in the following chart:

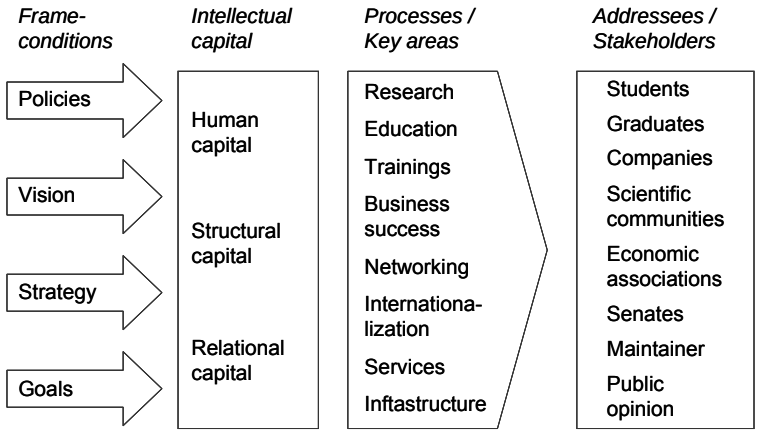

Figure 2: The Wissensbilanz-model (based on FH-BFI Wien [2006]; Wissensbilanz-Verordnung [2006])

Paying attention to the features and indicators of human, structural and relational capital Wissensbilanz can serve as an aid not only for the maintainers and other stakeholders but for the managers of the university to find and lead the vital factors – the outputs of the operations – that will determine the institution's effect on its environment. This external effect (output), for instance, can be the absentee ration, the number of classes, the number of on-time graduates, the number of scientific publications, the number of organized scientific events and conferences, the ratio of students studying abroad.

3. Case study: managing of intellectual capital at Corvinus University of Budapest (CUB)

3.1 Introduction of the university

The Karl Marx University, the predecessor of Corvinus University of Budapest, was established in 1948 as the first university of economic sciences in Hungary. At the end of the socialist era the new name became Budapest University of Economic Sciences, which had three faculties: Faculty of Business Administration, Faculty of Economics, and Faculty of Social Sciences.

In 2000, due to the integration process in Hungarian higher education, the university merged with a college, which became the Faculty of Public Administration, and offered a bachelor degree in this field. In 2004 three new faculties joined the university: Faculty of Horticultural Science, Faculty of Food Science, and Faculty of Landscape Architecture. The seven-faculty university adopted the new name of 'Corvinus University of Budapest' (CUB) in 2004. The short term goal of the University is to maintain its leading position in Hungary and enhance its international reputation.

The University is located in the capital of Hungary, the heart of the scientific and cultural life of the country, which makes the institution even more attractive. Most of the buildings are located on one of the three campuses in Budapest, although there are facilities outside the city (such as model gardens and botanical gardens). The infrastructure of the University improved immensely in 2007 when large-scale investments were completed.

17,708 full-time and part-time students were enrolled for the courses of CUB in the academic year 2007/2008. In the recent years the ratio of full time/part time students has not changed much: the proportion of full time students has increased to some extent whereas the proportion of part time students has decreased (the ratio of full and part time students is about 60/40). The ratios of state-funded and fee-paying students have been nearly 50-50 %. In 2002 the university had 969 employees which grew to 1446 by 2007 (the size of the academic staff was 974). In 2007, 48 per cent of the employees were academic staff members and 52 per cent were non-academic employees. Revenues of the university in 2007 can be expected to total around 60 million Euros (52% from state sources, and 48% from 'market' revenues).

Table 2: Faculties and numbers of Corvinus University of Budapest (source: CUB [2008b])

Faculties	No. of students (2007)			No. of teachers, researchers (2007)	
	State-funded	Fee-paying	**Sum**	Part-time	Full-time
Faculty of Business Administration	3421	2361	5782	60	177
Faculty of Economics	1404	886	2290	22	115
Faculty of Social Sciences	1404	1209	2613	20	109
Faculty of Public Administration	839	2180	3019	6	78
Faculty of Food Science	549	658	1207	14	90
Faculty of Horticultural Science	1344	731	2075	2	98
Faculty of Landscape Architecture	572	150	722	5	30
CUB SUM	**9533**	**8175**	**17708**	**129**	**698**

3.2 Available information on intellectual capital at the Corvinus University of Budapest

3.2.1 External reporting sent to authorities and other outer parties

The Corvinus University of Budapest draws up neither Wissensbilanz nor any other report with similar content at present (it is not a legal requirement to prepare a report like that in Hungary). Nevertheless it has to submit several reports and statements to various external bodies (like to the ministry that provides the funding of the university), but none of these reports are equivalent to the Austrian model.

Accordingly, we could have found a lot of data on intangible resources that are available at the university and which are also made for the public in accordance. The source of information and measures of intellectual capital can be collected primarily from the latest Institution Development Plan (CUB [2007]) and from the self-evaluating documents submitted to the Hungarian Accreditation Committee in 2008 (CUB [2008a]). Besides, the obligatory annual report that the university's library has to submit to public authority also contains indicators which measure intangible resources. And finally, CUB has to collect and report data on immaterial resources to the Ministry of Education and Culture in the so called Research and Development Report and other documents (e.g.: compulsory monitorring of performance in research centres, reporting of incomes from corporate relations, CEEPUS Mobility Report etc.) which are drawn up based on the information supplied to the authority or other external parties by the university.

Analysing the external reports, our university registers and makes public the following indicators of intangible assets (indicators are grouped into three categories according the Austrian Wissensbilanz-model):

Table 3: Indicators on intellectual capital in external reporting

Indicators of intangibles (external reporting):
A) Human capital:
1. Total number of employees in full time equivalent (FTE)
2. Academic staff's' FTE
3. The academic staff's' age distribution
4. The average age of academic staff according to different assessment criteria
5. Number of academic staff who teach languages (in FTE)
6. Number and ratio of academic staff with PhD or equivalent
7. Number of staff in research centres (total)
8. Number of PhD students
9. Fluctuation
B) Structural capital:
1. Educational area per number of students
2. Educational area per number of academic staff
3. Area of sport facilities per number of full-time students
4. Number of computers in the university network
5. Number of computers provided for students
6. Number, area and capacity of computer laboratories and laboratories for other purposes
7. Library area per number of students
8. Weekly library opening hours
9. Number of seats in the library
10. Number of database in library (international and Hungarian)
11. Number and change in the number of library resources
12. Number of ordered journals (traditional and digital)
13. Cost of journals
14. Annual cost of research and development investments
15. Number and average age of educational equipment
16. Number of research centres
C) Relational capital:
1. Number and sum of vocational education contribution (total and actual)
2. Number and income of innovation research (total and actual)
3. Chair-income
4. Number of memberships in scientific and professional organizations
5. Number of academic staff who are members in editorial boards
6. Number of library exchange programmes
7. Number of partner universities from abroad
8. Number of alumni-members

At Corvinus University of Budapest PhD students are recognised as full member of academic staff in teaching and in research, consequently they are completely included in human capital.

The swimming pool and other sport facilities, which are available for every student and university members, belong to the infrastructure of the university as well beside the lecturing halls, seminar rooms and libraries. The indicators connected to this specific area are also involved in structural capital. Five indicators measure the assets in information technology, while a separate data is designed to measure the educational equipment (e.g. projectors, interactive whiteboards). In two faculties of the CUB biological researches are conducted. These bio-laboratories also supply data for structural capital. Finally, the number of research centres indicator implies also standardised information of the university's research activities.

Some components of the relational capital possess specific Hungarian characteristics, because business organizations are supposed to pay a so-called vocational educational contribution and innovation contribution after reaching a certain size (it depends on the number of employees and the revenues). These obligations could also be fulfilled by supporting educational institutions or by making a contract with these institutions for innovation research. The amount of funding and the innovation researches' proceeds could be charged as their legal financial obligations. Hence, the indicators with the aim to measure the vocational education contributions and innovation researches are appropriate to denote the university's relational capital (and also their utilization).

The professorial corporate scholarships (chairs) indicate a special type of relationship between university and business as well, in the case when a specific company gives funding for one of our colleagues' educational or research activities for many years besides providing budget for material expenses too. These chairs are available for both senior researchers (for 5 years) and for PhD students (for 3 years).

The memberships in different scientific and professional organisations imply another valuable relation networks to the university. Some of these are related to the CUB itself (for instance CEMS, EDAMBA), while in other cases one of the university's staff member is involved in these bodies (for example in academic committees). The international and Hungarian exchange relations of the libraries are main sources of new scientific material and the university staff's positions in journals' editorial boards also have high value for CUB. Both are important components of relational capital.

Besides, CUB has alumni-system too, however it rather only implies even potential than real relation network for the present. But there are some improvements: a qualitative management system was set up, which also insisted on improving the alumni members' registration. Furthermore, the university plans to rely on these relationships in organising internships for students, which is a requirement in the Bologna Process. But we can say it, that these relationships are not measured now (CUB [2008a] p.95).

If we have a look on the available external intellectual capital measuring at the CUB, mainly we can find many sources and indicators connected to human, structural and relational capital. Nevertheless we found indicators which strive to denote effects and the results of intellectual capital management activities. This means financial and non-financial sources, which are available for measuring the effects of the teaching, research and other activities of the CUB. The main measures which are to quantifying the results of the result can be found in the following table:

Table 4: Process-indicators on intellectual capital in external reporting

D) Processes and results (output) – examples
1. **Educational performance:** number of students, proportion of students funded by the state, number of students participating in education programmes abroad, ratio of applications over the university quota, number of exchange students from abroad, average number of university years, number of awarded degrees;
2. **Research (students):** number of participants in the Scientific Student Conference, in the National Scientific Student Conference and the number of winners in the National Scientific Student Conference;
3. **Research (academic staff) :** number of publications (divided into categories as well);
4. **Research (income):** number of winner tenders (total and data from actual year), income of the tenders, income on tenders per one academic staff member, income per one FTE (total and per academic staff member);
5. **Library:** number of registered persons into the library, number of visitors (reading room, website, distance-visitors), number of lending, number of library trainings.

3.2.2 Internal reporting and organizational solutions used for managing of intangibles

Although, the aim of this paper is to identify and analyse the indicators and available information for intellectual capital measurement and management it is also important to present the most important internal reports and organizational solutions related directly to intellectual capital categories.

Some of the analysed organisational units have the dedicated goal to manage and report of the university's intellectual capital. They are the following ones:

- Innovations Centre, Inc. – its main tasks include the coordination of the research co-operations between the university and corporations, searching for research projects, supporting the search for their funding, the researches' coordination and project management.
- Corvinus Knowledge Centre – it is a three- year long research in food science. It aims to develop an international cluster for producers and distributors in food science research and innovation. It emphasises food processing, -preservations, -security and -quality.
- Office of Corporate Relations – its aim is managing of the relationship with university's primary external sponsors. Since it cannot cover the whole range of personal relations (e.g. private contacts of professors) it is difficult to obtain real information on CUB's external relationships through the data supplied by this office.
- Office of International Relations – its main task is to manage university's student exchange programs, to issue and coordinate the exchange opportunities and to support both the incoming and outgoing student and the lecturers.
- Career Office – its mission is to establish relationship between highly qualified students and private or public sectors organizations, to support the students' conscious career management, and in finding job that suits to their knowledge and interests mostly.
- Office of Quality Affairs – it aims to coordinate and operate university-wide satisfaction-surveys. It also initiates and supervises the development of monitoring tools such as staff publication- and CV-database.
- Central Office of Information and Education Affairs – its main task is to manage the general educational information system (NEPTUN) of the university. The Neptun-system is responsible for all course and exam registrations and for many financial transactions related to education.

The other units are supporting the regular or background functions of the university, thus, due to their characteristics they generate significant information concerning immaterial resources:

- Head office for Financial and Technical Affairs – it is responsible for the central budget and financing of the university, as well as infrastructure-maintenance, tender-coordination, controlling and administration.
- Information Service Centre – an internal service unit which operates and develops the university's IT-infrastructure.
- Central Library – it provides various management knowledge and information on lecturers' publications, on database of professional literature and about the books and magazines that are available for the university citizens.

By analyzing the abovementioned organizational units we could identify internal management reports that help us get a hold of the organizational intellectual capital. We have to emphasise that the availability of these pieces of information is a huge development in the university's life, however, we can't really talk about a mature, regular and well-established integration or flow of information in management reporting yet, as a result of underlying motivational factors.

Beside the abovementioned available information and internal reports (see: Table 5 and 6), the regular satisfaction surveys carried out at the university are other management tools for managing intellectual capital. The result of these surveys includes complementary (soft) information about the opinion and satisfaction level of students, employers, lecturers and researchers. The follow-up of the students', academic staff's and employers' requirements is also related to the principle of the quality management model of the university (EFQM) and applies several indicators for the intellectual capital. The surveys take place every 2-3 years; the next one is to be expected in 2009.

Table 5: The main regular internal reports and other sources of information (human, structural and relational capital)

Content of information	Sender	Recipient	Frequency
A) Human capital:			
Report on Human resources (Breakdown in e.g. education, income, personnel expenses etc.)	Head office for Financial and Technical Affairs	Economic Council, Senate, Rector's cabinet, deans	Quarterly
B) Structural capital:			
Course information, capacity usage (e.g.: educational infrastructure)	Central Office of Information and Education Affairs	Vice-rector of Educational Affairs	Semi-annualy
Technical-infrastructural expenditures (maintenance, refurbishment, trusteeship) in a faculty breakdown	Head office for Financial and Technical Affairs	Economic Council, Senate, Rector's cabinet, deans	Quarterly
IT costs in faculty breakdown (IT-Controlling Report)	Information Service Center	Director	Annually
Library performance report: - Documents and services (including on-line) - Cost of document development - Library infrastructure	Central Library	Members of Senate, rector, Vice-rectors, deans	Annually
C) Relational capital:			
Student preferences and satisfaction analysis (freshmen)	Office of Quality Affairs (Cooperation with: Carrier Office)	Vice-rector of Educational Affairs	Annually / semi-annually
Freshmen in a financial status breakdown	Central Office of Information and Education Affairs	Vice-rector of Educational Affairs, Senate	Annually
Cooperation among units in calls for tender	Office for Tenders	Available for lecturers through internal IP address	Monthly
Carrier Office performance report: - Number of advertising companies - Number of positions in diff. categories - Number of sent CVs and applications - Number of Job Fair participants - Number of visits on jobs-database - Number and type of events	Carrier Office	Vice-rector of Educational Affairs, Also: rector, deans	Annually
Exchange students and lecturers in according to partner universities (e.g.: faculty or year breakdown etc.)	Office of International Relations	Head of the office	Continuous monitoring and ad hoc reports
Library performance report: - Borrowing (documents) - International exchange (number of partners, documents)	Central Library	Members of Senate, rector, Vice-rectors, deans	Annually
Aid for vocational studies per company and faculty	Office of Corporate Relations	Rector (on website as well)	Semi-annually
Chair revenues	Office of Corporate Relations	Rector	Annually

Table 6: The main regular internal reports and other sources of information (process and result dimension)

Content of information	Sender	Recipient	Frequency
D) Processes and results (output):			
Student information in a financial status breakdown	Head office for Financial and Technical Affairs	Economic Council, Senate, Rector's cabinet, deans	Quarterly
Student satisfaction report (graduates)	Office of Quality Affairs, Carrier Office)	Self	Annually / semi-annually
Money circulation (material, personal and cumulated expenses in faculty breakdown)	Head office for Financial and Technical Affairs	Economic Council, Senate, Rector's cabinet, deans	Quarterly
Tenders and sum won by units and partners	Office for tenders	Available for lecturers through internal IP address	Monthly
Number of external publications per lecturer	Central Library	Director	Continuous (Replaced by on-line publication system which is in progress.)
Library performance report: - Number registered members - Member and file traffic (on-line as well) - Number of library events	Central Library	Members of Senate, rector, Vice-rectors, deans	Annually

3.2.3 The availability of information on the intellectual capital

Corvinus University of Budapest is supposed to report a part of the abovementioned information regularly. The obligation also applies to data on the library (see CUB [2006]). The number of employees should be submitted to the Social Insurance Office. The number of awarded teaching qualifications is to be submitted every half year to the Ministry of Education and Culture because it determines the university's funding. Because of this latter aspect, reporting the number of teacher qualifications and student data is not only an obligation, but also the interest of the university. The number of staff in research and development, the cost of R &D and the number of research centres must be presented in the annual research centres' reports. Accordingly two-fifth of the discussed data-categories are to be measured and submitted to external parties regularly.

Beside this regular reporting-obligation the university had to renew its accreditation in 2008. The Hungarian Accreditation Committee has specified and suggested several pieces of information that should or could be submitted, which also contains several indicators or components of intangible resources. Two third of the data in the external reporting table are included in the documents prepared for the accreditation, and they partly overlap with the obligatory data-supply mentioned before. Similarly, the last Institute Development Plan prepared in 2007 – as one-time report – contains intellectual capital information which also considerably overlaps with previously mentioned data.

The internal management reports also contain a large amount of information concerning the different aspects of intellectual capital. The sources of data are very heterogeneous, there is no unified and integrated information system.

Consequently, we can make the present conclusion that:

- The CUB does not report externally most of the intangible resources data constantly except the basic headcounts, some indicators on research and development and data from the library;
- The content of information from the internal reporting system is sometimes overlapping with the external reports, but these data draw up more frequently. The internal management reporting system is under development, it does not serve as an integrated management framework.

- The other components of the educational and research infrastructure and the university's relation network are explored only occasionally.

4. Discussion and further research directions

The analysis of intangible resources management practices at CUB revealed that the university has not yet developed a standardised framework like the Wissensbilanz-model. Nonetheless, there are some indicators which strive to measure the intangible resources, but mainly occasionally. Moreover, there are some organisational units and management tools at CUB which are responsible for the improvement of education and for supporting academic staff in their development, for reinforcing innovation and research activities, for management of university's relation networks, and for ensuring quality of operation.

However, the practices that CUB applies for reviewing and managing its intellectual capital are isolated from each other, their integration into a unified system is not common practice at present. Data-collection and reporting on intellectual capital have evolved in response to external legal requirements and to the information needs of different external stakeholders such as the Ministry for Education and Culture or Central Statistical Office. It is also a problem that these needs are not coordinated with each other so the university has to provide data slightly differently to each stakeholder. Some of the data needs are occasional or the needs change frequently, therefore it is not easy to develop stable framework.

In general, the indicators that are reported in these external documents have been adjusted to the external requirements in their content, structure and in the frequency of their measurement, but the support they could provide in decision-making has been rarely taken into consideration.

The measurement and management of intellectual capital at CUB have the following specific characteristics as a result of the irregular and changing obligations in data supply:

- The external reports get priority due to the legal requirements and the compulsory data supply to the Ministry. The fact that the reports must be submitted to various external parities, divert the attention from the importance of inner data supply.
- It is the ministries' changing requirements and not the strategic plans that determine the content, structure and frequency in measurement of the indicators presented in the external reports. Consequently the aim of their measurement is to satisfy external obligations rather than pulling down and monitoring the strategic plans, fulfilling other information requirements and supporting decision making in the university.
- The external and internal requirements are irregular, occasional and the various parties expects different- often overlapping-information to provide from the university. The requirements' irregularity and overlapping content result in parallelisms in the reports and in sub-optimal resource utilisation.
- The contents of internal reports are highly determined by the requirements of external reporting. They contain mainly financial data and some measures in kind, but we can not find e.g. comparisons or per unit indicators. The real using of management information in management decisions can be also next step of research.

We also have to point out that sometimes even the traditional financial and tangible resources necessitate the restructuring and improvement of the management control systems at CUB as well. The programmes that were launched for fulfilling these latter demands (like developing truly transparent funding, performance appraisal and management information systems) are prioritised at the university. These programs also engage significant amount of resources at CUB, which together with satisfying the irregular demands on data supply makes it even more difficult to establish an integrated system for measuring intellectual capital. The managing of this latter "irregularity" problem could imply the next step of the institution development.

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The Frontier of Linearity in the Intellectual Capital Metaphor

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Abstract: The purpose of this paper is to demonstrate that *linearity* is a major limitation of the metaphor *Knowledge as Capital*. This metaphor proposed by Daniel Andriessen as a challenging debate for ECIC 2009 has been extremely fruitful in promoting knowledge as a new field of interest in economic research and praxis. Since *Capital* is a core concept of any economic activity, using it as a semantic source for the newly coined expression, Intellectual Capital, proved to be a winning idea. However, any metaphor highlights certain things and hides others. There are some semantic frontiers in the source domain which constitute its limitations. The purpose of this paper is to analyse the *linearity* property of the source domain, and to demonstrate that it constitutes a major limitation of the IC metaphor. We begin with the mathematical definition of a *linear space*, and then we analyse how this definition requirements, which are fulfilled within the source domain, cannot be fulfilled within the target domain. We are interested especially in the following requirements of the linear space: *commutativity, associativity, distributivity* and the application of the *principle of superposition*. The *Knowledge* domain does not satisfy any of these requirements which means that the target domain is strongly nonlinear. Although many authors have used these concepts of *linearity* and *nonlinearity* in connection with knowledge and intellectual capital, none of them undertook a systematic analysis of the basic properties of linear spaces and how they fit within the knowledge field. Linearity is strongly related to the measurable property of the source domain, and this operational connection explains why many methods proposed to measure knowledge and intellectual capital failed to produce good results. We shall extend our analysis to *linear* and *nonlinear thinking* patterns, showing how the frontier of linearity can impair managerial decisions. We hope that our work will stimulate new research aiming at using properly the nonlinearity property of the *Knowledge* field.

Keyword: Capital, knowledge, linearity, linear space, linear thinking, nonlinearity

1. Introduction

Metaphors play a vital role in developing our knowledge field by initiating new perspectives of meaning associations and of using them in the decision making process. Andriessen (Andriessen, 2006; 2008; Andriessen and Boom, 2007) have shown that knowledge management and intellectual capital theories developed in these last years have been based primarily on using metaphors. "Knowledge is an abstract concept. It has no referent in the real world. We use metaphor to map elements of things we are familiar with in the real world (organisms, resources, products) onto the concept of knowledge to make it comprehensible. Knowledge is not a concept that has a clearly delineated structure. Whatever structure it has it gets through metaphor" (Andriessen, 2006, p.96). However, metaphors depend on the cultural value and cultural semantic systems of different countries or regions. In the Western culture the source domain of most such metaphors has been a tangible object, while in the Eastern culture the source domain has been an intangible one. Nonaka and Takeuchi (1995) claim that Japanese companies have a very specific understanding of knowledge, meaning the emphasis on *tacit knowledge*. This type of knowledge is highly personal and difficult to define and clearly express. "Furthermore, tacit knowledge is deeply rooted in an individual's action and experience, as well as in the ideals, values, or emotions he or she embraces" (Nonaka & Takeuchi, 1995, p.8).

In the metaphor *Knowledge as Capital*, the source semantic domain is *Capital*, and the target semantic domain is *Knowledge*. The source domain is coming from the Western culture. Thus, it incorporates a dominant tangible meaning, although its definition is rather fuzzy. In classical economics, *capital* is one of the three factors used in the production of other goods. The others being land and labour. In finance, capital is related to: investment, cash flow, credit, debt, funding, interest, risk, real estate, securities, trusts, mutual funds, commodities, futures etc. Regardless of its specific form of manifestation, capital is measurable. Since we use linear metrics for measuring the capital, we may consider *linearity* as a dominant characteristic of the source domain. Thinking about the new metaphor, *Knowledge as Capital*, let us remind that the metaphorical semantic kernel is given by the intersection of the two semantic domains. The larger this semantic intersection, the better cognitive approximation we get by using this metaphor. At the same time, there will always be some characteristics of the source domain not used by metaphor, as well as some characteristics of the target domain not covered by the source domain (see figure 1).

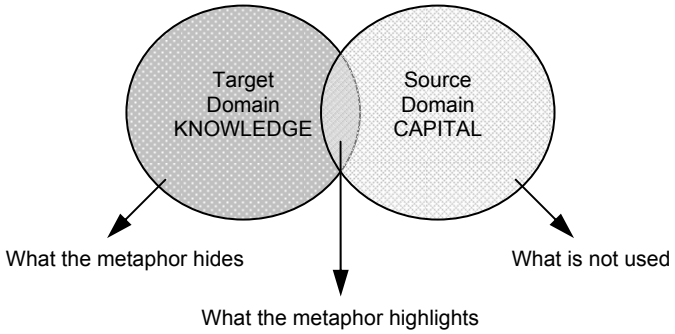

Figure 1: Source and target domains of the *Knowledge as Capital* metaphor

In the remainder of this paper we will explore the meaning of a *linear space,* and how the *linearity* characteristic of the source domain becomes a frontier toward the target domain. In other words, what this new metaphor hides is the *nonlinearity* of the knowledge field, among other things.

2. Linear space

The *linear space* concept has been developed in mathematics, both in geometry and in algebra. In geometry a linear space is defined by the rectangular system of reference (X, Y, Z) conceived by Descartes. It can be one-dimensional, bi-dimensional or three-dimensional space. In Algebra, there is a whole field of theory and research developed as Linear Algebra. One of the most frequently used definitions for the concept of *linear space* is the following: "A vector space is where all linear combinations of elements are also elements of the space. This is easy for spaces of numbers but not for a space of functions. Roughly, this is to say that multiplication by numbers, and addition of elements is defined in the space" (The Free Online Dictionary of Computing, 2003). Thus, a vector (linear) space is a set V together with two operations, + and x. The following are the mathematical requirements for a space to be a linear vector space:

- If $\boldsymbol{u}$ and $\boldsymbol{v}$ are vectors in V, then $\boldsymbol{u} + \boldsymbol{v}$ is also a vector in V.
- If c is a scalar, then $c\boldsymbol{v}$ is a vector in V.
- The vector addition is *commutative*: $\boldsymbol{u} + \boldsymbol{v} = \boldsymbol{v} + \boldsymbol{u}$.
- The vector addition is *associative*: $(\boldsymbol{u} + \boldsymbol{v}) + \boldsymbol{w} = \boldsymbol{u} + (\boldsymbol{v} + \boldsymbol{w})$.
- There is *an identity element* such that: $\boldsymbol{u} + 0 = 0 + \boldsymbol{u}$.
- There is *an inverse element* such that: $\boldsymbol{u} + (-\boldsymbol{u}) = 0$.
- There is *distributivity* over scalar addition: $(a + b)\,\boldsymbol{u} = a\boldsymbol{u} + b\boldsymbol{u}$.
- There is *distributivity* over vector addition: $(\boldsymbol{u} + \boldsymbol{v})\,a = \boldsymbol{u}a + \boldsymbol{v}a$.

The economic *Capital* is a measurable concept, and it can be expressed in numbers. The easy way is to consider the money metric. In this case, all of the above requirements are satisfied, and the linearity property can be defined. Linearity can also be discovered as a dominant property for the thinking pattern used to handle problems related to *Capital*.

3. Knowledge field

Bratianu and Andriessen (2008), performing a metaphorical analysis of *Knowledge* as *Energy* showed that knowledge can be considered as a *field*:"The first characteristic from the source domain we point out in the target domain is the *field* manifestation of the energy. Thus, *knowledge should be considered as a field.* A field of forces is by its nature mass free and spread in space as a continuous domain" (p. 76). This field contains both explicit knowledge and tacit knowledge. According to Nonaka and Takeuchi (1995) "Highly subjective insights, intuitions, and hunches are an integral part of knowledge. Knowledge also embraces ideals, values and emotions as well as images and symbols. These soft and qualitative elements are crucial to an understanding of the Japanese view of knowledge" (p. 9). Considering *tacit knowledge* and *explicit knowledge* as the two major components of any *knowledge* concept, we may construct knowledge vectors as shown in figure 2.

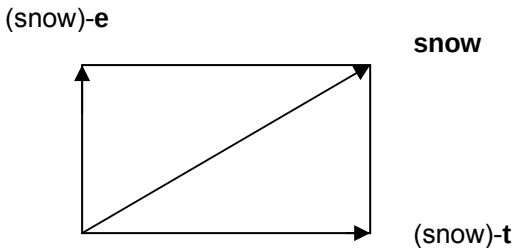

Figure 2: A graphical illustration of the vector **snow**

The vector **snow** can be decomposed into two components: (snow)-**e** which is the rational part of the concept learned in school (i.e. characteristics from physical point of view), and (snow)-**t** which is the experiential part of the concept learned through a direct experience by seeing, touching, smelling and tasting the real snow. Here, we introduced **t** as the unit vector on the **tacit** axis, and **e** as the unit vector on the **explicit** axis. These two components may have different magnitudes according to the degree of abstractness of each concept, and the level of direct experience of each individual. For instance, somebody who lives in a northern country with heavy winters and lots of snow will have a larger (snow)-**t** component than an individual who lives in a tropical country, where hardly there is any snow. Using this approach we can define each concept as a vector, and the knowledge field becomes a field of vectors. Now, we would like to investigate if the knowledge vector field is linear or nonlinear.

The first requirement is given by the *composition* rule. If two vectors ***u*** and ***v*** belongs to the defined space V, then their composition yields a new vector ***u*** + ***v*** which also belongs to this field. This rule applies to the source domain, and we want to see if it applies also to the target domain. Let us consider two vectors **snow** and **white.** The composed vector **snow** + **white** has meaning and it is a component of the knowledge field. We shall recall from vector algebra that two vectors can be added by adding each type of components separately, and then perform their aggregation into the vector form. For the two vectors just considered we have:

(snow)-**t** + (white)-**t** = (snow + white)-**t**

(snow)-**e** + (white)-**e** = (snow + white)-**e**

snow + **white** = (snow + white)-**t** + (snow + white)-**e**

In these above relations we use the mathematical symbol + with the meaning of *aggregating* concepts, and not to add them in a pure mathematical way. Thus, by aggregating these two concepts **snow** and **white** we get the meaning that snow is white, which is a part of the knowledge field. However, we can construct many combinations of the concept of **snow** with other concepts without getting any meaningful new concept. For instance, (snow + fire), (snow + bread), (snow + laptop) etc. are meaningless aggregations. Their resulting vectors *do not belong to the knowledge field, and thus the composition rule is not fully satisfied.*

The second requirement is a nonsense for the knowledge field, since meanings cannot be enlarged just by multiplication with a scalar. Since an operation of the form 5 x **snow** yields something outside of the knowledge field, *the scalar multiplication requirement is not satisfied within the target domain*.

Let us consider now the *commutative* rule of addition. In order to better illustrate this rule for the knowledge field we shall consider three knowledge entities:

(John) + (drinks) + (milk) ≠ (milk) + (drinks) + (John)

(professors) + (teach) + (students) ≠ (students) + (teach) + (professors)

We learn from school that there are certain grammar rules to construct sentences and phrases, and that word order in any such construction is vital. Thus, a sentence is an oriented semantic construction and *commutativity* is highly restricted. Also, in the decision making process there are clear defined sequences of knowledge aggregation which cannot be reversed like in a linear space (Baron, 2003; Goodwin & Wright, 2004). Management is also a highly oriented structural process which cannot accommodate the commutativity requirement. Moreover, real processes are irreversible

processes oriented along the time axis. Commutativity is compatible with reversible processes, and it is incompatible with the irreversible ones. Thus, the knowledge field is highly a nonlinear field.

Let us consider now the *associativity* requirement. In team management association process is quite natural. The way in which individuals associate together in order to perform different jobs is unique with respect to their knowledge fields (Katzenbach & Smith, 2003). Assuming that by working together two or more individuals yields new knowledge fields at the team level, the following relation can be proved easily in practice:

(John + Dan) + Mike ≠ John + (Dan + Mike)

In any organization, associativity is based on compatibility of knowledge and skills, on motivation and work requirements. Thus, the rule applied to linear systems cannot be applied in the same way to the nonlinear organizational knowledge field.

In the knowledge field there is no such *identity element* like 0 in a linear space. Even the no-thing-ness has got an interesting interpretation in Budhism as "the spirit of the thing itself". According to Musashi, the legendary Japanese warrior in marshal arts, the whole strategy of a warrior should be based on no-thing-ness: "You can come close to understanding no-thing by realizing that there is nothing outside of yourself that can ever enable you to get better, stronger, richer, quicker, or smarter. Everything is within. Everything exists. Seek nothing outside of yourself" (Kaufman, 1994, p.105).

In the knowledge field the rule of *the inverse element* cannot apply, for the main reason that there is no such identity element like 0 in the linear space. We may find concepts or ideas of opposite meaning, but bringing them together does not end up with nothing. It ends up with a state of uncertainty, or even a paradox. Consider the following examples, and try to think of the possible semantic result:

(Ted is tall) + (Ted is not tall) = ?

(Helen has a car) + (Helen has no a car) = ?

This is a very interesting property of the knowledge field, with many implications in management and hard times in decision making. One information or a knowledge concept cannot reduce to zero another information or knowledge concept of an opposite meaning, since zero does not exists in the knowledge field! Putting together the two conflicting semantic entities creates a state of uncertainty, which can be reduce only by getting new knowledge from a different source with respect to the same topic or example.

The *distributivity* rule does not apply to the knowledge field since the scalar multiplication in the knowledge field cannot be defined. Let us consider the knowledge associated to the concept of **wisdom**. A multiplication of the form 3 x **wisdom,** which means to multiply the scalar 3 with the knowledge vector **wisdom,** does not yield a meaningful result since:

3x**wisdom = wisdom** + **wisdom** + **wisdom = wisdom**

4. The superposition principle

The superposition principle is a direct consequence of the linear space properties. It is applied everywhere there is a linear field. In Physics, the superposition principle is applied especially in the electric field theory, and in the wave theory. For instance, in the electric field theory the superposition principle can be formulated as follows: the electric field due to a collection of particles is the sum of the fields produced by each particle separately. In the theory of light waves, the superposition principle states that when two or more waves overlap in space, the resultant disturbance is equal to the algebraic sum of the individual disturbances (Encyclopaedia Britanica, 2008). In other words, the superposition principle is an extension of the addition property to field entities, or effects of some linear transformations. Using mathematical generic equations, the superposition principle can be expressed as follows:

$L\varphi(1) = F(1)$ & $L\varphi(2) = F(2)$ => $L(\varphi(1) + \varphi(2)) = F(1) + F(2)$,

where L is a linear operator, and φ(1), φ(2), F(1), F(2) are some given functions.

The superposition principle can be applied in the source domain since linear metrics are frequently used here. It is interesting to see such kind of argumentation in the famous work "Wealth of Nations" of Adam Smith: "As the capital of an individual can be increased only by what he saves from his annual revenue or his annual gains, so the capital of a society, *which is the same with that of all the individuals who compose it*, can be increased only in the same manner" (Smith, 1998, p.199). Considering that this work has been written about three hundred years ago, we have to acknowledge that applying the superposition principle to explaining the capital composition was quite advanced for that period of time. The superposition principle can be applied also in the *reverse* order, i.e. de-composing a complex linear problem into several simpler linear problems and finding their solutions; then, assembling these solutions based on the superposition principle and getting the complex solution for the initial problem. In this perspective Adam Smith conceived the division of labour, which sometimes may go down to single simple operations. To illustrate how this division works he considered the case of a pin-maker: "One man draws out the wire, another straights it, a third cuts it, a fourth points it, a fifth grinds it at the top for receiving the head; to make the head requires two or three distinct operations; to put it on, is a peculiar business, to whiten the pins is another; it is even a trade by itself to put them into the paper; and the important business of making a pin is, in this manner, divided into about eighteen distinct operations, which, in some manufactories, are all performed by distinct hands, though in others the same man will sometimes perform two or three of them"(Smith, 1998, p.12). This division of labour is an excellent illustration of the linear thinking and of the superposition principle applied to the source domain. Thus, linearity proves to be a winning perspective of thinking and of structuring the industrial activities (Drucker, 1993).

In the new knowledge companies, this division of labour cannot yield high productivity anymore. Hamel & Breen (2007) consider these principles of division of labour and specialization to be insufficient and often toxic, since they limit the liberty of people and inhibit their creativity. When the initial problem is defined within a nonlinear field, like that of knowledge, this method does not work anymore. However, many managers consider as a general rule breaking down any complex problem into smaller problems and finding first these simple solutions, and then adding them up. If the field is strongly nonlinear, the method will yield wrong solutions. "Phenomena and events in the real world do not always fit a *linear model*. Hence the most reliable means of dissecting situation into its constituent parts and reassembling them in the desired pattern is not a step by step methodology such as system analysis. Rather, it is that ultimate *nonlinear thinking* tool, the human brain. True strategic thinking thus contrasts sharply with the conventional mechanical systems approach based on *linear thinking* " (Ohmae, 1982).

Intuitively, this superposition principle has been used in the pioneering research of the intellectual capital (Andriessen, 2004; Stewart, 1997). According to this incipient literature the intellectual capital is considered as a given potential composed of: human capital, structural capital and customer or relational capital. There are some variations of this structuring, but the main ideas are the same. For instance, in the Skandia navigator the intellectual capital is decomposed into human capital and structural capital; the structural capital is split into customer capital and organizational capital, and finally the organizational capital is split up into innovation and process capital. However, the three component entities designed as human capital, structural capital and relational capital are not independent entities. They overlap substantially since the intellectual capital is highly nonlinear and the superposition principle does not apply at all in this analysis. For instance, each component contains knowledge, intelligence and values, and their aggregation into intellectual capital means finally to count twice each of these basic constituents (Bratianu, 2008).

Applying the superposition principle to the organizational knowledge, as it is described in linear systems, someone may end up with the Albrecht's Law: "Intelligent people, when assembled into organization, will tend toward collective stupidity" (Albrecht 2003, p.4). This is not a compulsory phenomenon in any group of people. It is an optional one to the extent to which group members allow it to happen. However, it does happen frequently since it follows the entropy law (Bratianu 2007). The superposition principle is very close to the *static* interpretation of the organizational intellectual capital, since the *static model* has been developed based on the tangible assets experience (Edvinsson & Malone, 1997; Stewart, 1997; Sveiby, 1997). Organizational experience demonstrates every day that knowledge undertakes a continuous transformation process at both individual and organizational levels. In this new dynamic perspective "knowledge is understood as emerging from the ongoing

interactions between the organizational members, and the focus is not on the intangible assets per se but on the organizational capabilities to leverage, develop and change intangible assets for value creation" (Kianto, 2007, p.3). Performing a literature search and critically assessing the dynamic models, Kianto (2007) came out with three main dynamic interpretations of the intellectual capital: 1) value creation dynamic; 2) organizational activities, and 3) change capabilities. The first dimension shows how different resources interact to create value for organization. The second dimension shows how different activities interact in knowledge creation, acquisition, sharing, dissemination, combination. The third dimension demonstrates the organizational capability for change and strategy implementation (Carpenter & Sanders, 2007). This change is necessary for continuous adaptation of organization to the turbulent external business environment. Innovation, learning and renewal are the major topics related to this third dynamic dimension of the intellectual capital (Kianto, 2007; Roos et al, 1997; Sveiby, 1997). However, in these above dynamic models the basic structure of the intellectual capital does not change, which is a severe limitation to further investigation.

Organizational knowledge is not a result of summing up the individual contributions of all the employees, like in Physics. It is a result of their integration and of the synergy effect: "An integrator is a powerful field of forces capable of combining two or more elements into a new entity, based on interdependence and synergy. These elements may have a physical or virtual nature, and they must poses the capacity of interacting in a controlled way" (Bratianu, Jianu & Vasilache 2007). The synergy effect makes actually the difference between a linear and a nonlinear system. Thus, the linearity frontier cannot go beyond the static interpretation of the intellectual capital, interpretation based on the conception that knowledge is like any other tangible assets. The dynamic knowledge field is strongly nonlinear, and the intellectual capital is a synergetic effect of the organizational integrators work. The most important integrators are: vision and mission of the company, management and leadership, technology and processes, and organizational culture (De Geus, 2002; Hamel & Breen, 2007; Warren, 2008).)

5. Conclusions

The purpose of this paper is to show how *linearity* is a major limitation in using the metaphor *Knowledge as Capital*, a metaphor suggested by Daniel Andriessen as a challenging debate for ECIC2009. In this metaphor *Capital* represents the source semantic domain, and *Knowledge* represents the target semantic domain. One of the most important characteristics of the source domain with respect to management and organizations is that of *linearity*, since it dominated for about one hundred years the managerial thinking. In order to understand if this property can be projected into the target domain we performed a theoretical investigation of the necessary mathematical conditions for a given field to be considered a linear space. We considered step by step the rules for addition and multiplication required by a linear space, and analyzed the way in which they are satisfied or not in the target domain. Our analysis shows that these rules cannot be satisfied by the *Knowledge* domain, which means that the knowledge field is strongly nonlinear. In other words, *linearity* is like a frontier in the metaphor *Knowledge as Capital.* Understanding *Knowledge* means to break away with the classical linear thinking, and to embrace the new nonlinear thinking. Organizational knowledge, management and leadership, intellectual capital, creativity and innovation, learning organizations, cognitive and emotional intelligences, strategy and change are all concepts well beyond the frontier of linearity.

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IC – Based Inter-industry Variety in Serbia

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Abstract: This paper presents a wide-rage research and analysis of intellectual capital in Serbian business environment. The primary research objective was to look at organizational intellectual capital within different industries in order to enable the fine-tuning of intellectual capital reporting according to particular industrial features. The role of intellectual capital value drivers in the process of intellectual capital reporting focused this research on identification of relevant intellectual capital value drivers, as well as the specific features of intellectual capital and knowledge flows within observed industries. The results have revealed some specific features of industries, thus indicating inter-industry variety from the perspective of intellectual capital.

This research should be viewed, first as a contribution to refinement of the existing intellectual capital reporting methods with respect to unique characteristics of the industries, and second as a case where the different stages of the evolution of intellectual capital between different cultures/countries is presented.

Keywords: Intellectual capital, intellectual capital reporting, intellectual capital value driver, industry, Serbia

1. Introduction

An "intangible" asset as intellectual capital (IC), completely differs from its tangible counterparts and cannot be completely included in traditional accounting systems and disclosed in traditional business reports. Thus, companies are faced with the problem of how to successfully manage immaterial component of business. On the other hand, investors as well as other stakeholders, insist upon reporting on all value drivers, especially those of non-financial nature, in order to lower their own risks.

The lack of relevant information in traditional financial statements can be overcome by additional IC reporting. Portraying intangible value drivers which are not directly available, but are vital to the future success of an organization, IC statement is an instrument for strategic management of immaterial component of business. “There is a large number of intangible value drivers which affect the efficiency and effectiveness of performance and the success of an organization. They are a part of the organization’s IC” (Arbeitskreis Wissensbilanz, 2004, p.22) called intellectual capital value drivers (IC value drivers). According to the IC categories- human, structural and relational capital, IC value drivers can also be categorized into human capital value drivers (HC value drivers), structural capital value drivers (SC value drivers) and relational capital value drivers (RC value drivers). It is of primary importance that IC statement covers those IC value drivers that are the most significant for production processes and strategically-defined business success. This way a company focuses on monitoring of what is crucial for its success. Certain methods refer to those IC value drivers as key influencing factors -Wissensbilanz (Arbeitskreis Wissensbilanz, 2004), key success factors – IC index (Roos et. al., 1997), or critical intangibles – Meritum Guidelines (Meritum project, 2002). In this paper they are referred to as relevant IC value drivers. Identified relevant IC value drivers are “highlighted with measurable IC indicators in the shape of numbers and facts” (Arbeitskreis Wissensbilanz, 2004, p.28).

2. Researching IC in different industries

Pertaining to characteristics of the economic environment, industry and the company, many research works are focused on adjusting IC reporting to national (Andriessen and Stam, 2004; Bontis, 2004, EZ 2002; EZ, 2000; Pulic, 2002; Pasher 1999) and regional clusters (Ricarda project), as well as cities (Bounfour and Edvinsson, 2005) in order to increase report accuracy by including their specific features.

This paper aims to analyse IC in different industries in order to enable the fine-tuning of IC reporting according to particular industrial features. Researching organizational intellectual capital in Serbia from the perspective of IC reporting (Cabrilo, 2008), the following questions arise: Can a unique IC report, or the same group of IC indicators, measure and report on IC of companies from different industries with equal accuracy? Are there certain specific features within various industries, which would, if taken into consideration, increase the report accuracy and simplify the implementation in a particular industry? Looking for answers, a wide-range research has been carried out, in order to distinguish general characteristics of IC of particular industries. The role of IC value drivers in the

process of IC reporting focused the research of IC in various industries on identification of relevant IC value drivers, as well as the specific features of IC within these industries.

3. Research methodology

The questionnaire has been designed based upon analysis of the most common methods of IC reporting and IC value drivers. The analysis included the Intangible Assets Monitor (Sveiby, 1997; Sveiby 1997a), Danish Guidelines (Danish Ministry of Science, Technology and Innovation, 2003), Meritum Guidelines (Meritum Project, 2002) and Wissensbilanz (Arbeitskreis Wissensbilanz, 2004). Within the group of IC value drivers suggested in the initial methods, 32 value drivers were chosen: 12 of human capital, 10 of structural, and 10 of relational capital. Each of the mentioned value drivers was determined by a group of questions. The questionnaire consisted of 87 questions, with 70 Likert-type and 17 factual and categorized questions. To use a questionnaire and identify IC value drivers as well as knowledge flows, the survey would need to include top- and medium-level managers. This choice ensures relevant and sensible responses of participants. The response rate was outstanding – 90%. The total of 642 managers from 80 Serbian companies participated in the survey. Selected companies were diverse with regard to ownership structure, number of employees, industry, and geographic location. According to industry of their companies, groups of participants were formed, showed in Table 1. Further analysis included 7 industries (groups of 50 and more participants). They are highlighted in gray colour in Table 1.

Table 1: Number of participants from particular industries

Industry	Number of participants	% in the sample
Utility services	116	18.1%
Industry	109	17.0%
Mining and energetics	94	14.6%
Services	79	12.3%
Media	55	8.6%
Telecommunications&IT	51	7.9%
Banking	50	7.8%
Insurance	35	5.5%
Education	32	5.0%
Chemistry and pharmacy	16	2.5%
Agriculture	4	0.6%
Traffic	1	0.1%
TOTAL	642	100 %

4. Results and discussion

Gathered data were first analyzed by Pareto analysis of cumulative frequencies of answers (categorized questions) and then by factor analysis of major components (Likert-type items). Here follows the overview of the most significant results.

Managers' profile: In almost all the industries, the majority of participants belong to 36-45 age group. Nevertheless, in the public utility sector, industry and services, there is an older structure of managers, with longer average length of service, compared to the media and banking sector, which are distinguished by younger age structure and smaller length of service of their managers. The largest percent of managers in all the industries have university education. However, in comparison with others, the media has by far the smallest number of managers with university education, and the largest number of those with secondary school education.

Training and education of managers: The acquired results reveal that almost a half, or even more than a half of the managers in each industry in Serbia develop their competences insufficiently, neglecting training and education. In order to overcome challenges imposed by the knowledge economy, we have to accomplish obligatory pre-condition factors: managing competences and leadership. They make key factors of modern companies' success. The best situation, however, is in the sectors of telecommunications&IT, banking and services, while the worst situation is in the media, where 60% managers have never had any professional training, or they had it over a year ago.

Characteristics of employees most appreciated by managers: When the managers were asked to rank employee's characteristics (efficiency, experience, expertise, cooperativeness, innovativeness, commitment, education, initiative, loyalty, continuous competence development) they appreciate the most, the following results were gathered:

- managers in all the industries value employee expertise the most,
- characteristics most appreciated by managers in all the industries are: expertise, cooperativeness, commitment and efficiency, with slight variations in the ordering according to priority,
- efficiency is not included in the group of the most important characteristics only in the public utility sector and banking,
- what is particularly alarming is the result that innovativeness and continuous competence development belong to the group of the last three characteristics, according to how much the managers appreciate them in all the economic sectors.

Innovation is an imperative for survival in modern business. Together with knowledge, they present new forces for gaining economic wealth. Managers in Serbia are not aware that in the knowledge economy, expertise cannot exist without innovativeness.

Employee motivators: When the managers were asked to identify the key motivator for employees in their companies, 70-90% of them, in all the industries, stated money as the major motivator. There are certain variations in the percentage and ordering of other motivators (promotion, working environment quality, public praise, non-financial benefits). These results go in line with the theory that money is the most significant motivator in companies with insufficient funds. According to numerous lines of research (Herzberg *et al.*, 1959; Kovach, 1987; Linder, 1998), work variety, promotion, advancing possibilities and job security are the most important motivators, while monetary factors are ranked as third or forth.

Treatment of innovations: In all industries, innovations are mostly implemented spontaneously by employees, since there are no procedures for introducing innovations in business processes. Industry makes the only exception, since innovations are implemented to the largest extent according to formal procedures. Compared to other industries, far more innovations are patented in media and industry, while the smallest number of innovations is patented in the sector of mining and energetics. The largest number of innovations remains in the heads of employees (since they either do not want or are afraid to bring them up in groups) in banking and mining and energetics, whereas the smallest number remains hidden in the sectors of services and telecommunication&IT. Therefore, there is the lack of confidence between employees resulting in less knowledge sharing in companies from the field of banking and mining and energetics. The largest percent of innovations is implemented in telecommunications&IT and services, and the smallest in mining and energetics as well as banking.

Knowledge codification: If we consider codification of work processes, knowledge and experience, as well as innovations, we find out that the work processes are most codified (employees provide detailed documentation of the work process) in each industry. Knowledge comes second (documentation of specific problems and solutions) and experience third (documentation of the work methods). Innovations are the least codified (they document ideas for improving the work process). However, in telecommunication&IT as well as services, codification of innovations is present more than in other industries.

Knowledge base: Knowledge bases in all observed Serbian industries mainly contain employee personal information, information on formal education and service length, whereas information on the employee actual experience, as well as their knowledge and skills is much less documented. In all the observed industries, psychological profiles of employees are least documented. Based on these results, it is possible to come to the conclusion that observed Serbian companies are still not focused enough on identification of knowledge, skills and experience, the factors remarkably important in the value-creation process, their codification, and knowledge base creation.

Relations and cooperation with stakeholders: The process of identifying key stakeholders is very important during the analysis of relational capital. Out of 10 offered stakeholders (customers were not listed, since these relations were examined separately within other items), managers in various

industries made different ranks of stakeholders, taking into account relations and cooperation (Table 2). The key stakeholders are labeled by X in Table 2.

Table 2: Summary of the key stakeholders

	Utility services	Industry	Mining & energetics	Banking	Media	Telecomm & IT	Services
Partners	X	X	X	X		X	X
State administration		X	X	X	X		X
Local administration	X				X	X	X
Industrial association and unions			X		X		X
Banks		X		X		X	
Investors							
Unions					X		
Shareholders							
Research institutes							
Universities					X		

Business partners make the most important stakehlders for companies in all industries, except for the media. The media sector differs from the other sectors to a largest extent. The result according to universities occupy the first position and business partners are ranked as seventh on the list of stakeholders, according to their importance in media, is completely an unexpected and still without a valid explanation. Due to the fact that most companies in Serbia have just recently finished or yet not finished the process of privatization, companies in all the industries have not developed the proper relationship with shareholders and investors so far, unaware that these relations are extremely important for their business activities. In addition, low level of cooperation with research institutes (as well as universities) reveals the existence of a big gap between the economy and science. It is particularly surprising regarding the sector of telecommunication&IT.

Sources of competitiveness: According to the managers from the observed industries, key sources of competitiveness (most appreciated by users/consumers) are labeled by X in Table 3.

Table 3: Key sources of competitiveness

	Utility services	Industry	Mining & energetics	Banking	Media	Telecomm & IT	Services
Quality of products/services	X	X	X	X	X	X	X
Reliability	X		X	X	X	X	X
Long tradition	X	X	X		X		X
Image					X		
Innovation							
Other							

In all observed industries the managers do not believe that the competitiveness of their companies is based on innovation, which is completely inconsistent with the results of numerous researches world-wide that found innovation to be the key driver of corporate value.

Knowledge acquisition: “Knowledge acquisition is a process of capturing and bringing knowledge from the external environment into the company” (Starovic and Marr, 2004, p.20). Key sources of knowledge acquisition in the observed industries are shown in Table 4.

Training and education present the key source of knowledge acquisition in all the industries. On the contrary, cooperation with universities is not among the key sources of knowledge acquisition in any of them. Companies from mining and energetics acquire the missing knowledge the least by learning from the experience gained in more successful companies, while in telecommunications&IT, companies cooperate least with scientific –research institutions in order to acquire new knowledge that they lack.

Relevant value drivers of intellectual capital: Pareto analysis was used to determine the contribution of particular IC value drivers (human, structural and relational capital) to goals achievement and the company business success. Taking into account that the value driver with greater contribution can be considered as more relevant, measures of suggested IC value drivers’ relevance were identified based on their contribution level.

4.1.1 a) Relevant value drivers of human capital

The participants in the survey were first asked to choose, without ranking, 5 out of 9 offered HC value drivers, which according to them, have the greatest contribution to their company business achievements and success. Based on cumulative frequencies of their answers, the following ranking of HC value drivers (decreasing relevance) was acquired in observed industries (Table 5). By distinguishing value drivers with the greatest contribution (the "Pareto rule"), relevant HC value drivers were determined and they are labeled in Table 5 as gray.

Table 4: Key sources of knowledge acquisition

	Utility services	Industry	Mining & energetics	Banking	Media	Telecomm & IT	Services
training & education	X	X	X	X	X	X	X
employing individuals with proper competence	X	X		X	X	X	X
learning from experience gained in more successful companies		X				X	X
cooperation with customers	X	X				X	X
cooperation with scientific research institutes		X	X				
cooperation with universities							

Table 5. Value drivers of human capital and their relevance in industries

UTILITY SERVICES		INDUSTRY		MINING & ENERGETICS	
HC value driver	C.freq.	HC value driver	C.freq.	HC value driver	C.freq.
efficiency	89,6	efficiency	91,5	efficiency	89,4
experience	88,7	experience	84,9	motivation	85,1
motivation	70,4	motivation	79,2	experience	84,0
strategic alignment	55,7	manag. competence and leadership	57,5	expertise	64,9
manag. competence and leadership	53,9	education and knowledge-sharing	49,1	education and knowledge-sharing	56,4
expertise	46,1	expertise	44,3	innovativeness	35,1
education and knowledge-sharing	35,7	strategic alignment	43,4	manag. competence and leadership	35,1
innovativeness	34,8	innovativeness	26,4	strategic alignment	30,9
social skills	27,5	social skills	17,0	social skills	12,8

BANKING		MEDIA		TELECOMMUNICATION& IT		SERVICES	
HC value driver	C.freq.	HC value driver	C.freq.	HC value driver	C.freq.	HC value driver	C.freq.
efficiency	89,8	efficiency	85,5	efficiency	88,2	efficiency	84,8
motivation	73,5	experience	83,6	expertise	68,6	motivation	73,4
experience	67,3	motivation	65,5	experience	68,6	experience	68,4
education and knowledge-sharing	65,3	expertise	61,8	motivation	66,7	expertise	53,2
manag. competence and leadership	55,1	manag. competence and leadership	52,7	manag. competence and leadership	58,8	manag. competence and leadership	48,1
expertise	46,9	innovativeness	43,6	education and knowledge-sharing	49,0	education and knowledge-sharing	45,6
strategic alignment	42,9	strategic alignment	40,0	innovativeness	37,3	innovativeness	43,0
innovativeness	32,7	social skills	34,5	strategic alignment	35,3	strategic alignment	36,7
social skills	28,6	education and knowledge-sharing	27,3	social skills	21,6	social skills	32,9

The fact that employee efficiency was seen as the most relevant HC value driver in all the observed industries was unexpected, especially if we take into account that expertise is listed among the group

of relevant HC value drivers only in media and telecommunications&IT. Efficiency, being on top of the list, innovativeness and education of employees close to last position, reflect the existence of the industrial, rather than the knowledge era in Serbia. The ranking of employee experience in the group of relevant HC value drivers is expected. The fact that motivation is listed in the group of relevant HC value drivers in all industries indirectly reflects the managerial awareness of its importance which is rather encouraging. Motivation is perceived as a powerful means of building relationships within the organization and a more efficient goals achievement. On the other hand, employee expertise is listed in the group of relevant HC value drivers only in media and telecommunications&IT. Education and knowledge-sharing is relevant only in banking. Employee innovativeness (as well as strategic alignment and social skills) is not on the list of relevant HC value drivers in any of the industries. That is quite discouraging. Such attitudes are certainly not in accordance with modern economy in which innovation and life-long learning have become company's ultimate tools in the attempt to cope with the dynamics and global competition in business.

4.1.2 b) Relevant value drivers of structural capital

Based on the same principle, participants were supposed to chose 4 out of 10 offered SC value drivers (without ranking), which, in their opinion, primary contribute to business achievements and business success. The following ranking of SC value drivers, relative to their relevance in decreasing order, was acquired in observed industries (Table 6). Relevant SC value drivers were determined by the "Pareto rule" and they are labeled in Table 6 as gray.

SC value drivers that usually make the smallest contribution to business achievements are corporate culture or technical possibilities for transfer and acquisition of knowledge, except for telecommunications&IT, where product innovation development take the last position when it comes to relevance for business success. This is probably seen as the biggest surprise. In this extremely knowledge-intensive industry, product innovation development make the condition for market survival, whereas R&D make the basis for the competitiveness. Corporate culture was ranked as the most relevant SC value driver in banking, but in all other industries was ranked last or next to last.

R&D and product innovation development were not seen as the relevant SC value drivers in any of the industries. We come to conclusion that innovation and development components are again neglected, which goes in line with the previous results of ranking HC value drivers, in which innovation and competence development are omitted. These findings reveal obvious deficiency in business innovation in Serbia. It can be a result of poor employee innovativeness, lack of managing initiatives aimed to encourage innovation, or insufficient implementation of innovations.

4.1.3 c) Relevant value drivers of relational capital

Participants were also supposed to choose 4 out of 10 offered RC value drivers (without ranking), which, in their opinion, primarily contribute to business achievements and business success. The following ranking of RC value drivers, relative to their relevance in decreasing order, was acquired in observed industries (Table 7). Relevant RC value drivers were determined by the "Pareto rule" and they are labeled in Table 7 as gray.

Customer relationship was emphasized as the most relevant RC value driver in all observed industries. Banking, media, telecommunications&IT as well as services have the same relevant RC value drivers (customer relationship and image). Furthermore, industry and mining and energetics have the same RC value drivers (customer relationship and supplier relationship), whereas in the sector of utility services the relationship wih local community is seen as the second relevant RC value driver.

Setting aside only the relevant value drivers of human, structural and relational capital (Table 5, Table 6, Table 7), groups of the relevant IC value drivers for particular industries were established. They are presented in Table 8. These IC value drivers, according to managers, contribute the most to business achievements and business success in observed industries.

Table 6: Value drivers of structural capital and their relevance in industries

		INDUSTRY		MINING & ENERGETICS	
SC value driver	C.freq.	SC value driver	C.freq.	SC value driver	C.freq.
process management	70,0	employees' commun. and interaction	64,0	employees' commun. and interaction	63,0
employees' commun. and interaction	68,0	process management	63,0	process management	52,0
ICT	60,0	process&procedural innovation	50,0	ICT	49,0
process&procedural innovation	54,0	brands and trade marks	42,0	process&procedural innovation	40,0
data bases	41,0	ICT	41,0	data bases	31,0
R&D	19,0	R&D	39,0	R&D	24,0
product innovation development	17,0	product innovation development	28,0	tech. opportun. for knowledge transfer and acquision	17,0
brands and trade marks	17,0	tech. opportun. for knowledge transfer and acquision	20,0	product innovation development	16,0
corporate culture	17,0	data bases	19,0	brands and trade marks	12,0
tech. opportun. for knowledge transfer and acquision	15,0	corporate culture	13,0	corporate culture	12,0

BANKING		MEDIA		TELECOMMUNIC. & IT		SERVICES	
SC value driver	C.freq.	SC value driver	C.freq.	SC value driver	C.freq.	SC value driver	C.freq.
corporate culture	98,0	ICT	80,0	ICT	86,3	employees' commun. and interaction	74,7
process&procedural innovation	61,0	employees' commun. and interaction	75,0	employees' commun. and interaction	60,8	process management	63,3
ICT	59,0	data bases	51,0	process management	47,1	ICT	54,4
employees' commun. and interaction	51,0	process management	51,0	process&procedural innovation	41,2	data bases	48,1
product innovation development	49,0	process&procedural innovation	36,0	data bases	37,3	process&procedural innovation	39,2
process management	45,0	brands and trade marks	31,0	brands and trade marks	33,3	brands and trade marks	31,6
brands and trade marks	43,0	product innovation development	25,0	R&D	31,4	product innovation development	21,5
data bases	27,0	R&D	24,0	tech. opportun. for knowledge transfer and acquision	23,5	R&D	20,3
R&D	18,0	tech. opportun. for knowledge transfer and acquision	20,0	corporate culture	19,6	corporate culture	17,7
tech. opportun. for knowledge transfer and acquision	14,0	corporate culture	9,0	product innovation development	15,7	tech. opportun. for knowledge transfer and acquision	16,5

Table 7: Value drivers of relational capital and their relevance in industries

UTILITY SERVICES		**INDUSTRY**		**MINING & ENERGETICS**	
RC value driver	**C.freq.**	**RC value driver**	**C.freq.**	**RC value driver**	**C.freq.**
customer relationship	91,0	customer relationship	90,0	customer relationship	76,0
relationship with local community	72,0	supplier relationship	84,0	supplier relationship	60,0
relationship with media	50,0	perceived image	56,0	relationship with banks and finan. institutions	34,0
supplier relationship	46,0	relationship with banks and finan. institutions	47,0	perceived image	31,0
relationship with banks and finan. institutions	33,0	integration of external knowledge	33,0	relationship with local community	26,0
perceived image	33,0	relationship with competitors	26,0	relationship with competitors	24,0
relationship with shareholders and investors	25,0	relationship with shareholders and investors	22,0	relationship with media	22,0
social involvement	25,0	relationship with media	18,0	social involvement	16,0
relationship with competitors	9,0	social involvement	10,0	integration of external knowledge	14,0
integration of external knowledge	9,0	relationship with local community	6,0	relationship with shareholders and investors	9,0

BANKING		MEDIA		TELECOMMUNIC. & IT		SERVICES	
RC value driver	**C.freq.**	**RC value driver**	**C.freq.**	**RC value driver**	**C.freq.**	**RC value driver**	**C.freq.**
customer relationship	94,0	customer relationship	93,0	customer relationship	96,1	customer relationship	96,2
perceived image	67,0	perceived image	67,0	perceived image	62,7	perceived image	65,8
relationship with media	51,0	relationship with local community	51,0	relationship with media	49,0	relationship with media	54,4
relationship with shareholders and investors	39,0	relationship with media	40,0	supplier relationship	47,1	relationship with local community	48,1
integration of external knowledge	33,0	social involvement	33,0	relationship with local community	33,3	supplier relationship	35,4
relationship with local community	31,0	supplier relationship	29,0	relationship with banks and finan.institutions	29,4	integration of external knowledge	24,1
relationship with banks and financial institutions	22,0	integration of external knowledge	29,0	integration of external knowledge	27,5	relationship with competitors	21,5
relationship with competitors	22,0	relationship with banks and finan. institutions	25,0	relationship with competitors	25,5	social involvement	15,2
supplier relationship	20,0	relationship with shareholders and investors	16,0	relationship with shareholders and investors	17,6	relationship with shareholders and investors	11,4
social involvement	16,0	relationship with competitors	16,0	social involvement	11,8	relationship with banks and finan. institutions	10,1

5. The most important observations

By analyzing IC in 7 different industries, specific IC features, knowledge flows and relevant IC value drivers were identified. Comparative analysis of IC of the observed industries, indicated numerous similarities, as well as certain specific features within particular industries.

The fact that there are no 2 industries with the same relevant IC value drivers (Table 8) proves the existence of inter-industry variety from the perspective of IC reporting. Having in mind the basic assumption that relevant IC value drivers largely select the group of relevant IC indicators, the differences in groups of identified relevant IC value drivers in industries could result in different groups of IC indicators for particular industries, i.e. in differences in IC reporting.

On the other hand, similarities of industries from the perspective of intellectual capital, such as the common characteristics of IC and IC value drivers which are relevant in all industries (Table 8), can present the basis for defining the general model of IC reporting, applicable in all industries. This would create an opportunity for comparing companies from IC perspective, which is crucial for precise assessment of company performance and success.

The results show that employee efficiency is considered to be the primary HC value driver in all industries. On the other hand, innovativeness is not in the group of relevant HC value drivers in any of the industries. Education and knowledge-sharing are seen as relevant ones only in banking, whereas employee expertise is the relevant value driver in 3 out of 7 industries (media, teleccomunication&IT, services). These results illustrate the existence of the industrial rather than the knowledge era in observed economic environment. Managers are not sufficiently aware of the fact that innovation and long-life learning are the ultimate tools for business success in modern economy. Therefore, they do not invest in professional development which results in low competitiveness in the marketplace. In addition, product innovation development, as well as R&D, is not seen as the relevant SC value drivers in any of the observed industries. Furthermore, process and procedural innovation development is the relevant SC value driver only in utility services and banking. The key importance of innovation, as well as management initiatives for promoting innovation, is not recognized in the observed Serbian industries.

	UTILITY SERVICES		INDUSTRY		MINING & ENERGETICS	
	Value driver	**C.freq**	**Value driver**	**C.freq**	**Value driver**	**C.freq**
Human	employee efficiency	89,6	employee efficiency	91,5	employee efficiency	89,4
	employee experience	88,7	employee experience	84,9	employee motivation	85,1
	employee motivation	70,4	employee motivation	79,2	employee experience	84,0
Structural	process management	70,0	employees' commun. and interaction	64,0	employees' commun. and interaction	63,0
	employees' commun. and interaction	68,0			process management	52,0
	ICT	60,0	process management	63,0	ICT	49,0
	process&procedural innovation	54,0				
Relational	customer relationship	91,0	customer relationship	90,0	customer relationship	76,0
	relationship with local community	72,0	supplier relationship	84,0	supplier relationship	60,0

	BANKING		MEDIA		TELECOMMUNIC. & IT		SERVICES	
	Value driver	**C.freq**	**Value driver**	**C.freq**	**Value driver**	**C.freq**	**Value driver**	**C.freq**
Human	employee efficiency	89,8	employee efficiency	85,5	employee efficiency	88,2	employee efficiency	84,8
	employee motivation	73,5	employee experience	83,6	employee expertise	68,6	employee motivation	73,4
	employee experience	67,3	employee motivation	65,5	employee experience	68,6	employee experience	68,4
	education and knowledge-sharing	65,3	employee expertise	61,8	employee motivation	66,7	employee expertise	53,2
					manag. competence and leadership	58,8		
Structural	corporate culture	98,0	ICT	80,0	ICT	86,3	employees' commun. and interaction	74,7
	process and procedural innovation	61,0	employees' commun. and interaction	75,0	employees' commun. and interaction	60,8	process management	63,3
	ICT	59,0						
Relational	customer relationship	94,0	customer relationship	93,0	customer relationship	96,1	customer relationship	96,2
	image	67,0	image	67,0	image	62,7	image	65,8

Table 8: Relevant IC value drivers in observed industries

6. Conclusion

This paper presents a wide-rage research and analysis of intellectual capital and knowledge flows in seven different industries. The obtained results reveal some specific features of industries, particularly regarding relevant intellectual capital value drivers.

The results should be considered while keeping in mind the following:

- the primary research objective was not to identify precise IC measures for individual companies, but to look at organizational IC from a broad perspective. In other words, the goal was to identify specific IC features within different industries in order to define general measures that are applicable in particular industries. These would in turn prescribe applications of IC reporting and management in companies from the observed industries;
- identification of relevant IC value drivers and specific IC features in different industries was not only oriented towards defining relevant IC indicators and IC measuring, but also towards managerial control and decision-making, based upon identified strengths and weaknesses of IC within the industries. "Measurement alone or measurement for the sake of measurement is not

enough" (Nordic Industrial Fund, 2001, p.64). The knowledge about IC of each of the observed industries can be synthesized into separate IC overviews of a particular industry. These IC overviews could further on be used in order to provide more accurate IC reporting and management within the observed industries;

- identified groups of relevant IC value drivers are environment –specific, because they were picked by surveyees (Serbian top- and medium- level managers). Therefore, their implementation could be limited to the observed environment. Furthermore, identified groups of relevant IC value drivers are not free of certain drawbacks. For example, competence, employee training and education, innovation, and R&D are not included in the groups of relevant IC value drivers almost in all observed companies. These value drivers were not found significant in the observed environment. Nonetheless, they are dominant in value-added creation and an IC statement without indicators related to these value drivers does not constitute a valid and all-encompassing picture of reality.

In general, the contributions of this research should be viewed as a refinement of the existing IC reporting methods with respect to unique characteristics of the industries. By fine-tuning of IC reporting to particular industrial features it is possible to capture and picture intellectual capital more precisely, increasing the accuracy of IC measuring and reporting and make it easier for implementation in different industries.

On the other hand, a limitation of using different IC reporting models (different groups of relevant IC indicators) is the inability to compare companies from different industries. Comparison is only possible when the same measuring system is applied. In the case of IC measuring and reporting it only works if the same IC indicators are applied.

However, research programs that are tailored to specific environments while utilizing large data sets such as the present one can contribute to our efforts toward developing an universal methodology for IC reporting and measurement. Although IC community has made significant advances in assessing and reporting methods (Edvinsson and Malone, 1997; Sveiby, 1997; Roos et al., 1997; Stewart, 1997; Bontis, 1999; Sanchez et al., 2000; Andriessen, 2004), convergence of existing measuring methods towards a universal one and standardization in the field of IC measuring are of the extreme importance for IC community.

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Firm Attributes and Intellectual Capital Disclosure: Evidences From IPO Prospectuses in Taiwan

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Abstract: The paper examines the relationship between firm attributes (e.g., profitability, firm size and the share of stocks held by board of directors) and intellectual capital disclosure. Based on the framework by Guthrie and Petty (2000), three dimensions with 18 intellectual capital disclosure keywords were proposed. Content analysis was used to analyze the frequency, quality and compound indicators in 142 IPO prospectuses from 1992 to 2006. The results of regressions revealed: (1) corporate profitability is significantly positively correlated to the disclosure frequencies of external capital and human capital, but is significantly negatively correlated to the disclosure quality of human capital; (2) the corporate size in term of sales is significantly negatively correlated to disclosure quality of external capital; (3) but corporate size in terms of number of employees is significantly positively correlated to disclosure frequency and quality of overall intellectual capital; and (4) the share of company stock held by it's board of directors is negatively correlated to the overall intellectual capital, but not with statistical significance. The stock market administration can provide more support to guide the small firms and internal capital disclosure in the IPO prospectuses.

Keywords: Firm attributes, intellectual capital disclosure, content analysis, IPO prospectuses

1. Introduction

The concept of intellectual capital (IC) has been extensively discussed by scholars from distinct fields since Galbraith originally proposed it in 1969 (Bontis, 2001; Edvinsson & Sullivan, 1996), and it can be described as intangible assets in an accounting field. Scholars in economics use knowledge assets to represent intellectual capital, and it is widely used to indicate the nonphysical claim of a company's future benefit in the fields of management and law. According to the Edvinsson's evaluation, the intangible assets of an enterprise are approximately three to four times the book value of an enterprise (Edvinsson & Malone, 1997). Furthermore, it has been emphasized that intellectual capital can create wealth for an enterprise and it includes human capital, brand, trademark, patent, learning capability, adaptation capability etc. It also strengthens relationship betweens the customers and suppliers. Therefore, intellectual capital becomes a key factor to enhance an enterprise's core value. With the advent of a knowledge economy, an enterprise's intellectual capital value has gradually exceeded its tangible assets, and so most industries increasing emphasize intellectual capital as a crucial issue (Petty & Guthrie, 2000). In addition to establishing a disclosure framework consisting of three constructs with 18 indicators of intellectual capital, this paper investigates the relationship between firm attributes (enterprise profit, firm size and company stock share held by board of directors) and intellectual capital disclosure. Methods for calculating IC disclosure frequency, disclosure quality and compound disclosure score are also proposed.

2. Theoretical background

2.1 Intellectual capital disclosure

Guthrie et al., (1999) used this frame to analyze the annual finances of an enterprise and began the study of disclosing intellectual capital .Guthrie and Petty (2000) quoted it and revised use by Seivby's (1997) frame, then developing an analytical framework appropriately to Australia enterprises. We also have review papers on disclosure of intellectual capital for enterprises in Ireland, Canada, Malaysia, Holland, France, Germany and Denmark (Brennan, 1999; Bontis, 2002; CDAIT, 2001; DMSTI, 2003; Goh & Lim, 2004). The literature on intellectual capital disclosure is summarized in Table 1. Since most of the studies are based on Guthrie and Petty's framework, that study is also based on the framework.

Table 1: Intellectual capital disclosure studies by scholar

Scholar	Year	Country	Subjects	Feature and Result
Sveiby	1997	—	—	The study develops the framework of intellectual capital disclosure. The framework is distinguished as internal construct, external construct and employee competitiveness construct.
Guthrie and Petty	2000	Australia	Top 20 companies	The study modifies Seivby's framework and is the first case of the research using content analysis method to analyze financial annual to disclose intellectual capital.
Brennan	2000	Ireland	11 knowledge-based companies	The study is based on Guthrie & Petty's framework to disclose the intellectual capital of Ireland companies.
DATI	2001	Denmark	17 companies	The study uses four-step procedure to transform internal information into Intellectual capital statement.
Bontis	2002	Canada	10000 financial annual	The study develops a framework consisting of 39 indicators and uses content analysis to disclose intellectual capital.
DMSTI	2003	Denmark	100 companies	The study follows the framework developed in 2001 to renew the intellectual capital disclosure.
Bukh, Nielsen, Gormsen, and Mouritsen	2005	Denmark	68 IPO prospectuses	The study focuses on intellectual capital disclosure using content analysis.
Goh and Lim	2004	Malaysia	Top 20 profitability companies	The study is based on Guthrie & Petty's framework to disclose the intellectual capital.
Vandemaele, Vergauwen and Smits	2005	Netherlands, Sweden, UK	180 companies	The study is based on Guthrie & Petty's framework and use content analysis to disclose intellectual capital.
Guthrie, Petty, and Federica	2006	Hong Kong, Australia	100(Hong Kong), 50 (Australia)	The study is based on Guthrie & Petty's framework to disclose intellectual capital.

2.2 The IC disclosure framework

Most research uses the intellectual capital framework of Guthrie and Petty (2002). For the internal capital part, this combines the "management processes" and "management philosophy" to a single-item "Management philosophy", and it also combines" information system network system" to comprise the "information system"; in the external capital part, it is called "customer relation" to the shopper and shopper's loyalty. Since they are finance-related information, company name and other related information are not discussed in this study. Finally, for human capital, the indicators "expertise" and "job qualification" are included in the indicator "level of education". While the indicators of "work-related knowledge" and "work-related competitive ability" are included in the indicator "training". We find "social responsibility" is the important indicator for an enterprise to be competitive in Taiwan. Therefore it is added as one of the indicators. These comprise the three constructs and the 18 indicators of the intellectual capital in this study (Table 2).

Table 2: Intellectual capital disclosure framework

Internal capital (IC)	External capital (EC)	Human capital(HC)
Management philosophy	Brand	The employee relation
Corporate culture	Customer relation	Level of education
Patent	Vendor's relationship	Training
Trademark	Distribution	Entrepreneurship
Copyright	The enterprise cooperates	
Information system	Authorize agreement	

Source: Guthrie and Petty (2000)

2.3 Firm attributes and intellectual capital disclosure

An enterprise's profit comes from its continued investment in intellectual capital. The companies which have more investment in intellectual capital will tend to disclose more information about intellectual capital. Therefore the more an enterprise can make profits, the more it will tend to disclose the information about intellectual capital. The higher the performance of companies is, the more it will discloses intellectual capital to the public (Li, Pike & Haniffa, 2008). Singhvi and Desai (1971) pointed out that a company with high profits will disclose more information about intellectual capital. Verrecchia (1983) found that the decision to disclose a company's information will influence its stock price. Garcia-Meca and Martinez (2007) analyzed 260 financial reports of Spanish companies and verified a positive relationship between intellectual capital disclosure and the corporate profitability. To sum up, we propose the first hypothesis, as follows:

> *H1: Corporate profitability is positively correlated to the degree of intellectual capital disclosure.*

Firm size positively affects intellectual capital disclosure (Li et al., 2008). Robb, Single and Zarzeski (2001) found that the larger the firm the higher degree of disclosure for non-financial information. Titman and Wessels (1988) took 469 listed companies from 1974 to 1982 as research subjects and used sales amount as firm size in their study, using the natural logarithm of sales amount as the agency variable of the firm size (Titman & Wessels, 1988; Kester, 1986). Furthermore, the number of employees in a company has a positive impact on the IPO disclosure (Cordazzo, 2007). Thus, sales amount and total number of employees are used to represent firm size in this study. We propose the second hypothesis, as follows:

> *H2: Firm size is positively correlated to the degree of intellectual capital disclosure.*
>
> *H2-1: Firm size in term of sales is positively correlated to the degree of intellectual capital disclosure.*
>
> *H2-2: Firm size in term of number of employees is positively correlated to the degree of intellectual capital disclosure.*

The proportion of company stock share held by board of directors will also affect intellectual capital disclosure (Eng & Mak, 2003). Eng and Mak (2003) pointed out that the structure of company stock shares will influence the degree of supervision and hence influence the tendency of intellectual capital disclosure. The proportion of managerial ownership is also related to intellectual capital disclosure (Bukh, Neilson, Gormsen and Mouritsen, 2005). Raffournier (1995) pointed when the ownership of a company is more broadly there is more pressure on the company and as a result it will disclose more intellectual capital. Conversely, when the company ownership is more concentrated in a minority of stock holders, the company will disclose less intellectual capital (Marr, 2003; Cormier, Magnan & van Velthoven, 2005). Furthermore, some studies have shown substantial evidence suggesting that the proportion of company stock share held by board of directors negatively influences the extent of intellectual capital disclosed (Bukh, et al., 2005; Li, et al., 2008; O'Sullivan, 2000). In sum, we propose the third hypothesis, as follows:

> *H3: The amount of company stock share held by its board of directors is negatively correlated to the degree of intellectual capital disclosure.*

3. Research method

3.1 Data collection

The research subjects are drawn from the Market Observation Post System in Taiwan, and all made an initial public offering (IPO). The time span of the subjects is from 1992 to 2006, a totally of 15 years, and the there are 142 IPO prospectuses we select the prospectus of emerging stock because their prospectus can offer information on disclosing major or unusual events for the enterprise in order to respond to a special demand from the stock market administration and potential investors. The prospectus can be a tool to disclose more internal information of the company in order to attract investor interest and hence it provides valuable information to evaluate stock price. Moreover, it includes a lot of future information (Mouritsen, 2001; Bukh, et al., 2005), and much valuable data. Therefore we adopt the IPO prospectuses as the research samples.

3.2 The operational definition of variables

3.2.1 Independent variables

The corporate profitability: earnings per share (EPS) disclosed in the prospectus is used as the corporate profitability. Firm size: The natural logarithm of sales amount and the total number of employees are used to represent firm size following Titman and Wessels (1988) and Kester (1986). Company stock share held by board of directors: The proportion of company stock shares held by its board of directors as disclosed in the prospectus is used as the independent variable.

3.2.2 Dependent variables

Disclosure Frequency of Intellectual Capital

This study analyzes the frequency distribution of keywords in the prospectuses of 142 subjects, using a computer program and human analysis to promote the validity of this research. In this study, the disclosure frequency of each measurement indicator is normalized (as in Equation 1). $NDFC_i$ is defined as the notation.

$$NDFC_i = \frac{DFC_i}{DFC_{i\_\max}} \qquad C \in \{IC, EC, HC\} \qquad \text{…….. Equation 1}$$

$NDFC_i$: Normalized Disclosure Frequency of intellectual Capital indicators

DFC_i : Disclosure Frequency of intellectual Capital indicators

$DFC_{i\_\max}$: Maximum of Disclosure Frequency of intellectual Capital indicators

C : Intellectual Capital including Internal Capital (IC), External Capital (EC) and Human Capital (HC)

i : any indicator in the intellectual capital construct

Disclosure Quality of Intellectual Capital

Since the investigator has to assign quality weights to the related intellectual capital indicators mentioned in the prospectus, we develop a computer program to pick up five sentences centered on each keyword. After being integrated individually and then examined and coded by investigators, the score of disclosure quality is obtained. By referencing the four-way numeric coding systems proposed by Guthrie et al., (1999), we develop recognizing the quality weight number. The scores are defined as follows.

- 0: variable doesn't appear in the prospectus
- 1: description of variable is expressed only by pure textual expression
- 2: description of variable is already expressed by quantification data
- 3: description of variable is already expressed by using currency

The quality of intellectual capital disclosure will produce a quality weight number from 0 to 3. Higher score for the indicator indicators better quality. In this study, we define $AveDQC_i$ (shown as Equation 2) to determine the average value in each indicator of disclosing the quality under each intellectual capital construct.

$$AveDQC_i = \frac{\sum_{j=1}^{m} DQC_{i_j}}{m} \qquad C \in \{IC, EC, HC\} \qquad \text{……. Equation 2}$$

$AveDQC_i$: Average of Disclosure Quality of each intellectual Capital indicator

DQC_i : Disclosure Quality of each intellectual Capital indicator in each occurrence

Compound Disclosure Score

This study defines Equation 3 to compute the compound disclosure score of each intellectual capital ($ComDSC$). We take the weight of indicators into considerations since the disclosure frequency is not enough to represent the importance of indicators. In the study, disclosure quality is used as the weight. Therefore, we develop the "compound disclosure score" to promote the correctness of intellectual capital disclosure. This equation considers both disclosure frequency and disclosure quality into considerations.

$$ComDSC = \frac{\sum_{i=1}^{n} NDFC_i \times AveDQC_i}{n} \qquad C \in \{IC, EC, HC\}, n \in \{n_1, n_2, n_3\} \qquad \text{… Equation 3}$$

n : Number of indicators in each intellectual capital constructs

3.3 Data analysis

3.3.1 Content analysis

Content analysis is one of the methods to translate text description into quantification. Through this process, the disclosure frequency and quality of intellectual capital are recorded for each indicator. The higher disclosure frequency indicator, the indicator is more important (Krippendorff, 1980). We focus on "keywords" or "a keyword in context". Gray, Kouhy & Lavers (1995) proposed that if we utilize content analysis to carry out inference, understanding the meanings described in the sentences is more important than just counting the keyword occurrences. Milne and Adler (1999) argued that using sentences for the analysis would increase the reliability and validity of the research. Thus, this study, in addition to counting the keywords frequency for each indicator, we also utilize the keywords in sentences and paragraphs to evaluate the quality of the indicator. We further invite interested scholars to verify the classified indicators to the keywords.

3.3.2 Coding

This research utilizes information technology to deal with the most amount of complies information. We developed a JAVA program to automate the coding process for accurate and efficient information, so we can analyze the information. In order to reduce errors in the manual coding, we use Text Mining technology to assist with the coding and reduce the manual burden and error. Furthermore we check the match gap between computer and manual coding by sampling the subjects.

3.3.3 Statistics analysis

In this study, the descriptive statistics are considered for the firm attributes and intellectual capital disclosure. In addition, we carry out the correlation and regression analysis between intellectual capital disclosure and firm attributes to test the derived hypotheses.

4. Results

4.1 Descriptive statistics and correlations

In the 142 prospectuses, descriptive statistics including EPS, the number of employees, and stock ownership by the board of directors is shown in Table 3. On average, IPO firms had EPS of 2.31 NTD (New Taiwan Dollars), average sales of NTD 13.14 hundred millions with about 70% of the sample enterprises sales below 10 hundred millions; enterprise scale total employee numbers average is 267.05, and 104 enterprises (73.2%) have 50-300 employees; the proportion of the samples whose the share of company stock held by it's board of directors is below 40% is 76%.

From the derived correlation matrix we make the following observations: EPS has a negative significant correlation with human capital compound disclosure score (r= -.173, p< .05) (Table 3); company sales has a positive significant correlation (r= .218, p< .01) with total number of employees and a negative significant correlation (r= -.187, p< .05) with external capital average disclosure quality; company total number employees has a positive significant correlation (r= .188, p< .05 ; r= .254 and .295 p<.01) with internal capital compound disclosure score, external capital average disclosure frequency and compound disclosure score, and it also has a positive significant correlation (r= .272, p< .01) with human capital average disclosure frequency.

4.2 Regression analysis

In Table 4, the F value of model 2 is 2.5999 which reaches 10% standard; the F values of models 9 and 10 are 2.236 and 2.045 which reach a 5% standard, indicating that the regression analysis is valid. The R^2 value is not high in this research, showing that there are many factors to explain intellectual capital disclosures, and the variables represent the company characteristics can not completely explain the degree of intellectual capital disclosures. Models 1, 4, and 7 are company characteristics which evaluate the frequency of each intellectual capital average disclosure. The results show that EPS has a positive significant correlation with external and human capital with values of .01 and .05 standard, thus supporting hypothesis 1. Moreover, the total number of employee also has a positive significant correlation with external and human capital with values of .01 and .001, therefore supporting hypothesis 2-2.

Models 2, 5, and 8 are corporate characteristics which evaluate every intellectual capital average disclosure quality, and the results show that each stock share per earning has a positive significant correlation with human capital at .05 standard. This demonstrates that with explains the corporate the higher corporate profits, there is more average of human capital disclosure quality, which cannot be supported the hypothesis 1. However, the sales amount has a negative significant correlation with external capital at the .05 significant level and so hypothesis 2-1 has no apparent relationship to the degree of intellectual capital disclosures. Models 3, 6, and 9 are company characteristics which evaluate every intellectual capital compound score, and experiment results show that the total number of employees has a positive significant correlation with internal and external capital at .05 standard, which supports hypothesis 2-2. Moreover, model 10 has a positive significant correlation with the overall employee evaluation of intellectual capital total disclosure score of .01 standards which supports hypothesis 2-2. However, the stock share held by its board of directors has no apparent correlation with each model, so hypothesis 3 cannot be supported.

5. Discussions

Industries with high profitability will disclosure the external capital and human capital. This is helpful for reinforcing the relationship with external interested parties and helpful for attracting the most talented employees; but companies may be reluctant to disclose internal capital and capital disclosure quality to prevent competitors from understanding the enterprise profits and intellectual capital relationship. One financial supervisor from the listed company said *"Most enterprises in Taiwan are raised by their own efforts. Those listed are mostly top one or top two in the same industry, those managers experienced a great deal of competition from their competitors. So they protect themselves, and they considers that if they disclose more key information, their competitors will understand their companies more, and then their profits will be reduced!"*

Moreover, we find that the strategy of capital disclosure strategy of highly profitable companies is to increase the exposure by the disclosure frequency to attract talented employees, but put disclosure quality low to protect their human capital. The result is that profitability and intellectual capital disclosures have no relationship, but the number of employees and intellectual capital disclosures mostly are significantly correlated (Li, et al., 2008). The total number of employees is the most reliable forecast variable of intellectual capital disclosures, since with the company growth, it needs to more systematically disclose intellectual capital. According to Huselid (1995), the total number of employees in corporation has a positive significant correlation with the intellectual capital disclosures. One manager handing stock affair pointed out：*"There is no management at the beginning of establishing a company, no training program, no, absolutely, while the firm size is so lager that they need managing rules, because Labor Standards Law and employee rights is very important ."*The only exception is that enterprises with higher sales have negative significant correlation with quality of external capital disclosure. They would be the benchmark objects in the same industry and they would tent to conceal their external capital strategy, investment degree and related market performance to reduce the disclosure of business information and prevent their market share being taken by competitors.

The ratio of company stock share held by its board of directors is negatively correlated to the overall intellectual capital, but it is not statistically significant. The stock market administration can provide more support to guide the small firms and internal capital disclosure in the IPO prospectuses. The difference is no description of the stock share of management in Taiwan's prospectus, therefore, this research analysis "stock share by board of directors". Further more, the board of directors has different requirements for enterprises' management transparency and social responsibility, and this research

samples are mainly in the electronics industries. This was clarified during an in-depth interview with a project manager, who indicated: "*Most electronics firms invest large amounts of money, so the information transparency needs to be higher to be welcomed by the legal representatives. If these industries need more funds, they need to take syndicated bank loans and invest outside of Taiwan markets to attract more foreign capital to be their stakeholders and periodically hold investor conferences."*

Table 3: Descriptive statistics and Correlations (N=142)

	Mean	S. D.	1	2	3	4	5	6	7	8	9	10	11	12	13
1. EPS	2.31	3.23													
2. Sales	6.44	1.40	.142												
3. Number of employees	267.05	342.1	-.093	.218**											
4. Directors stocks Share	32.13	18.30	-.056	.086	.008										
5. Internal Capital Ave NDFC	.25	.06	.046	.081	.125	.053									
6.Internal Capital Ave DQC	.94	.27	-.008	.035	.010	-.089	.249**								
7. Internal Capital Com DSC	.54	.15	-.049	-.004	.188*	-.047	.375**	.709**							
8. External Capital Ave NDFC	.25	.07	.131	.100	.254**	-.012	.371**	.327**	.549**						
9. External Capital Ave DQC	1.35	.27	.058	-.187*	.062	-.064	.083	.191*	.245**	.388**					
10. External Capital Com DSC	.61	.15	.101	.098	.295**	-.027	.351**	.268**	.497**	.962**	.442**				
11. Human Capital Ave NDFC	.47	.11	.133	.047	.272**	-.002	.357**	.271**	.491**	.956**	.388**	.937**			
12. Human Capital Ave DQC	.94	.17	-.173*	-.011	-.030	-.012	.285**	.311**	.200*	.086	.203*	.074	.083		
13. Human Capital Com DSC	.69	.15	-.035	.006	.110	-.006	.884**	.234**	.397**	.295**	.061	.281**	.274**	.350**	
14. Total DSC	1.83	.29	.013	.047	.264**	-.036	.660**	.530**	.828**	.811**	.342**	.801**	.765**	.253**	.680**

Note : * p< 0.05, ** p< 0.01

Table 4: Regressions: Firm attributes and intellectual capital disclosure

Variable	Internal Capital			External Capital			Human Capital			TDSC (Model 10)
	NDFC (Model 1)	Ave DQC (Model 2)	Com DSC (Model 3)	NDFC (Model 4)	Ave DQC (Model 5)	Com DSC (Model 6)	NDFC (Model 7)	Ave DQC (Model 8)	Com DSC (Model 9)	
Constant	.35*	.35***	.10	-.03	.56***	-.14	-.02	.56***	.17+	.13
H1:EPS	.05	-.02	-.03	.15+ (Accept)	.10	.13	.17* (Accept)	-.18* (Reject)	-.02	.04
H2-1:Sales	.04	.05	-.04	.02	-.22* (Reject)	.02	-.04	.03	-.01	-.01
H2-2:Number of Employees	.12	-.001	.19* (Accept)	.26** (Accept)	.12	.30*** (Accept)	.30*** (Accept)	-.05	.11	.27** (Accept)
H3: Directors of Stocks Share	.05	-.09	-.05	-.007	-.04	-.02	.008	-.02	-.007	-.04
R^2	.02	.01	.04	.09	.06	.10	.10	.03	.01	.07
F-Value	1.397	2.599*	1.857	1.347	1.150	1.539	0.827	1.127	2.235+	2.045 +

Note: + p<.1, * p< 0.05, ** p<0.01, *** p< 0.001

6. Conclusions

This paper identifies the relationship between firm attributes and intellectual capital disclosures in the prospectuses of 142 listed enterprises from 1992 to 2006 in Taiwan. Overall, the degree of human capital disclosure is the highest for human capital, followed by external capital and internal capital. In the relationship between the firm attributes and intellectual capital disclosures, high profitability and large company size (defined by the number of employees) have positively significant correlation to all dimensions of intellectual capital disclosure. Through intellectual capital disclosure, companies can emphasize the importance of their relationships with the interested parties such as customers, suppliers, partners, investors, stakeholders and there by build a sustainable management philosophy and plan of action. Due to competition, companies can accordingly reduce the quality of external capital and human capital to avoid imitation by competitors and head hunters. However, the sales and stock ownership of the board of directors have no significant influence on intellectual capital disclosure, it is more appropriate to forecast the degree of intellectual capital disclosure by the employees and stock ownership of the management the future research.

Thus study has to shed some light on the relationships between firm attributes and intellectual capital disclosures, and it has advanced our understanding on the firm's behavior on IC disclosure. This might

offer the strategic direction toward intellectual capital disclosures and building external non-financial communication channels. There are two specific suggestions in this research. First, firms can make a good strategy for intellectual capital disclosures to balance among enterprises, interested parties and employees, which balancing business performance and business secrets. Second, the stock market administration can update a set of intellectual capital disclosures guidelines in the current prospectus, especially for internal capital, and also assist small firms.

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Prioritizing Corporate R&D Capabilities: The Intellectual Capital Perspective

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Abstract: Few researches have been undertaken to prioritize corporate R&D capabilities in the intellectual capital view. This paper synthesized a comprehensive list of IC-related indicators for developing corporate R&D capabilities along the input-process-result process. Via the factor analysis, 43 IC-related indicators were abstracted into 11 IC-related factors. Corporate R&D managers prioritized these IC factors by deploying analytical hierarchy process (AHP) questionnaires. The results of AHP revealed: (1) the result phase is the pivotal of developing corporate R&D capabilities in three phases, (2) the top three weighting factors are the relational and process capitals (cost effectiveness to customers) in the result phase, following by organizational capital (strategy fitness) in the input phase, and human capital (competency of R&D personnel) in the input phase; (3) strategy fitness is the most significant IC capability in the input phase; project execution capability is the most important IC in the process phase; and cost effectiveness to customers is valued the most in the result phase. Some discussions and conclusions were drawn.

Keywords: Intellectual capital; corporate R&D capabilities; input-process-result model, analytical hierarchy process

1. Introduction

As Drucker (1993: 42) suggested, “The traditional factors of production─ land, labor, and capital─ have not disappeared. But they become secondary. Knowledge is becoming the only meaningful resource.” However, although the paradigm has shifted from manual work towards knowledge work, it remains a fact that managerial awareness of the importance of “intangible assets” is quite low (Litschka et al. 2006). Intellectual capital is concerned with how better to manage and measure knowledge and other intangibles in the company (Mouritsen 2002). Hence, it has been insufficient to develop its corporate R&D capabilities in the traditional method, which focuses on tangible aspects. There is a need of intangible aspect when a firm tries to develop their corporate R&D capabilities. The paper is one of few attempts to develop IC-related indicators for better corporate R&D capability development. The paper proceeded as follows. We reviewed the definition and taxonomy of intellectual capital, categorizing corporate R&D capabilities and process into an IC framework in Section 2. The exercise of analytical hierarchy process was illustrated in Section 3. The results of AHP were shown in Section 4. We compared the research results and previous literature in Section 5. Finally, some managerial implications were drawn to R&D managers in firms and organizations.

2. Intellectual capital and corporate R&D capabilities

2.1 Definition of intellectual capital

Intellectual capital meant more than just “intellect as pure intellect” but rather incorporated a degree of “intellectual action” (Feiwel 1975). In that sense, intellectual capital is not only a static intangible asset per se, but an ideological process; a means to an end (Bontis 1998). However, there is considerable lack of consensus on the definition of intellectual capital. In addition, there are several concepts with similar meaning. Itami & Roehl (1987) introduced the concept of “invisible assets” and defined them as information-based assets, which include technology, consumer trust, brand image, corporate culture, as well as management skills. Hall (1992) classified “intangible resources” as “assets” or “skills/competence”. The former included patents, trademarks, copyrights, resisted designs, contracts, trade secrets and data bases; the later covered the knowledge of employees, suppliers, and advisers, as well as the collective aptitudes which add up to the organizational culture.

Stewart (1991:44) mentioned: “Every company depends increasingly on knowledge – patents, processes, management skills, technologies, information about customers and suppliers, and old-fashioned experience…add together, this knowledge is intellectual capital.” He defines intellectual

capital as “the sum of everything everybody in your company knows that gives you a competitive edge in your marketplace”. Then, Stewart (1997) defined intellectual capital as “the intellectual material – knowledge, information, intellectual property, experience –that can be put to use to create wealth. It is a collective brainpower or packaged useful knowledge.”

Edvinsson and Sullivan (1996) defined intellectual capital as knowledge that can be converted into value. This definition is very board, encompassing inventions, ideas, general knowledge, designs, computer programs, data processes, and publications. It is not limited to technological innovations or to just those forms of intellectual property by the law. Edvinsson and Malone (1997) defined intellectual capital as: “the procession of the knowledge, applied experience, organizational technology, customer relationships and professional skills that provide a company with a competitive edge in the market.”.

Roos et al. (1998) claimed that IC includes all the processes and the assets which are not normally shown on the balance-sheet and all the intangible assets (trademarks, patents and brands) which modern accounting methods consider ... it includes the sum of the knowledge of its members and the practical translation of his/her knowledge. Bontis et al. (2000) defined intellectual capital as “elusive, but once it is discovered and exploited, it may provide an organization with a new resource-base from which to compete and win.” in 1996. McElroy (2002) proposed a major modification to Edvinsson’s model which includes the addition of both social capital and the underlying notion of social innovation capital. The description of social innovation capital is that a collection of independent learners and communities of practice who collaborate with one another in self-organizing ways to develop and integrate shared knowledge. The definitions of intellectual capital are summarized in Table 1.

Table 1: Definition of intellectual capital: A summary

Scholar	Definition
Galbraith (1969)	Intellectual capital is not only a static intangible asset per se, but an ideological process; a means to an end.
Stewart (1991)	The sum of everything everybody in your company knows that gives you a competitive edge in your marketplace.
Edvinsson & Sullivan (1996)	Intellectual capital as knowledge that can be converted into value.
Stewart (1997)	The intellectual material – knowledge, information, intellectual property, experience –that can be put to use to create wealth.
Edvinsson & Malone(1997)	IC is the procession of the knowledge, applied experience, organizational technology, customer relationships and professional skills that provide Skandia with a competitive edge in the market.
Roos et al. (1998)	IC includes all the processes and the assets which are not normally shown on the balance-sheet and all the intangible assets (trademarks, patents and brands) which modern accounting methods consider ... it includes the sum of the knowledge of its members and the practical translation of his/her knowledge.
Bontis (1998)	Intellectual capital is the pursuit of effective use of knowledge (the finished product) as opposed to information (the raw material).
McElroy (2002)	A major modification to Edvinsson’s model which includes the addition of both social capital and the underlying notion of social innovation capital

2.2 Taxonomy of intellectual capital

From reviewing the literature, it presents a great number of classification schemes for intellectual capital. Edvinsson (1997) defined intellectual capital as human capital and structural capital. Sveiby (1997) proposed a conceptual framework based on three families of intangible assets: external structure; internal structure; and individual competence. Bontis (1998) categorized into three types: (1) human capital, structural capital and customer capital. However, a convergent taxonomy of IC emerged, categorizing intellectual capital into: (1) human capital, (2) structural capital including :organizational capital, innovational capital, and process capital; (3) relational capital (do Rosario Cabrita & Vaz 2005). We elaborated these five types of IC in the following.

2.2.1 Human capital

Human capital is the primary component of intellectual capital (Edvinsson and Malone 1997, Stewart 1997, Bontis 1998), because human interaction is the critical source of intangible value in the intellectual age (O'Donnell 2003). Edvinsson (1997) defined human capital as the combined

knowledge, skill, innovation, and the ability of company's individual employees. It is also includes the company's values, culture, and philosophy. Roos et al. (1998) argued that employees generate IC through their competence, their attitude and their intellectual agility. Competence includes skills and education, while attitude covers the behavioral component of the employees' work. Intellectual agility enables one to change practices and to think of innovative solutions to problems. Even though employees are considered the most important corporate asset in a learning organization, they are not wholly owned by the organization. Bontis (1998) described human capital as the firm's collective capability to extract the best solutions from the knowledge of its individuals. Unfortunately, personnel lost can result in the loss of corporate memory and hence become a threat to the organization. Bontis et al. (2000) defined human capital as the individual knowledge stock of an organization as represented by its employees.

2.2.2 Structural capital

Edvinsson (1997) defined structural capital as the hardware, software, databases, organizational structure, patents, trademarks, and everything else of organizational capability that supports those employees' productivity. In a word, it's everything left at the office when the employees go home. Structural capital also includes customer capital, the relationships developed with key customers. Unlike human capital, structural capital can be owned and thereby traded. However, structural capital itself composed of organizational, innovational, and process. Further details are as follows:

Organizational capital: It is the company's investment in systems, tools, and operating philosophy that speeds the flow of knowledge through the organization, as well as out to the supply and distribution channels. It is the systemized, packed, and codified competence of the organization as well as the systems for leveraging that capability. Innovational capital: This refers to the renewal capability and the results of innovation in the form of protected commercial rights, intellectual property, and other intangible assets and talents used to create and rapidly bring to market new products and services. Process capital: This is those work processes, technologies (such as ISO 9000), and employee programs that augment and enhance the efficiency of manufacturing or the delivery of services. It is the kind of practical knowledge used in continuous value creation. According to Bontis et al. (2000) structural capital "includes all the non-human storehouses of knowledge in organizations which include the databases, organizational charts, process manuals, strategies, routines and anything whose value to the company is higher than its material value".

2.2.3 Relational capital

This Swedish insurance company Skandia considers that the customer base, customer relationships and customer potential form customer capital. The size and structure of the customer base is crucial to a firm's future value because customer relationships are the origin of the financial flows. Edvinsson (1997) stated that "…every customer contact is an investment in a mutual, value-creating relationship…the firm creates long-term growth in value by investing in customer relationships. But by adopting a greater customer focus, we do more than create value. We also contribute to the success and growth in value for our customers". Bonits (1998) identified customer capital as the potential an organization has due to ex-firm intangibles. These intangibles include the knowledge embedded in customers, suppliers, the government or related industry associations. Roos et al. (1998) identified relational capital as the relationships with internal and external stakeholders. It is the knowledge embedded in organizational relationships with customers, suppliers, stakeholders, strategic alliance partners, etc.

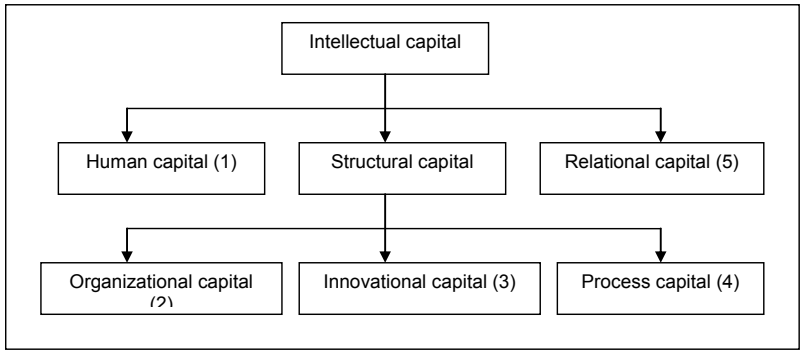

Figure 1: Category of intellectual capital

2.3 Corporate R&D capabilities and IC

The R&D performance measurement methods described in the literature are so varied and uniquely designed for particular situations that conducting a selection process for R&D performance indicators is a challenging task (Ellis 1997). Therefore, factors influencing R&D performance are discussed prior to the three main measurement methods: Input-Process-Result (IPR) Phase (EIRMA 2004, Lee et al. 1996).

Ojanen & Vuola (2006) propose a selected set of different factors of R&D performance analysis for a full recognition and careful consideration of the measurement needs. Brown and Svenson (1998) regarded R&D as a processing system includes a number of phases that contain several subjects for the measurement of performance. The system includes contents of input, processing system, output of the processing systems, receiving systems and outcome, as well as their linkages to each other.

In this study we focus on the view of intangible assets to measure R&D productivity; therefore, we exploit five types of intellectual capital (Figure 1) to classify the metrics of R&D capabilities based on the IPR framework. Not only the metrics of R&D capabilities but also the indicators of IC framework are taken into consideration; therefore, it is a fusion of R&D capabilities and IC. In this study we focus on the view of intangible assets to measure R&D capabilities and performance; Intellectual capital perspective used to categorize the metrics of measuring R&D capabilities is described in Table 2.

Table 2: Categorizing intellectual capital of R&D capabilities

Intellectual capital	R&D capabilities
Human capital	Degree of professionalization (Lee et al. 1996) Skill level of R&D personnel (Lee et al. 1996) Adequate education/training (Lee et al. 1996) Knowledge & Know-How (EIRMA 2004) Employee motivation (Edvinsson & Malone 1997) Employee turnover (Edvinsson & Malone 1997) Employee experience (Edvinsson & Malone 1997)
Organizational capital	Degree of goal achievement (Lee et al. 1996) Effects on general management improvement (Lee et al. 1996) Leadership, vision, mission (EIRMA 2004) Budgeting (EIRMA 2004) Strategic Portfolio (EIRMA 2004) Business Alignment (EIRMA 2004)
Innovational capital	Enough R&D investment (Lee et al. 1996) Enough R&D facilities (Lee et al. 1996) Expansion and diversification of research areas (Lee et al. 1996) IP management (EIRMA 2004) Ideas management (EIRMA 2004) Usefulness of developed technology (EIRMA 2004) Technology leadership (EIRMA 2004) Innovativeness (EIRMA 2004) Employee satisfaction (Edvinsson & Malone 1997)
Process capital	Feasibility of R&D plans (Lee et al. 1996) Validity of selected R&D topics (Lee et al. 1996) Effort to strictly follow plans (Lee et al. 1996) Collaboration between R&D and production/marketing (Lee et al. 1996) Process Intelligence (EIRMA, 2004) Portfolio Management (EIRMA 2004) Knowledge Management (EIRMA 2004) Cost Efficiency (EIRMA 2004)
Relational capital	Market intelligence (EIRMA 2004) Societal responsiveness (EIRMA 2004) External partnerships (EIRMA 2004) Technical service (EIRMA 2004) Customer satisfaction of products/services(EIRMA 2004) Image, brand & stock value (EIRMA 2004) Market share (Edvinsson & Malone 1997) Customer lost (Edvinsson & Malone 1997)

2.4 Corporate R&D capabilities and IC: the IPR model

From the previous literature, the method of the IPR framework was adopted to measure R&D capabilities from the perspective of Intellectual Capital: Human capital, Organizational capital, Innovational capital, Process capital, and Relational capital. Figure 2 shows the indicators, which combines Intellectual Capital and Research and Development (R&D). Therefore, managers can monitor the capabilities of R&D unit in different phases.

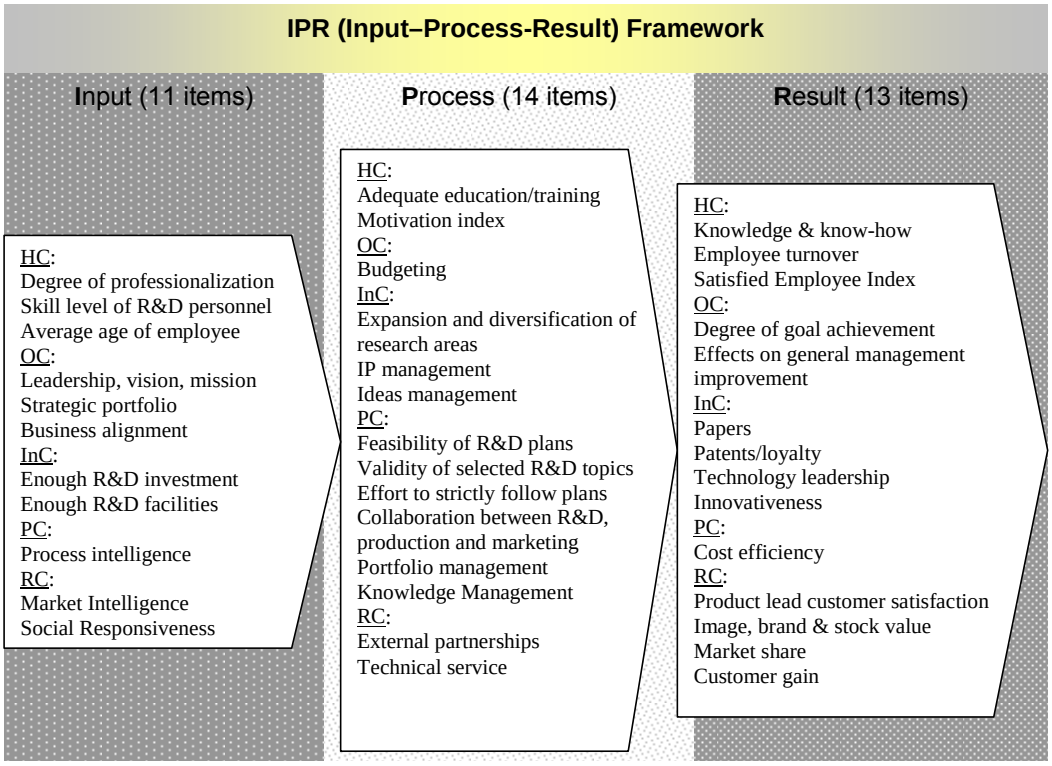

Figure 2: Corporate R&D capabilities and intellectual capital: Input-Process-Result framework

Notes: HC: Human Capital, OC: Organizational Capital, InC: Innovational Capital; PC: Process capital, RC: Relational Capital

3. Methods

3.1 Questionnaire design

In the study, forty-three indicators were collected from both the literature of IC research and R&D management. Before drafting the factor-analysis questionnaire, two R&D managers were interviewed in order to provide us with the validity of question items. There are three parts of the factor analysis questionnaire. The first part is the basic information about the respondent; the second part is the company basic information; and the third part the importance of IC-related capabilities along the 3-phase R&D process. All items can be rated 1~7 Likert scale. The data collection was used on-line questionnaire tool created by Chunghwa Telecom Co., Ltd. Telecommunication Laboratories. The website is as below: http://qqq.cht.com.tw/webform/index.htm .

3.2 Factor Analysis

By the software of SPSS, the steps of exploratory factor analysis are as below: 1. Bartlett Test of Sphericity & Kaiser-Meyer-Olkin (KMO): a widely programmed statistical test of appropriateness is Bartlett's test of sphericity and it should be applied prior to factor analysis. Besides, a test of appropriateness of a matrix for factoring is Kaiser-Meyer-Olkin measure of sampling adequacy, MSA (Kaiser, 1970). The MSA provides a measure of the extent to which the variables belong and whether they are appropriate for factor analysis or not. Kaiser and Rice (1974) give the six scales of the MSA, which stands for acceptable value when MSA is higher than .50. 2. Extraction Method: principal factor analysis is the most widely used mathematical method for such decomposition (Gorsuch, 1983); therefore, it was chosen as the extraction method in the study. 3. Eigenvalues: factor selection should not base on this criterion alone. In 1960, Kaiser recommended holding the factors with the

eigenvalues greater than 1, which is adopted in this study. 4. Rotation: the characteristics that most variables have high loading on the most important factor and that small loading on all other factors makes the interpretation difficult; therefore, factor rotation is used to discriminate between factors (Field, 2005). VARIMAX has been shown to be among the best orthogonal rotation procedures and is the most common one to use (Stewart, 1981). Hence, VARIMAX is adopted as the rotation method. 5. Reliability Test: reliability means that a scale should be consistent. Cronbach's α is the most common measure of scale reliability. The reliability is acceptable when Cronbach's α is greater than or equal to .35; it achieves high reliability when alpha is greater than or equal to .7. Seven factors were denominated from 43 items (Table 3).

Table 3: Factor analysis

R&D phase	Factor	Cronbach's Alpha	% of Variance	Denomination
Input	F1	.812	33.252	I_HC: Competences of R&D personnel
	F2	.867	17.322	I_InC+PC: Enough R&D investment & forecasting
	F3	.755	13.663	I_OC: Strategy Fitness
	F4	..699	9.820	I_RC: Market intelligence
Process	F5	.920	45.307	P_PC: Project Execution
	F6	.835	13.883	P_InC+HC: Managing creative people
	F7	.777	11.262	P_RC+OC: Strategic external partnership
Result	F8	.870	39.130	R_InC+OC: Innovation yield
	F9	.867	18.527	R_RC1: Customer relationship management
	F10	.744	8.664	R_RC2+PC: Cost effectiveness to customers
	F11	.567	7.411	R_HC: Accumulation of R&D personnel knowledge

3.3 Analytical hierarchy process

3.3.1 AHP questionnnaire design

Afere the factor analysis, eleven factors were extracted from forty-three indicators. In order to weigh the importance of each factor in its phrase, AHP was adopted to design the second questionnaire. However, the main challenge here was to denominate the name of each factor based on the literature. Based on AHP, Figure 3 shows the structure of the second questionnaire. Its goal is to determine which factor outweighs the others in the case of assessing R&D capabilities. Therefore, the objective (level 1) is to assess R&D capabilities; the criteria (level 2) are the input phase, the process phase, and the results phase; the sub-criteria (level 3) under input phase, process phase, and results phase.

The first part of the questionnaire is the main content, pairwising comparison between factors (Saaty 1980, Saaty 1995); it includes four sections: the first section is the relative importance of the input phase and there are six questions of comparing ( ); the second section is the relative importance of the process phase and there are four questions of comparing ( ); the third section is the relative importance of the results phase and there are six questions of comparing ( ); the fourth section is the relative importance of the three phases and there are four questions of comparing ( ).The second part is the basic information about the interviewee. The targeted companies were from the top 500 company list especially for the ones with R&D Centers. Nevertheless, instead of sampling, we inquired by email whether the high-level managers were willing to answer the questionnaire. The respondents were mainly CTOs, VPs, and R&D Managers in R&D centers.

4. Results

4.1 Respondent analysis

There were twenty-five respondents in total. All of them serve in the domestic enterprise except that there is one who serves in the research institute. The other information is clearly showed in Table 4.

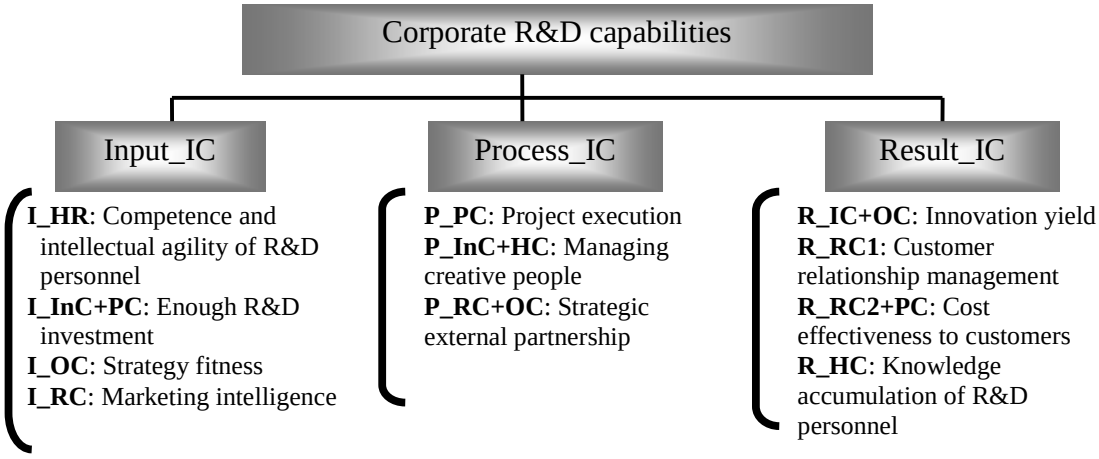

Figure 3: Corporate R&D Capabilities: The IC framework

Table 4: Demographics of Respondents

Question	Items	Number	Percentage
Industry	Semi-Conductor	3	12%
	3C	9	36%
	Optotronics	1	4%
	Biopharmaceutical	2	8%
	Material and Chemical	3	12%
	Others	7	28%
	Total	25	100%
Position	Chief Technology Officer(CTO)	4	16%
	Vice President (VP)	6	24%
	R&D Manager	6	24%
	Project Manager	2	8%
	Others	7	28%
	Total	25	100%
Working years	0-5 year	2	8%
	5-10 year	5	20%
	10-15 year	6	24%
	above 15 year	12	48%
	Total	25	100%
Tenure in this department	0-5 year	9	36%
	5-10 year	12	48%
	10-15 year	1	4%
	above 15 year	3	12%
	Total	25	100%

4.2 Weight analysis

At level 2, the results indicate the highest importance to the criteria P3 “Results Phase” (43.7%); the other two criteria have priority under 30%, as results from the eigenvector of the criteria comparison matrix, reported in Table 5. The principal eigenvalue of this matrix is λmax= 3.0032 with the consistency ratio CR=0.0028<0.1. Thus, the results are consistent. At level 3, there are four sub-criteria under the input phase (Table 6). The relative weights of I1, I2, I3, and I4 are equal to 0.1832, 0.1708, 0.4338, and 0.2121, respectively. Hence, I3 “Strategy fitness” is the highest importance to sub-criteria under this phase. The principal eigenvalue of this matrix is λmax= 4.05 with the consistency ratio CR=0.0202<0.1, leading to consistent results.

Table 5: Matrix of criteria comparison

Phases	P1	P2	P3	Relative Weight	Rank
P1: Input_IC	1	1.22	0.65	0.30	2
P2: Process_IC	0.82	1	0.63	0.26	3
P3: Result_IC	1.54	1.58	1	0.44	1
λ_{max} =3.0032 , CI=0.0016, RI=0.58, CR=0.0028					

Table 6: Matrix of sub-criteria comparison under input phase

Input	I_HC	I_InC+PC	I_OC	I_RC	Relative Weight	Rank
I_HC: Competence of R&D personnel	1	1.41	0.32	0.88	0.18	3
I_InC+PC: Enough R&D Investment and forecasting	0.71	1	0.50	0.84	0.17	4
I_OC: Strategy fitness	3.16	2.02	1	1.93	0.43	1
I_RC: Marketing intelligence	1.14	1.19	0.52	1	0.21	2
λ_{max} =4.05, CI=0.0182, RI=0.90, CR=0.0202						

At level 3, the process phase contains three sub-criteria (see Table 7). The relative weights of P1, P2, and P3 are equal to 0.4263, 0.4231, and 0.1506, separately. Thus, P1 "Project Execution" is the highest importance to sub-criteria under this phase and P2 "Renewal capability and management of innovation" is slightly lower than P1. The principal eigenvalue of this matrix is λmax= 3.0012 and the consistency ratio CR=0.0010<0.1. As a consequence, the results are consistent.

Table 7: Matrix of sub-criteria comparison under process phase

Process	P_PC	P_InC+HC	P_RC+OC	Relative Weight	Rank
P_PC: Project Execution	1	0.97	2.93	0.43	1
P_InC+HC: Managing creative people	1.03	1	2.71	0.42	2
P_RC+OC: Strategic external partnership	0.34	0.37	1	0.15	3
λ_{max} =3.0012 , CI=0.0006 , RI=0.58, CR=0.0010					

At level 3, the results phase embraces four sub-criteria (Table 8). The relative weights of R1, R2, R3, and R4 are 0.1617, 0.1786, 0.4041, and 0.2557, respectively. Therefore, R3 "Usefulness of Technology" is the highest importance to sub-criteria under this phase. The principal eigenvalue of this matrix is λmax= 4.1529 with the consistency ratio CR=0.0566<0.1. So, the results are in agreement.

Table 8: Matrix of sub-criteria comparison under results phase

Results	R_IC	R_RC1	R_RC2+PC	R_HC	Relative Weight	Rank
R_IC: Innovation yield	1	1.55	0.30	0.50	0.16	4
R_RC1: Customer relationship management	0.64	1	0.63	0.85	0.18	3
R_RC2+PC: Cost effectiveness to customers	3.41	1.60	1	1.64	0.40	1
R_HC: Knowledge accumulation of R&D personnel	1.99	1.18	0.61	1	0.26	2
λ_{max} =4.1529, CI=0.0510, RI=0.90, CR=0.0566						

4.3 Global priority analysis

The global weight for each phase can be calculated by multiplying the relative weight of each sub-criterion with the relative weight and then summing up those values (Table 9). Under global priority, "Usefulness of Technology" is the highest priority, followed by Strategy Fitness, Knowledge and Know-how of R&D Personnel, Project Execution, and Renewal Capability and Management of Innovation orderly.

5. Discussions

Two perspectives are applied to discuss the results, that is, research and development (R&D) and intellectual capital (IC). The former embraces the factors of R&D capabilities analysis (Ojanen and Vuola 2006), the weights among the three phases (Lee et al. 1996), and the global priority among the eleven factors (Cooper & Kleinschmidt 1997); the latter includes the priority of the five factors in each phase (Edvinsson and Malone 1997, Stewart 1997, Bontis 1998) and the proposed model of assessing R&D performance: the intellectual capital perspective.

Firstly, the purpose of R&D performance analysis is associated with diagnosing activities and organizational units (Kerssens-van Drongelen and Cook, 1997). Secondly, the level of analysis is

based on the Taiwan R&D Centers. Thirdly, the type of R&D is the combination of quantitative-objective metrics, quantitative- subjective, and qualitative-subjective metrics (Werner and Souder, 1997). Fourthly, the phases of R&D process include the contents of input, processing system and output (Brown and Svenson, 1998). Eventually, the perspective of R&D capabilities analysis is based on intellectual capital.

Table 9: IC-related R&D Capabilities: the local and global priorities

Level	Indicators		Local Priority (Rank)	Global Priority (Rank)
1	Corporate R&D Capabilities		1	1
2	Input_IC		0.3009 (2)	0.3009
2	Process_IC		0.2619 (3)	0.2619
2	Result_IC		0.4373 (1)	0.4373
3	Input_IC	I_OC: Strategy fitness	0.4338 (1)	0.1305 (2)
3		I_RC: Marketing intelligence	0.2121 (2)	0.0638 (8)
3		I_HC: Competence of R&D personnel	0.1832 (3)	0.0551 (9)
3		I_InC+PC: Enough R&D Investment and forecasting	0.1708 (4)	0.0514 (10)
3	Process_IC	P_PC: Project Execution	0.4263 (1)	0.1116 (4)
3		P_InC+HC: Managing creative people	0.4231 (2)	0.1108 (5)
3		P_RC+OC: Strategic external partnership	0.1506 (3)	0.0394 (11)
3	Result_IC	R_RC2+PC: Cost effectiveness to customers	0.4041 (1)	0.1767 (1)
3		R_HC: Knowledge accumulation of R&D personnel	0.2557 (2)	0.1118 (3)
3		R_RC1: Customer relation management	0.1786 (3)	0.0781 (6)
3		R_InC+OC: Innovation yield	0.1617 (4)	0.0707 (7)

The first five factors (level 3) of global priority are technology cost effectiveness to customers (R-RC2+PC), Strategy fitness (I_OC), Knowledge accumulation of R&D personnel (R_HC), project execution (P-PC), and managing creative teams (P_InC+HC). Table 9 shows nine factors that distinguished the better performing business, four factors in a very strong way (Cooper & Kleinschmidt 1997); besides, the similarities and differences between the study and Cooper and Kleinschmidt's theory are shown in it as well. Consequently, the study is consistent with the theory by Cooper and Kleinschmidt in general. Except for "R&D cost effectiveness to customers (R_RC2+PC)", the other four indicators are included in the success factors.

In the field of intellectual capital, the components (level 3) of each phase (level 2) are re-analyzed and re-interpreted. First of all, in the input phase, competence of R&D personnel is meant to human capital, which is employees' competence, attitude, and intellectual agility (Roos et al. 1998). Then, enough R&D investment and forecasting is belonging to innovation capital and process capital, which include the investment in systems and tools (Edvinssion 1997). Also, business image, adopted from marketing perspective, is part of relational capital, which covers the items such as brands and customer relationship (Fernström 2005).In addition, strategy fitness is organizational capital, which consists of the operating philosophy that speeds the flow of knowledge through the organization (Edvinssion 1997). Furthermore, marketing intelligence is the same as relational capital, as the relationships with internal and external stakeholders (Roos et al. 1998). Secondly, in the process phase, project execution is the combination of human capital and organizational capital, which embraces the combined knowledge, skill, innovation, and the ability of company's individual employees (Edvinssion 1997) Moreover, managing creative teams is the hybrid of innovation capital and human capital, which refers to the renewal capability (Edvinssion 1997) and is those work processes, technologies, and employee programs (Edvinssion 1997). Besides, strategic external partnership has the same meaning of relational capital, which is like the relationships with internal and external stakeholders (Roos et al. 1998). Thirdly, in the results phase, innovation filed is meant to innovational capital, which refers to the results of innovation in the form of protected commercial rights, intellectual property, and other intangible assets (Edvinssion 1997). Also, customer relationship management adopted from marketing perspective is part of relational capital, which covers the items such as brands and customer relationship. Furthermore, cost effectiveness of technology is a hybrid of relational capital and process capital, which meet the criteria of design-to the-cost. Finally, knowledge accumulation of R&D personnel is result-typed human capital, as the increasing individual knowledge stock of an organization as represented by its employees (Bontis et al. 2000).

In short, the above supportive literature reveals that human capital is pivotal in all the phases, which is consistent with the concept of intellectual capital, that is, human capital is the primary component of intellectual capital (Edvinsson and Malone 1997, Stewart 1997, Bontis 1998).

In the results phase, innovational capital is much more focused on, which embraces innovation yield and cost effectiveness of technology. However, the previous discussions tend to regard relational capital, which comes from the emphasis on the customer satisfaction, as the significant one rather than innovational capital. Figure 4 exhibits the model of assessing R&D capabilities from the perspective of intellectual capital, each phase comprising the significant capitals, and numbers in parenthesis showing the percentage of each capital.

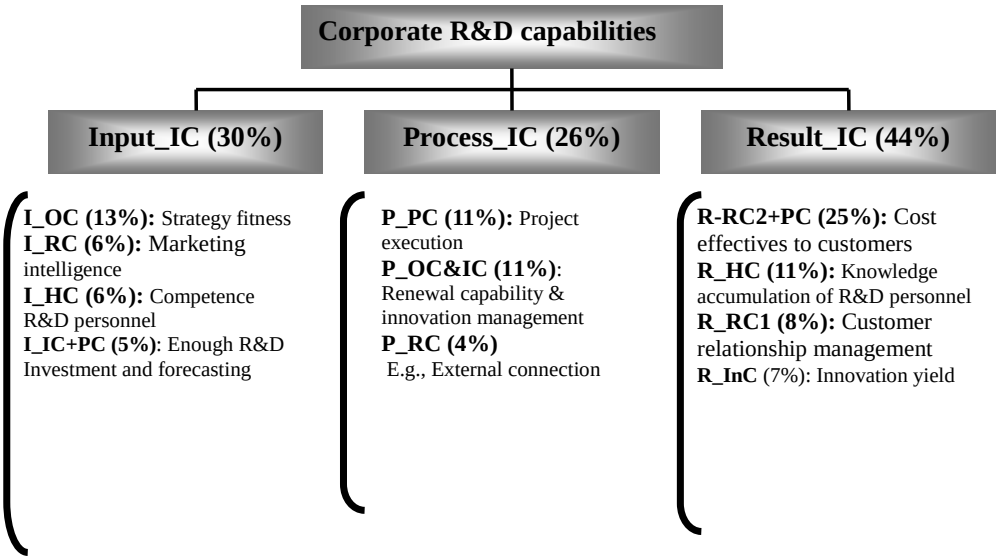

Figure 4: Decomposition of IC-Related R&D capabilities by weighting

6. Conclusions

We first integrated the indicators from research and development (R&D), and intellectual capital (IC) for the sake of measuring R&D capabilities, which embraces both tangible and intangible perspectives. Afterwards, the 1forty-three indices were condensed into eleven factors by deploying the factor analysis under the structure of the Input-Process-Results framework. Finally, based on the extracted factors with their hierarchy structure, the study used AHP method to weigh IC criteria and sub-criteria to measure R&D Centers.

The major findings supporting the theory are that the result phase is the main concern for assessing capabilities and that the top three weighting factors are cost effectiveness to customers, strategy fitness, and Knowledge accumulation of R&D personnel. Particularly, strategy fitness places a significant role in the input phase; project execution is the primary indicator in the process phase; cost effectiveness to customers is valued uppermost in the results phase. However, the finding, not aligned with the theory, is that cost effectiveness to customers is valued uppermost in all the phases. Furthermore, the characteristic of industries may determine whether the input or process phase is more weighty. The main contributions of the thesis are as the following three points: firstly, it provides the manager level with the major factors to appraise R&D capabilities in each phase; secondly, the manager level can survey the weight of particular factor in the five capitals; eventually, the model, which integrates the indicators from both R&D and IC perspective, is proposed; besides, it focuses on the intangibles rather than tangible assets. Moreover, the model is provided with the priority of all the factors in each phase.

The manager level can apply the model to plan the R&D activities in advance and furthermore to appraise R&D capabilities. On the other hand, from IC point of view, the model can aid managers to be conscious of the significance of the intangible assets in the companies. In conclusion, the traditional measurement of R&D capabilities put more emphasis on Structural capital (Organizational capital, Innovational capital, and Process capital), but little on Human capital and Relational capital; however, from the perspective of intellectual capital, it supplements the lack of human and relational capitals to assess R&D capabilities in a comprehensive viewpoint. Future research is that the model of assessing R&D capabilities should be replicated in the other countries to testify the proposed model. Besides, from strategy perspective (Marr et al. 2005), all of the resources are no longer the concept of stock, but the notion of flow. In the future research, the key resources can set be dynamically interacted with each other to deliver capabilities.

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The Growth of Intellectual Capital: An Observation from the Organizational Lifecycle

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Abstract: Extant research implies heterogeneity of resources has been a foundation for firm-wise competitive advantage. However accumulation of these resources is a continuous process. By taking an organizational life cycle perspective, this paper examines the dynamics of intellectual capital within DRAM companies in Taiwan.

Keywords: Organizational lifecycle, intellectual capital

1. Introduction

The idea of Intellectual Capital (IC) helps executives to elucidate intangible resources and knowledge assets of organization. In extant IC research, a greater emphasis is on antecedents of IC and the casual relationship between IC and market performance. Little is surveyed on why components of IC evolve relatively different and on the causal relationship between certain IC component and market performance at a certain period of time. Considering that the accumulation of Intellectual Capital is a dynamic and continuous process. The limited resources firms are able to engage in the creation of intellectual capital given a certain time frame, different weights are often distributed to different subcomponents of IC. The question of when and why firms prioritize one dimension over the others and the relationship between the organizations' priorities and market performance are therefore pragmatic. This paper takes on the organizational lifecycle perspective to survey the evolutionary dynamics of intellectual capital. A basic argument is that firms often cultivate intellectual capital in a similar and possibly sequential manner. It may be a consequence of organizational adaptation to industrial environment over time while heterogeneity in intellectual assets between firms may be a result of firms' enaction to the environment. In terms of the generally accepted consensus on the content of intellectual capital, three interdependent IC components are examined in this study: human capital, structural capital and social capital. Due to the sample in this preliminary study is mainly with high technology industry. We therefore also consider the relative change in technology capital (Chang, 2007). Using financial data of DRAM companies in Taiwan's IT industry, a descriptive analysis is presented.

2. Literature review

When competitive success of a strategy is dependent on the firm's invisible assets, the dynamic change of invisible assets is also largely determined by the content of a strategy (Itami, 1987: p.2). The issue of fit among organization, resources and environment is a dynamic process. The alignment between organizational system, structures, processes and changes in the environment significantly impact organizations' behaviour in resources acquisitions and performance. Whether such adaptation is environmentally derived or out of managerial choice (see Hrebiniak and Joyce, 1985 for more discussion on organizational adaptation), the history of organizational changes depicts the progress of organizational life.

2.1 Organizational lifecycle

To capture the evolution of organization, the notion of lifecycle has been a useful metaphor to describe the maturational and generational processes driven by mechanisms of reproduction in natural populations (O'Rand and Krecker, 1990). A basic tenet to OLC is that the evolution of organizations tends to follow a pattern that is usually characterized by sequences of progressive stages. The creation, transformation and decline of organizations could be described as the results of reactions to environmental forces and organizations' strategic choices (Greiner, 1972; Hannan and Freeman, 1977; Aldrich, 1979; Kimberly and Miles, 1980). Organizations in different stage of life cycle would implement different internal structures and processes in the hope to respond to change in the

environment. This process of organizational evolution corresponds to the scientific metaphors "punctuated equilibrium" or "phyletic gradualism" in evolutionary biology that organizations adapt to new environmental challenges over the course of organizational life and gradually becomes what they are today. Because their criteria of effectiveness change over different life cycles, behaviors of younger organizations are thus perceivably different from mature ones (Cameron and Whetten, 1981; Quinn and Cameron, 1983).

2.2 Organizational lifecycle and strategy

The use of Organizational Life Cycle as an approach in the study of strategy has been observed in various papers. For instance, researchers observed that managerial priority varies in different life stages (Smith and Miner, 1983; Smith, Mitchel and Summer, 1985). In a seminal article Miller & Friesen (1984) develop a longitudinal study on corporate life cycle. Lifecycle configurations in this paper center on organizational strategy, structure, decision making methods and organizational situations. In different phases changes are observed in these configurations and imply different challenging facing the organizations. At the same time, the politics accompany strategic changes are different at different organizational life stages (Gray and Ariss, 1985). Baird and Meshoulam (1988) argue that organizations move from one stage to another because the misfit between the organization and its environment. At the same time organization's efficacy and survival are challenged. Managers of organizations therefore seek to change organizational goals and strategies in order to correspond to the new set of issues. Their argument is that different stages of corporate life cycle (five stages are proposed) require alterations in the firm's objectives, strategies, managerial processes, technology, culture, and decision-making. Milliman, Von Glinow and Nathan (1991) investigate strategic human resource management in multi-national companies across different life cycles. They stress the importance of congruence, the fit to flexibility over different stages of OLC with research directions proposed. Dodge, Fullerton and Robbins (1994) identify sixteen external and internal problems associated with small businesses. Although the relation between OLC and perceived problems is not significant, they found businesses in early life cycle concentrate more on capital requirements than those in later life stage. Jawahar and McLaughlin (2001) develop a descriptive stakeholder theory over organizational life cycle. They argue that stakeholders' significance is relative and dynamic which change over different OLC. The different resource allocation decisions and uses of strategy need to address changes in stakeholders' demands simultaneously.

Typologies of organizational life stages are many (Table 1). In a collective work Quinn and Cameron (1983) provide a thorough review on the different typologies used in literature. In this research a more intuitive one proposed by Miller and Friesen (1984) that a five-stage model including birth, growth, the maturity, revival and decline stage is adopted.

Table 1: Strategic behaviours and Organizational lifecycles

Organizational Life stages	Strategic Behaviors
Stage One: Birth	In this period, a new firm is attempting to become a viable enterprise (Miller & Friesen, 1984). The focus is on viability, or simply identifying a sufficient number of customers to support the existence (Churchill & Lewis, 1983) of the organization. Organizations in this stage tend struggle to enact or create (Bedeian, 1990) their own environment.
Stage Two: Growth	As firms move into the Growth stage they seek to grow, develop some formalization of structure (Quinn & Cameron, 1983), and establish their own distinctive competences (Miller & Friesen, 1984). The centre is upon achieving rapid sales growth based on formalized structure and amassing resources in an attempt to realize advantages accruing to larger scale.
Stage Three: Maturity	Maturity represents an organizational form where formalization and control through bureaucracy are the norm (Quinn & Cameron, 1983). The companies in maturity stage have passed the second stage, growing to a point that they may seek to protect what they have gained instead of targeting new territory.
Stage Forth: Revival	The revival organization displays a desire to return to a leaner time (Miller & Friesen, 1984), where collaboration and teamwork foster innovation and creativity.
Stage Fifth: Decline	Even though firms may exit the life stage at any stage, a decline stage can trigger the demise. A final stage that companies' profitability drops because of the external challenges and because of the lack of innovation.

Note: Adapted from Miller and Friesen (1983, 1984)

3. Methodology and Hypothesis development

In this preliminary study financial data of seven DRAM (Dynamic Random Access Memory) companies in Taiwan spanning from year 1990 to year 2007 is used for analysis. A total of 95 entries of annual financial data are included. The reason for this is not only DRAM companies have a longer history when compare to other IT companies, but it is also more realistic to compare companies within an industrial sector for the purpose to understand the differences between organizations in different life stages. A list of DRAM companies is in Table 2.

Table 2: Companies' Information in Taiwan DRAM industry

Name	MVI	WEC	NTC	IMI	PSC	VIS	ProMOS
Establish Date	1987/01/08	1987/09/29	1995/03/04	2003/01/23	1994/12/20	1994/12/05	1996/12/12
Listed Companies at Stock Exchange Market	1995/09/19	1995/10/18	2000/08/17	2006/03/17			
Listed Companies at OTC Market					1998/03/23	1998/03/25	1999/05/13
Employees	904 (in 2007)	4454 (in 2007)	5303 (in 2007)	3381 (in 2007)	6132 (in 2007)	2832 (in 2007)	6934 (in 2007)
Ave. Age*	32.00	34.70	31.00	29.40	29.80	31.00	30.00
Ave. Seniority*	5.20	6.73	4.49	2.07	3.42	4.60	2.83
PhD. (%)*	0.60	0.79	0.77	0.71	0.50	0.49	0.68
Graduate (%)*	9.80	23.32	20.68	19.58	19.30	18.79	19.37
Undergraduate (%)*	65.10	50.63	55.13	55.16	58.20	44.81	59.36
Below Undergraduate (%)*	24.50	25.26	23.42	24.55	22.00	35.91	20.59
Capital	1.057E+10	3.727E+10	4.7E+10	3.338E+10	7.848E+10	1.712E+10	7.283E+10

Source: TEJ Data Bank (* are for reference only and are not considered in this study)

3.1 Valued added Intellectual Capital (VAIC)

While many survey methods (internal measures) are proposed in addition to those based on accounting information (external measures), it is difficult to compare company to company using such methods (Boremann, 1999; Pulic, 2000 and 2004). In this research we adopted an accounting tool for IC management, namely the Valued Added Intellectual Capital (VAIC^{TM}) (Pulic, 2000) for evaluation of intellectual capital. A primary focus of this method is on the efficiency of resources that creates values for the firm.

A basic principle to VAIC^{TM} is to calculate the value added (VA) of a firm by subtracting input from output, whereby labor expenses are not included in the input. In financial terms, this is equal to:

VA = GM – sgaExp. + LExp. = Operating Income + LExp.

Where VA is value added; GM is gross margin; *sgaExp.*: selling, general, and administrative expenses; *LExp.*: labor expenses that Pulic (2000b) calls human capital.

According to Pulic (2000b), the value of human capital (HC) and structural capital (SC) is described by the labor expenses and the difference between VA and HC. From this description, HC and SC are denoted as in the followings:

HC = LExp.

SC = VA- HC

where HC is human capital; SC is structural capital; Pulic states that human capital and structural capital are reciprocal. The less human capital participates, the more structural capital is involved.

The next step is to evaluate social capital. According to Pulic's VAIC, social capital is calculated by capital employed which equals to the book value of the net assets of the firm.

SC= CE (capital employed) = Book Value of Net Assets

For technology capital, R&D and intellectual properties are taken into consideration. To proxy for technological capital (TC), the study includes R&D expenditure and the value of intellectual property following Chang's propositions (2007). To account for the effect, the study uses the same denominator of the dependent variable (Tobin's *q*) as the scaling variable for technological capital.

Technology Capital Efficiency TCE =

$$\frac{\text{R\&D expenditure + value of intellectual property}}{\text{Book value of common stocks}}$$

The study sets out to calculate the efficiency of the four forms of IC and the Tobin's *q* is adopted as the proxy of firm's market performance (*MPerf*) with those resources. Up to this point the study now has four indicators (predicting variable) and one dependent variable :

(1) Human Capital Efficiency HCE = VA / HC
(2) Structural Capital Efficiency SCE = SC / VA
(3) Social Capital Efficiency CEE = VA / CE
(4) Technology Capital Efficiency TCE =

$$\frac{\text{R\& D expenditure + value of intellectual property}}{\text{Book value of common stocks}}$$

(5) *MPerf* =

$$\frac{\text{Market value of equity + Book value of debt}}{\text{Book value of assets}}$$

Market value of equity variable is based on closing share prices on the last trading day of the year

3.2 Differentiation of organizational life stages

Miller and Friesen's (1983, 1984) phases of organizational life are adopted in the present study in which sales growth as a key attribute in determining organizational lifecycles. To distinguish different organizational life stages, the study uses cluster analysis to derive the patterns of organizations' life stage by taking *P/E ratio*, *Net Sales*, and *size of Employees* into consideration. The input variables were analyzed using Ward's method and the number of derived clusters ranged from 2 to 6 cluster solutions representing different life stages. In order to reduce the sensitivities of outliers causing by different ranges, scales, or units, the study may be cases where Z-score transformation is appropriately adopted to standardize the contribution of all variables to the distance measured. The result of DRAM companies' life stage is described in Appendix 1.

3.3 Hypothesis development

To test the relationship between IC components and firms' market performance in different life stages, we conduct a series of regression analyses that substituted the various performance measures as dummy and dependent variables.

Hypothesis 1 (H_1): There is a positive relationship between intellectual capital components including HCE, SCE, CEE and TCE, and market performance.

$$MPerf_t = \alpha_0 + \alpha_1 HCE_t + \alpha_2 SCE_t + \alpha_3 CEE_t + \alpha_4 TCE_t + \varepsilon_t \qquad (1)$$

By setting the dummies for companies that are listed separately on Taiwan Stock Exchange (TWSE) and GreTai Securities Market (OTC), as well as the different IC-components, H_1 allows us to test the difference between where the companies are listed. TWSE and OTC are dummy variables for companies which are listed on Taiwan Stock Exchange and GreTai Securities Market individually.[1] HCE, SCE, CEE and TCE are different IC-components as described above. Coefficient β_1 and β_2 would be equivalently significant if Hypothesis 2 is true.

Hypothesis 2 (H_2): There is no difference regarding which market the companies are listed.

$$MPerf_t = \beta_1 TWSE_t + \beta_2 OTC_t + \alpha_1 HCE_t + \alpha_2 SCE_t + \alpha_3 CEE_t + \alpha_4 TCE_t + \varepsilon_t \qquad (2)$$

To investigate the relationship between market performance and IC-components in different life stages, we use equation 3 and include five different life stages in the following tests. A key postulate

[1] The details regarding the Taiwan Stock Exchange and GreTai Securities Market could be found in http://www.twse.com.tw and http://www.otc.org.tw.

is that the relationship between market performance and IC-components would mislead if the effect of lifecycle is ignored. In the first test we use a null hypothesis to examine the relationship between market performance and IC components across different life stages. In the second test we take a pair-wise comparison to further investigate the difference between life stages in terms of the relationship between IC components and market performance.

Hypothesis 3 (H_3): The relationship between market performance and IC components are significantly depending on life stages.

$$MPerf_t = \gamma_1 Birth_t + \gamma_2 Growth_t + \gamma_3 Maturity_t + \gamma_4 \mathrm{Re}vival_t + \gamma_5 Decline_t + \alpha_1 HCE_t + \alpha_2 SCE_t + \alpha_3 CEE_t + \alpha_4 TCE_t + \varepsilon_t \quad (3)$$

Test 1: When the null hypothesis H3a is rejected, H3b is supported

$$H_{3a} : \gamma_1 = \gamma_2 = \gamma_3 = \gamma_4 = \gamma_5 = 0$$

$$H_{3b} : \text{Not all } \gamma_i \text{ equal zero}$$

Test 2: A pair-wise comparison between organizations in different life stages. When H_{3c} is rejected, H_{3d} is supported.

$$H_{3c} : \gamma_i = \gamma_j, i \neq j$$

$$H_{3d} : \gamma_i \neq \gamma_j$$

Where i and j represents the five different organizational life stages

4. Results

Table 4 shows the results from testing hypothesis 1 and 2. The relationship between intellectual capital and market performance (H_1) has not received support (*p* value = 0.3001, 0.1987, 0.2250, and 0.2492 respectively). It also makes no difference regarding whether these companies are listed in TWSE or OTC (H_2). A further examination on the relationship between market performance and intellectual capital in different life stages was conducted. Because the sampling frame we realize that the notion of organizational life cycle in this preliminary study also reflect the lifecycle of the industry. Result from the cluster analysis has separated different time period of organizations into five different life stages. Table 3 shows results from cluster analysis utilizing Wards clustering method, as well as cluster-wise comparison using ANOVA. Descriptive statistics for individual company across different life stages are provided in Appendix 2. The result from ANOVA shows there are significant difference between cluster in terms of different IC components and performance indicators (Table 3). This suggests that companies in different lifecycles emphasize different IC components and perform differently. Companies in Cluster 1 (birth) show all intellectual capital components are substantially below the mean. Companies in Cluster 2 (growth) improve relatively in all four IC components. Most interestingly, these organizations are highest P/E ratio among all clusters. All IC components within companies in cluster 3 (mature) also improve compare to those in cluster 2. Technological capital efficiency is the most significant one even when compare to all other clusters however P/E ratio is close to the mean. For those in cluster 4 (revival), social capital efficiency appears to be the most salient component cluster-wise. Net sales and the numbers of employees peak to the highest level. Firms in Cluster 5 (decline) appear to have the highest structural capital however all other IC components have declined. P/E ratio, net sales and number of employees also dropped.

Table 3: Cluster Analysis Based Intellectual Capital and Organization Performance

	Total	Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5	ANOVA	
	(n=95)	(n=33)	(n=7)	(n=31)	(n=7)	(n=17)	F-State.	Sign.
Intellectual Capital								
Human Capital	-1.29	-2.12	0.26	0.49	0.20	-5.28	153.37	0.000***
Structural capital	0.83	-2.33	0.18	0.30	0.14	5.84	1365.41	0.000***
Social Capital	0.37	-1.39	0.05	0.17	4.47	-1.43	43.65	0.000***
Technological Capital	-0.21	-0.92	-0.38	1.62	-0.50	-0.89	81.73	0.000***
Org. Performance								
P/E Ratio	0.39	-0.78	2.68	0.38	-0.09	-0.25	94.18	0.000***
Net Sales	0.46	-0.75	-0.07	-0.26	2.46	0.94	110.65	0.000***
Employees	0.43	-0.81	-0.10	-0.18	2.18	1.04	84.03	0.000***

Note: *, **, *** denotes significance at the 10%, 5%, and 1% level

Table 4: Analysis of the relations of MPerf and Intellectual Capital in different Company Type

Coefficient	(1)		(2)	
	Beta	p-value	Beta	p-value
Intercept			7.6699	0.0569*
Listed Company	7.7222	0.0609*		
OTC Company	7.7379	0.0628*		
HCE	3.309	0.3033	3.2796	0.3001
SCE	-25.629	0.2034	-25.4042	0.1987
CEE	-0.1771	0.2296	-0.1754	0.2250
TCE	0.9450	0.2804	0.9631	0.2492
	F-test	p-value		
Hypothesis：List Company = OTC Company	0.0059	0.9388		

Note: *, **, *** denotes significance at the 10%, 5%, and 1% level

In the earlier hypothesis testing we are unable to find support in the relationship between market performance and intellectual capital (Table 4). When taking organizational lifecycle into consideration, those in birth (*p* value = 0.0900) and growth stage (*p* value = 0.0872) however show significance in terms of the relationship between IC and market performance (Table 5). A further investigation into the difference in intellectual capital considering OLCs reports a similar finding that using a cluster-wise comparison, e.g. there is a difference between birth and maturity stage (*p* value = 0.0015), etc. Table 6 shows the result of testing using null hypothesis testing.

Table 5: Analysis of the Companies' MPerf and IC Considering the OLCs

	Beta	*p*-value
Birth	5.1614	0.0900*
Growth	5.2918	0.0872*
Maturity	4.0666	0.1868
Revival	3.7182	0.2272
Decline	3.8406	0.2141
HCE	1.1432	0.6392
SCE	-9.8408	0.5175
CEE	-0.2594	0.0272**
TCE	0.3300	0.6118

Note: *, **, *** denotes significance at 10%, 5%, and 1% level

5. Conclusion and implications

The purpose of this paper is to explore the relationship between intellectual capital and firms' market performance by taking organizational lifecycle into consideration. We use P/E ratio, net sales, and size of employees to categorize organizations into five different clusters (life stages). The results confirm that DRAM companies place different weights and distribute resources to certain IC components across different life stages.

The result from the cluster analysis may not directly correspond to strategic behaviors of the organization as proposed in the literature on organizational lifecycles (as in Table 1). However a possible explanation is that intellectual capital takes time to accumulate and there may be a time lag between the development and the harvesting of new capabilities (e.g.: Kujansivu and Lonnqvist,

2007; Lin, & Edvinsson, 2008). Taking this perspective, we try to make sense of what we observed based on the literature we reviewed. When organizations in their startup stage would focus on identifying a sufficient number of customers, a consequence of that may be reflected in a higher P/E ratio when they move into growth stage. Firms in growth stage would establish their own distinctive competencies. In the case of DRAM industry a higher technological capital efficiency in the mature stage is possible the efforts from previous stage. In order to prolong competitive advantage, companies in mature stage may be actively in pursuing value chain integration by building up allies and networks. As a result, higher social capital efficiency in the next stage could be the outcome. The link between revival and decline stages is the most interesting one. When firms seek to revive by returning to fit, however they would continue to degenerate if higher structural capital is maintained.

Table 6: Hypothesis Tests of the Different Effect of the IC between OLCs

Hypothesis	F-test	*p*-value
H0:There is no difference among five OLCs	11.5576	0.0000***
H0:There is no difference between Birth and Decline	14.8423	0.0003***
H0:There is no difference between Birth and Revival	15.8574	0.0002***
H0:There is no difference between Birth and Maturity	11.1348	0.0015***
H0:There is no difference between Birth and Growth	0.1153	0.7354
H0:There is no difference between Growth and Decline	33.4007	0.0000***
H0:There is no difference between Growth and Revival	27.1683	0.0000***
H0:There is no difference between Growth and Maturity	26.0308	0.0000***
H0:There is no difference between Maturity and Decline	1.7787	0.1877
H0:There is no difference between Maturity and Revival	2.1920	0.1443
H0:There is no difference between Revival and Decline	0.2392	0.6267

Note: Note: *, **, *** denotes significance at 10%, 5%, and 1% level

When studies on intellectual capital have been mostly with mature organizations, it is worth noting that the results in this study show that the relationship between IC and market performance is the most significant in younger organizations. Limited by the sample size, we are unable to investigate further into the competitive dynamics between firms as to which specific IC component is most significant in gaining competitive advantage. We therefore aspire to extend this preliminary study to a greater extent by taking a larger sample size with a specific industrial sector in later research.

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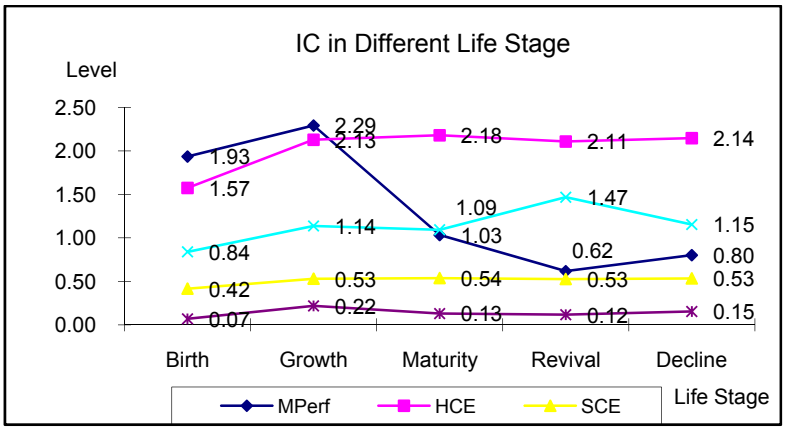
Figure 1: IC in Different Life Stage (DRAM companies)



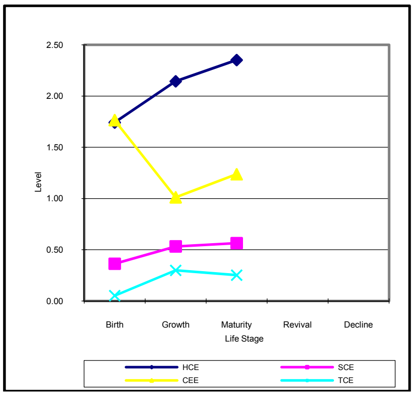
Appendix 1：Lifecycle Stages for Sample in the Study

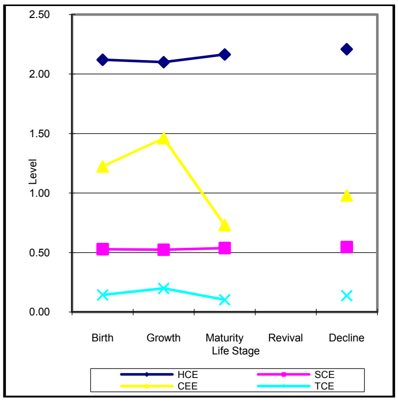
	Period#																	
	90	91	92	93	94	95	96	97	98	99	00	01	02	03	04	05	06	07
MVI	B	B	B	B	B	G	M	M	M	G	M	M	M	M	B	B	M	M
WEC	B	B	B	B	B	G	M	M	M	G	D	D	D	D	D	D	D	D
NTC						B	B	B	B	B	M	M	D	D	D	D	R	R
IMI													B	B	B	M	D	D
PSC					B	B	B	B	M	G	M	M	M	M	D	R	R	R
VIS					B	B	B	B	M	G	M	M	M	M	B	B	M	M
ProMOS							B	B	B	G	M	M	M	M	D	D	R	R

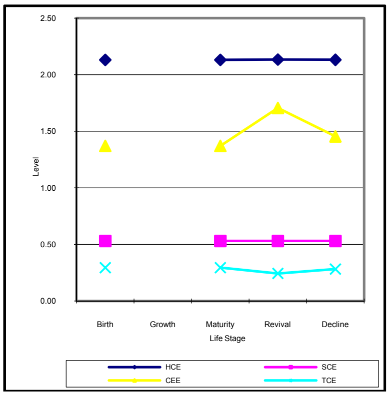
*□B, G, M, R, D represent Birth, Growth, Maturity, Revival, and Decline stage

Appendix 2: Descriptive Analysis on Intellectual Capital in Individual DRAM Company

Panel1 MVI Panel2 WEC Panel3 NTC



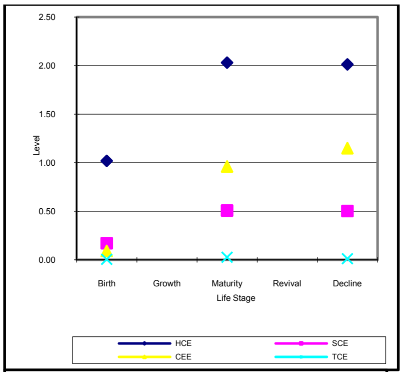


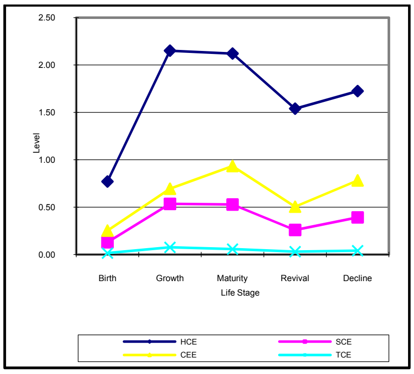


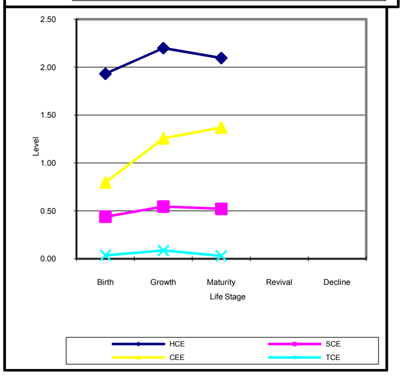
Panel4 IMI

Panel5 PSC

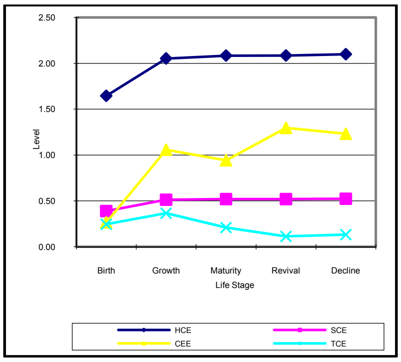
Panel6 VIS



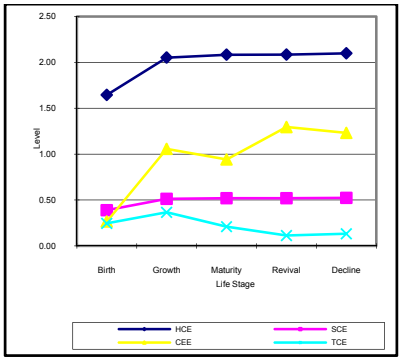




Panel7 ProMOS



Note: ♦, ■, ▲, and * represent HCE, SCE, CEE and TCE under different OLCs



Note: ⬥, ■, ▲, and * represent HCE, SCE, CEE and TCE under different OLCs

Making a Difference: Employees as Social Capital Investors

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Abstract: A 2008 Australian-Canadian credit union comparative study found that employees, as social capital investors, are making a significant contribution to their organisations and their members' communities. The qualitative, pilot study included 27 interviews with credit union employees. Through an interpretative analysis of employees' understanding of social capital and the relational context of that capital, findings point to employees developing and managing credit union's social capital as part of a *culture of social responsiveness.* As part of their mission statements, Australian and Canadian credit unions aim to assist those in need to stand on their own and to add value to their members' communities. This is part of their historical background as credit unions began in order to provide fair access to financial services for groups who were underserved by mainstream financial services. The study reported in this paper indicates that social capital investment and community engagement slowed down during recent mergers; this was especially evident in the Canadian credit unions. The economic slow down, and tight financial markets, also had an impact on credit union viability. But credit union employees were determined to re-engage with their communities, with an emphasis on social responsiveness as fundamental to their business practice. Credit unions in the study demonstrated a strong commitment to their members and their communities. In the context of this paper, where the focus is on applied research, social capital is used reflexively to refer to the investment of an organisation in community programs where employee involvement is central to the success of these programs. Social capital encompasses a broad range of concepts and understandings. It has perhaps been most widely written about by Pierre Bourdieu, the French sociologist who extended the idea of 'capital' to categories such as 'social capital', 'cultural capital', and 'symbolic capital'. In this paper, credit unions (the organisations central to the study reported here) are social arenas where struggles over certain forms of capital occur as employees, for example, determine that credit unions become more than financial institutions managing members' financial matters. When credit union employees engage with their members' communities and public relations and corporate social responsibility staff facilitate community partnerships, this paper contends that their role as social capital investors develops organisations' moral fibre and generates and develops organisations' reputation and character.

Keywords: Social capital, community engagement, employees, relationships

1. Introduction and initial reflections

When credit union employees become involved in supporting a non-profit organisation, for example, allowing that organisation to continue to support disabled children, these employees are developing their organisation's social capital, or the capacity of their organisation to develop relationships and add value to their community. They are also building individual capital and developing strong relationships between and amongst other staff involved in community engagement. This emphasis of this paper is to report on a qualitative pilot study of Canadian and Australian credit unions employees' contribution to credit union members and local community members with a view to understand how social capital develops, or might be hindered in its development. Initial reports about support for local and national charities suggest that credit union employees are social capital investors. Social capital in the context of this paper refers to employees as organisational actors initiating and participating in giving back to society and where the public relations (PR) professionals and corporate social responsibility (CSR) managers are central to developing social capital. The study reported in this paper suggests that social capital investment is subtle and intangible as it is part of credit unions' "moral fibre" where the ethical stance is embedded in the organisation's ethos of giving back to the community.

Human capital (credit union employees in this paper) leverages or makes social capital possible (Cunningham 2002). Cunningham posits that "merely developing the human capital of the organisation is not enough to guarantee success" (2002 p.89) especially in competitive markets where organisations need a "wider brief than just the development of individuals" (p.91). Some scholars (Fussel, Harrison-Rexrode, Kennan and Hazleton 2006; Edwards 2008; Bandiera, Barankay, Rasul 2007) suggest that social capital can be advantageous to individuals but it simultaneously benefits groups and organisations as they engage with the community. In the study presented here the engagement is made possible by public relations and corporate social responsibility managers

developing relationships with communities and partnering with other organisations and, simultaneously, developing an internal culture where social capital benefits are understood and appreciated. As Heath and Coombs (2006) posit, the "rhetorical challenge" (p.83) is one where the symbolic power of the language that organisations use to say what they want to do is evident in reflexive relationships developed with employees and the community. A Kantian perspective, where obligation, bound by organisational self interest dominates, (L'Etang, 2006) is therefore inappropriate as focus is on brand promotion rather than on relational partnering which is central to community partnerships and social capital investment.

Drawing on Bourdieu's concept of social capital, this paper proposes that social capital and its benefit to human capital development depends on the "network position that an individual occupies" so that "the more access he/she has to information and social resources" (Lin and Huang p.201) the more successful the individual can be. This can also produce a positive impact on career opportunity. In the study reported in this paper, the affect of employees' positions in developing social capital was important but there was also a strong focus on credit union employee involvement in all levels of decision making and in developing social capital as a team where team leadership and emphasis was seen to make a difference.

The emphasis of social capital is that it is a "quality created between people" (Burt, 1999 p.339) and that it gives opportunity for the building of relationships between people; this could be understand as a "relational capital quality" (Chia 2008) where individual employees and the teams and groups of employees develop their relationships, and each employee becomes skilled as a relational social capital investor. The "relational dimension" (Tsai and Ghoshal 1998 p.465) refers to assets that are derived from relationships that include three core dimensions of social capital; the relational, the structural (the social interaction) and the cognitive (the understanding of social capital goals and objectives). Social capital investments are important to employees' positions, career and personal development and they are also important to an organisation's brand and its overall effectiveness (Fussel et al 2006). These scholars emphasise that the consequence of poorly managed relationships and the "absence of social capital" (p. 151) makes employee groups dysfunctional, suggesting that developing and recognising the place and importance of social capital in organisations and employees' lives is most important. Ihlen, (2005, 2007) suggests that there is a risk in not being involved in social capital as organisations' economic viability might be hampered. More importantly, as reciprocity and exchange "accrues good will and some sense of exchange" (Bartol and Zhang 2008 p.6), it is important to developing relational trust as part of social connections (Putnam 1995). Putnam suggests that the more we connect "with other people the more we trust them" (1995 p.1) and therefore investment in "trustworthiness of the social environment, which means that obligations will be repaid" (Coleman p.102) will be possible. Coleman argues that "social capital depends on these two elements": trustworthiness and obligation. In the context of our study, there is an additional third element-that of wanting to give back and be a part of the community; it is the intent and commitment to social capital investment that is important especially the commitment of public relations and corporate social responsibility staff that makes it possible. It is argued by many scholars that developing social capital is more than a deontological process (L'Etang, 2006). Rather, it has been proposed that organisations, such as credit unions, embed social responsiveness in their culture where the connections with the community are meaningful, strategically planned relationships. Connections do not happen; rather they are a part of meaning-making as relationships develop mutual respect amongst relational partners (Bruning, McGrew & Cooper, 2006).

Bourdieu and Wacquant (1992) describe social capital as "the sum of the resources, actual or virtual, that accrue to an individual or a group by the virtue of possessing a durable network of more or less institutionalised relationships of mutual acquaintance and recognition" (p.119). The focus on relationships, or as Bourdieu puts it "connections", (p.32) suggests that they become part of economic capital but, in so doing, it is the way that social capital is understood that is important to its translation to organisations' overall capital development. Social capital "is defined by its function" (Coleman 1988) as the actors within the structure "facilitate actions of actors-whether persons or corporate actors-within the structure" (p.98). In this way social capital is developed amongst and between organisational actors. This was evident in the Canadian and Australian credit unions as a focus on relationships, and how one employee could assist another, led to increased engagement with credit union members and their local communities. However, the function or purpose of social capital needed to be understood and when it was ambiguous social capital development seemed to stagnate

or become diffused, especially when economic viability was the primary focus and managing mergers dominated the credit union landscape.

Organisational capital can be represented as economic, cultural and social capital where capital "in its variety of forms" (Bourdieu and Wacquant p.119) exists in different societies and diverse political systems that affect the way capital is operationalised and understood. Symbolic capital includes economic or social capital that has symbolic value for organisations so that the credit unions in the study reported in this paper were at a stage where they were beginning to understand that social capital investment represented both a symbolic and material commitment to their communities.

2. Method

The aims of the study reported in this paper were to:

- Explore employees' attitudes to organisational activities which aim to 'give back' to society and build organisations' social capital, and
- Explore the public relations and communication management roles in facilitating and developing social capital initiatives.

This paper focuses on the employees' understanding of social capital and how they understand their role as social capital investors. This paper does not therefore allow for a detailed analysis of all perspectives of the credit union research.

This qualitative study included semi-structured interviews which aimed at uncovering employees' understandings of social capital initiatives. The construction of meaning around credit union employee responses developed understanding of the reality of their community engagement and connections as they can be understood as the "actors" (Flick 2006 p.75) who construct the basis of meaning giving context to what is being uncovered and explored. The interviews needed to be flexible so that "understanding the perceptions of participants or learning how participants come to attach certain meaning to phenomena or events" (Berg 1995 p.35) could be explored in some detail. Credit union employees had the opportunity to express their views as "the in-depth interview, like all informal research methods provides rich detail and the ability to understand what the individual being interviewed really thinks about something" (Stacks 2002 p. 86.) The interviews included a similar sequence of questions so that data could be collected on similar areas being explored (Daymon and Holloway, 2002).

The Canadian and Australian Director of Public Relations and Marketing and Corporate Social Responsibility managers emailed research aims and questions to employees and invited them to participate in the research. Canadian and Australian interviews were conducted with 27 employees in diverse positions from front-line staff managing call-centres, to branch managers and micro-loans managers. The interviews were transcribed and data coded according to emerging themes: "qualitative analysis begins with coding the data, dividing the text into small units (phrases, sentences, and paragraphs) and assigning a label to each unit" (Creswell and Clark p131); comparing the responses of Canadian and Australian credit unions employees then enhanced data validity.

2.1 Credit Unions

The research was conducted in a Canadian credit union which had 541 employees and 142,000 members located in the Toronto and Ottawa regions. The Australian credit union employed 620 staff and had170, 000 members at the time of this study. The Australian credit union central to this study was benchmarking its social capital initiatives on Canadian credit unions in view of the significant Canadian developments in this area. Credit unions were central to the study reported in this paper as they began in order to provide fair access to financial services for groups who were underserved by mainstream financial services

2.2 Findings: Employees' understanding of social capital.

Not all aspects of the research can be presented, rather responses to questions about employees understanding of social capital, internally, and how connections are made externally so that relationships are developed, are presented here. Staff had been employed from 3 months to 28 years so there was considerable variation in the length of time and in the work experience of the 27 employees interviewed.

A quote from a Canadian Insurance manager highlights the particular way many employees' made sense of social capital objectives and initiatives: as

> *Investing in people and communities. So it's not always a financial payoff. Adding low pressure value. Selling trust. Doing what is best for the member (CA1).*

This employee and three others managing and coordinating micro-loans reported that social capital was an investment in the community; as such, giving a cheque or donating money was useful but it did not represent an investment. Investment was described as *putting people on track* and *helping those in debt so that they could help themselves*. This was portrayed as a long-term credit union asset. These four employees, and most Canadian and Australian employers, pointed to the importance of going back to their roots; the credit union philosophy to serve their members and the members' communities, and to assist those who were not supported by other financial institutions. This was especially so as some employees (CA,1, 4, 5 and 10) reported that the credit union's merger resulted in a focus on day-to-day business management more so than the organisation's commitment to the community and to its members.

Micro loans and insurance managers regarded every aspect of their work as social capital investment so that giving a loan and helping a client to begin a business *was* social capital. These employees were also involved in raising money for prostrate cancer in the *Do it for Dad* program based in Ottawa and in other corporate and local projects sponsored and supported by the credit union. Several staff (CA11,CA10, CA7) viewed social capital as a total package that included their personal involvement in giving back and what they brought to the organisation such as volunteer work on youth projects (CA11), their commitment to assisting newcomers, extending their financial expertise overseas to facilitate Ugandan women becoming independent (CA7) and working with generation Y to reach out to younger people (CA10). The leadership of the public relations and marketing manager and CSR vice president was reported by many employees to be a driving force in making social capital developments possible.

One employee said that she "can actually transform people's lives" (CA7) and she gave an example of giving a $2500 loan that was paid off, then giving another $2500 loan to this member who now runs her own business employing 50 people. Another employee stated: "The community that we live in and we serve is benefiting from the organisation that we also work for and it's a nice blend-it's for the betterment of the community–work gives a chance to be involved (CA8)". The opportunity for social capital investment resulted from the credit union's acknowledgement of its importance to the organisation and the community.

Australian employees interviewed understood social capital as *doing the right thing for the right reasons* and that meant giving back to the community and being open and ethical in their advice to members on all financial matters (SLR1). Some employees said that it was very important to involve credit union members more in social capital investment so that they should be involved in decisions about who to support; members should be a first priority (SLS, SLD3, SLA3).

The current world financial crisis prompted many of the employees to focus on being creative in the way the credit union develops its social capital so that even if funds may not be as readily available to support charities, employees can volunteer their time. As one employee put it "the staff are the community. I believe that they are really quite passionate of walking the walk, so for me I've seen it in the eyes of my CEO and my Deputy CEO and that to me is belief" (SLS). It is the belief in social capital investment that is important. Reference to the support of the executive, including the CSR manager, in building a culture of social responsiveness was evident in many of the interviews as well as emphasis on working as a team for meaningful social capital investment.

The fact that credit unions were generally smaller organisations than banks was reported by most staff as giving them more opportunity and diversity in their work; being social capital investors was a valued opportunity. One employee said "the biggest thing for me and probably one of the reasons I stay with the credit union is the impact that I can have on my community and the people within it" (SLS) and another that "the organisation's values are aligned with the staff member" (SLV). A branch manager reported that "I found something that gives me an internal reward" (SLV2) while Canadian employees (CA7 CA3) reported that a sound culture and philosophy empowered them to add value to the community.

2.2.1 Concerns, limitations of social capital development

The main concern expressed by Australian interstate and regional branch managers, or those away from the corporate headquarters, was the need to invest in local charities and support local members and their interest. One member said that the credit union was too Adelaide (South Australian) centric (SLS). Darwin (Northern Territory) managers wanted to focus on indigenous community needs; while others identified charities in their region such as the *Riding for the Disabled*, where relationships with this charity developed with employees and the charity over time (SLR1). Some employees also expressed the view that the credit union should not support the same charities that other institutions such as banks supported. As one employee put it, "don't support the old charities – there is a tendency for the big corporates to do that" (SLR2). Others considered social capital investment to be "directly involved with the members and you're a bit more of the heartbeat of the organisation instead of a being a processor, so to speak" (SLV) so that social capital can be meaningfully translated by the members who are stakeholders integral to the organisation's well being. This was viewed as a reciprocal relationship.

For Darwin branches, constant staff turnover was an issue in developing social capital as the focus was on staff training and managing staff logistics. Yet one of the branch managers, who said "at the moment we are not doing anything," had volunteered his time in supporting a Cambodian micro-enterprise project together with his wife and other credit union staff. Reports from all credit union staff indicated that staff took turns to volunteer and that staff who could not find the time to volunteer did not need to do so, indicating that they had developed a way to continue social capital development without full staff commitment.

2.2.2 Social capital benefits

There was some evidence that volunteering and community engagement through the credit union facilitated employees' volunteering role, that is, their role as social capital investors where the organisational culture facilitated social capital investment. One of the employees suggested that if staff were not involved in social capital through their credit union they most likely would not be involved in any volunteering (SLGS). Some staff (SLHR, SLA2, and SLA1) reported substantial benefits of being social capital investors as they had a better work-life balance because they focused on other aspects of their work; that engaging with the community meant that employees were learning and focusing on sustainability and not just on short term solutions. One employee described social capital investment as "the more you put in the more you gain at the end. We are out there socially and we are not just saying that we are going to do things" (SLA1); it was a fulfilling experience.

Canadian staff placed greater emphasis on every aspect of their work as developing social capital compared to Australian credit union employees. But the latter also included reports of social capital investment as engaging with the community that "has an impact on business" (SLNS) and "it needs to be part of everyone's role" (SLA3). These employees recognised that social capital investment affected their business, and reports by many of the staff indicated that social capital investment should be closely tied to the credit union's function as a financial institution. One manager said "it's the opportunity to be able to use finance and our finance knowledge to help the communities and help people's families" (SLS) and another, "to help young people to manage their finances" (SLR2). Other employees seemed to focus on the wider community engagement and the need to invest in economic, social and environmental issues (SLV, SLHR, SLCSR1, SLCSR2), similar to their Canadian counterparts. There was increasing emphasis on environmental issues and how staff could respond individually by car pooling or riding to work and, as a team, by being involved in coastal revegetation programs, for example. These initiatives were managed and lead by the CSR teams with considerable effort in the Australian credit union as a "green team" was set up to take a greater role in the organisation's response to the environment. Environmental initiatives understood as developing organisational human and social capital were also reported by the Canadian CSR vice president and micro-loans staff as being important to their social responsiveness as responsible citizens; their emphasis was on an ethical response important to their members and communities. Most employees reported that the credit unions had the intent to invest in social capital in terms of increased community engagement although their intent was not always matched by the reality.

3. Discussion

The rich data from Canadian and Australian credit union employees' interviews reflects Cunningham's (2002) social capital perspective that human capital and social capital are integral to each other. Facilitated by public relations and CSR staff as the connectors, employees in the study established relationships with credit union members and with their communities; these relationships also added value to their work-experience. Employees' understanding of social capital focused more on the ethical dimension of their relationships rather than their obligation to engage with their members and their community. It reflects the "shared meaning" (Heath and Coombs 2006, p.94) established between credit unions and the community as relationships are under-pinned by "similar values, attitudes, and beliefs" (p.94) about what is important to social capital investement.

The cognitive dimension (Tsai and Ghoshal 1998) or employee's understanding of social capital affects the way they respond to credit union social capital initiatives. For many employees it is about every aspect of their work being part of social capital investment. For others it is their community engagement and support for a charity although it is argued that in volunteering for a charity and taking part in revegetation of beach sand hills (experience of two Australian regional credit unions) this experience was also important to developing overall credit union social capital. It is difficult to separate social capital investment, where employees are integral to its success, away from the understanding that employees are social capital investors or social actors, whether they are assisting with a loan, helping a non profit organisation to begin a business, or wrapping Christmas presents for disadvantaged children. As Hazelton and Kennan (2000) emphasise "social capital, grounded in social relationships is obviously complex and multidimensional" (p.82) so that it is part of every transaction and relationship. Hung (2007) argues that "from the dialectical aspect, relationships are not static" (p.19) so that the trust and connections important to social capital development (Coleman 1998; Putnam 1995) will only be beneficial if organisations constantly adapt to the changing contexts of those relationships. There was strong evidence in the credit unions central to our study they were constantly considering how they could be more effective and that they needed a *local* focus to capitalise on social capital initiatives. However, some corporate based projects such as *Do it for dad* (supporting prostrate cancer) were obviously successful and needed to continue.

Not all employees could be involved in community engagement as some branches experienced constant turn over of staff and others were only just setting up networks. As Fussel et al (2006) contend "It is clear that concepts such as access, timing and network ties add considerably to the predictive power of social capital" (p.158) and there was evidence amongst credit union employees that network ties varied considerably and that each branch needed time to develop its networks and to communicate the credit union goals and role as a community member.

4. Conclusion

A central finding of this study was that Canadian and Australian credit unions employees had a key role in developing credit union social capital. However, in an earlier paper (Chia, Peters, 2008) the impact of staff's involvement in social capital initiatives was often undersold or undervalued by both management and staff. Indeed, we found that there was almost an embarrassment at times to signify the importance of the credit unions' contribution to their communities in terms of the projects undertaken. This is interesting as employee reports' in this pilot study indicate that there is a deep moral commitment to making positive changes in the lives of members and the communities the credit unions served. As global fiscal challenges increase, giving back to a community is becoming less of a choice and more of a social imperative. Creating a partnership of giving and receiving makes good business *and* moral sense. Credit unions can continue to point the way for other organisations to follow and to benchmark the model of employee social capital investment.

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The Helix of Knowledge Management - Innovation - Competition on the Global Market

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Abstract: The paper analyzes the relationship between the level of intellectual capital development and fraud by disregarding the provisions of the competition law. Large multinationals, which received fines for anti-competitive behavior, are studied in terms of their innovative practices, which may be premises of predisposition to fraud. Based on data from the Global Innovation Index, and from the EU Commission and USA Department of Justice Decisions for anti-competitive practices, we set the correlations, by means of probit regression, between economic fraud and innovation as a potentially influencing factor. Clusters of innovative companies, depending on their risk to commit fraud, are being proposed, in an attempt to examine the threats, as a counterpart of the largely discussed opportunities, of innovation.

Keywords: Intellectual capital, innovation, anti-competitive practices, multinational companies, fines

1. Introduction

Intellectual capital is, for more than two decades, a topic of particular interest for researchers worldwide. In their comprehensive review from 2005, *Managing Intellectual Capital in Practice*, Roos, Pike and Fernström show that 94% of the CEOs answering a survey conducted by the Economic Intelligence Unit for Accenture declared that managing intellectual capital is vital to their business's success. Studies dedicated to intellectual capital issues have proliferated in two major directions:

1.1 Intellectual capital definitions

Serenko and Bontis (2004), in a research on the citation impact of various intellectual capital definitions, quote what may have been the first mention of the intellectual capital concept. In a birthday letter of homage to the Polish economist Michał Kalechi, in 1969, Galbraith wrote: "I wonder if you realize how much those of us in the world around have owed to the intellectual capital you have provided over these past decades". Of course, the use here is not in the organizational sense of the term, but the reference to creating wealth by thinking is obvious. This is going to be, years after, the essence of intellectual capital approaches. The literature review by Petty and Guthrie (2000) traces the roots of the intellectual capital concept in the early 80s, when the "organizational goodwill" was introduced in order to account for the intangible assets of the organization. In 1980, Hiroyuki Itarni publishes an article on mobilizing invisible assets, trying to approach this "hidden" mechanism of organizational performance. In 1989, Sveiby expands this theory, in *The invisible balance sheet*, where he deals with human capital issues from the point of view of the expertise companies. Edvinsson and Sullivan (1996) define intellectual capital as "knowledge that can be converted into value". Stewart's (1997) definition sees intellectual capital as "intellectual material – knowledge, information, intellectual property and experience – that can be put to work to create wealth."

1.2 Intellectual capital indices and models: IC reporting

In *The invisible balance sheet*, twenty years ago, Sveiby developed a list of 35 indicators, put together by the so-called "Konrad group". Still, the first, and the most well known model of intellectual capital was the Skandia model, developed by Edvinsson and Malone (1997). In this way, 91 measures of intellectual capital were added, in the Skandia model, to the traditional accounting indicators. This model proposed a three-pillar structure of intellectual capital: human capital, structural capital, relational capital. The same structure is preserved in Roos and Roos (1997). They propose a single IC index, which was criticized by Bontis (2001), who regarded it as being context dependent, and subject to value judgments, which are seldom quantifiable. Some other approaches (Kelly, 2004) speak of thinking and non-thinking intellectual capital, of competence capital, but also of attitude capital, integrating the collection of skills with the collection of behaviours. The Intangible Assets Monitor, developed by Sveiby (1997), or the Knowledge Assets Map by Mar and Schiuma (2001) provide instruments for auditing the intellectual capital of a company. The MERITUM project (1998-

2001), conducted in six European countries (Denmark, Finland, France, Norway, Spain, Sweden) had as a purpose the identification of the appropriate measures for intangible assets. Some other initiatives, as Leitner's (2001, 2002) bibliometric studies on intellectual capital add to these efforts of quantifying the contribution of the intangible assets to the company's success. The RICARDA project (2006-2007) has also dealt with identifying intellectual capital indices to be used in intellectual capital reporting. The first edition of the IC Congress, in 2006, at INHOLLAND University, the Netherlands, was dedicated to broad issues of IC defining, measuring and reporting.

The need for conceptual clarification, which is obvious in these attempts to delimit the sphere of intellectual capital, attracts the risk of obscuring the connection between intellectual capital use and business competitiveness. Intellectual capital management offers, also, the premises for business competitiveness through the gain of competitive advantage on the market. Such an effort, often, is achieved by anti-competitive practices, as indicated in the logical sequence below:

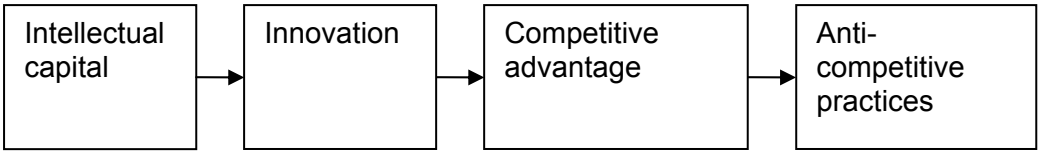

Figure 1: The logical progress from intellectual capital to anti-competitive practices

This will be the issue we analyze here, starting from the intellectual capital model proposed by Bratianu (2008):

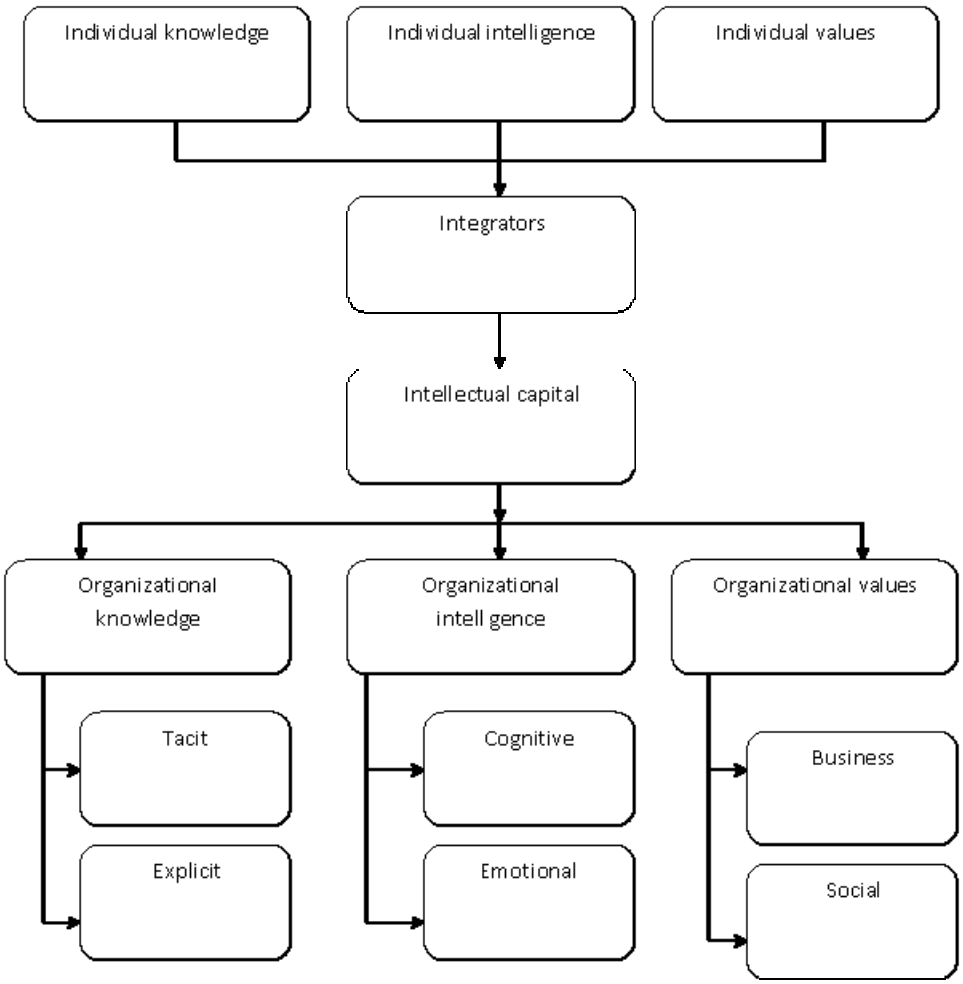

Figure 2: An integrated perspective on intellectual capital

Source: Bratianu, C. (2008) A dynamic structure of the organizational intellectual capital, in Marja Naaronaja (ed.), Knowledge Management in Organization (KMO), Proceedings of the University of Vaasa, Finland, pp. 233-242

As it can be seen, organizational intellectual capital is driven by organizational values, together with intelligence and knowledge. According to Edvinsson, quoted in Stewart (1994), a company grows because it has hidden values. Among these values, a special mention should be made for organizational values stimulating innovation (Hooper and Steeple, 1997). Although they are usually perceived as something enhancing the development for better, there is, still, another side of the matter. Hsieh (2008) shows that "bad" organizational values lead to information hoarding, instead of information sharing, which is an issue of dysfunctional knowledge management. Applying the same logic, "bad" values generate wicked intelligence in the market, that intelligence of companies being simply too smart to observe the rules. This is the point where they disregard the provisions of the competition law.

Among global competitors, innovation has become one of the factors that helps enterprises compete in the arena as they primarily develop the proficiency based component by building skills and competences. One way to use knowledge and capabilities innovatively is to create new products/ markets (achieving a better position on the market); another way is to develop an innovative organizational structure by providing a balanced approach between strategy and structure. The competitive advantages of a firm could be determined by environmental, organizational or personal factors identified on both internal and external levels of a company, deliberately or not (Ma, 2004). According to the literature in the field, factors that deliberately determine competitive advantages, namely managerial actions and strategic maneuvers are related to competition, cooperation and co-option (Şandru and Dima, 2008).

All in all, competition can be regarded as a driving force; the more companies achieve competitive advantages, the better they can compete on the market. In their race for gaining competitive advantages, challenging for companies is not to use extreme competitive manoeuvres that could result in anti-competition practices.

Corporations have emerged as dominant world leading institutions, the biggest of them being present in every world country and surpassing other countries in power and financial capacity. Even Adam Smith, in his book "The wealth of nations", published in 1776 regarded both corporations and governments as instruments to suppress market's competition forces, condemning them firmly (Korten, 1995).

2. Antitrust and innovation based competitive advantage

The current economy is characterized by intensified, global competition to which firms, that need to innovate in order to survive, respond by taking part in different cooperation agreements. As a matter of fact, innovation does not result from individual actors, but rather from the interactions among companies and institutions within a specific environment. In pusuing innovation, firms face costs associated with R&D that they cannot bear individually. Albeit forms of market imperfections in a traditional sense, coordination and cooperation are means for making the innovative process feasible (Marinelli, 2008). As the practice has often shown, the same firms cooperate and compete at the same time, making hard to identify the boundaries of technologies, firms and industries themselves.

At the EU level, article 81 restricts agreements that facilitate concentration or introduce discrimination and hence create market power, while article 82 outlaws the abuse of monopoly power. Whilst the articles are clearly embedded in the standard analysis of competition, focused on market share and prices, innovation is explicitly taken into account only in article 81(3) which makes innaplicable article 81 (1) if an agreement contributes to promoting technical or economic progress.

The effects of antitrust policy on innovation and the relationship between the two are poorly understood and debated in the literature. Articles 81 and 82 of EC Treaty that refer to anti-competitive practices of companies (either understandings or abuse of dominant position) include among others negative effects on the market *the limitation or controlling of production, markets, technical development and innovation*. Such a practice is always connected with a powerfull position on the market, which gives to the competitors the independence of their behaviour on the market, the right

to choose to innovate or to share the innovation with the others in the benefit of the consumers. In the Microsoft case, for example, the most significant issue arising from Microsoft's allegedly exclusionary practices (bundling) was almost surely their effect on innovation. Microsoft argued that while a technological leader like Microsoft may possess a good deal of static market power, this is merely the fuel for stimulating dynamic R&D competition, a process that it argued works well in the software industry. Antitrust intervention in this process would run the risk of reducing the rate of innovation and welfare. The authorities, in contrast, argued that Microsoft's practices prevented entry of new firms and products, and therefore would both raise prices and retard innovation. How to reconcile these two views, however, was never clear in the discussion surrounding the case and the real effects on the market are still in high debate among practitioniers but also academics. However, the uncertainty surrounding technological change in highly dinamic sectors implies that is difficult, if not impossible, to evaluate the effects of inter-firm collaborations or the abusive impact of dominant position firm conduct that can in principle lead to anti-competitive practices (Mollgaard and Lorentzen, 2006)

2.1 Unilateral conduct by dominant firm

Unilateral behaviour of patent holder dominant form (in EU legislation is reflected in the At 82 TEC), such as the refusal to license or licensing restrictions can have a strong impact on competition as it affects the posibility of rival firms to enter the market and hinders the ability to approppriate retun on innovation. The situation is even worsened by the rapid pace of technical change, which makes rapid return of market performance.

This proficiency-based, competitive advantage namely, knowledge, competences and capabilities represent key factors within business processes. This type of competitive advantage can lead, in certain cases, to forms of dominant position abuses. For e.g. both Novell (in 1993) and Sun Microsystems (in 1998) complained to the European Commission about Microsoft's anti-competition practices. The European Commission found Microsoft guilty of two different types of abusive conduct: one of them referred to tying practices and the other to Microsoft refusing to provide its competitors with information regarding the system `interoperability', thus, setting the ground for a possible competition among Microsoft's own products and other competitors' products.

By setting foothold firms aim at eventually becoming first movers on the market. This first mover action can be extremely important in establishing the hierarchy on the market. If the firm that succeeds in doing so is quick and powerful enough to block the access of other competitors (timing and positioning), then it can declare monopole in that respective business area.

Innovation can be one also of the fundamentals in promoting a new product on the market. The literature identifies product promotion techniques, one of them being the so-called tying or bundling technique: in order to promote products, the company will tie an older product (already existent on the market) to the new one. It often happens that these techniques lead to anti-competition actions. Opera Software, for e.g., a Norwegian company, having developed a web browser that provides Internet services, complained to the Commission against Microsoft for abusing a dominant position by tying its own Internet Explorer browser to the Windows operating system and by not following accepted Web standards, fact that affected the interoperability of the systems.

2.2 Collaborations between companies

Different types of collaborations have become common in performing innovative activity. As a general rule of thumb, shorter-term contract and spot relationship have less implications for competition policy than long-term ones (Marinelli, 2008).

Gaining competitive advantage through cooperation could also refer to building strategic alliances or pooling resources and sharing risks. By getting together, companies that use similar resources and engage in similar product market activities gain competitive advantage over those competitors that act individually. Sharing complementary resources and skills by actors on the market that aim through their action to achieve goals of interest for the ones involved is also a form of competitive advantage (Şandru and Dima, 2008). Art 81 from EU Treaty prohibits different forms of understandings between companies having as an object or effect the restriction of competition through practices as direct or in-direct fixing the purchase or selling price, limit or control production, markets, technical development, or investment, sharing the markets or the sources of supply apply dissimilar conditions to equivalent transactions with other trading parties, thereby placing them at a competitive disadvantage etc

Competitive maneuvers leading to competitive advantage are often ownership-based or access-based and refer to timing and positioning (first mover advantage), pre-emption that generates competitive advantage by eliminating or constraining rivals' option space and by limiting, reducing or neutralizing rivals' ability to create customer value in comparison to that of the focal firm, direct attack regarded as a direct challenge of the competitors; flanking attack – attacking that side of the competitors where they are unlikely to respond due to "insignificance" of the attack, incapability, etc.; encirclement – competitors build up competences in geographical areas and industries close to other competitors' strongholds; concentration – by "concentrating a firm's resource at any point of encounter and create local superiority" (Ma, 2004).

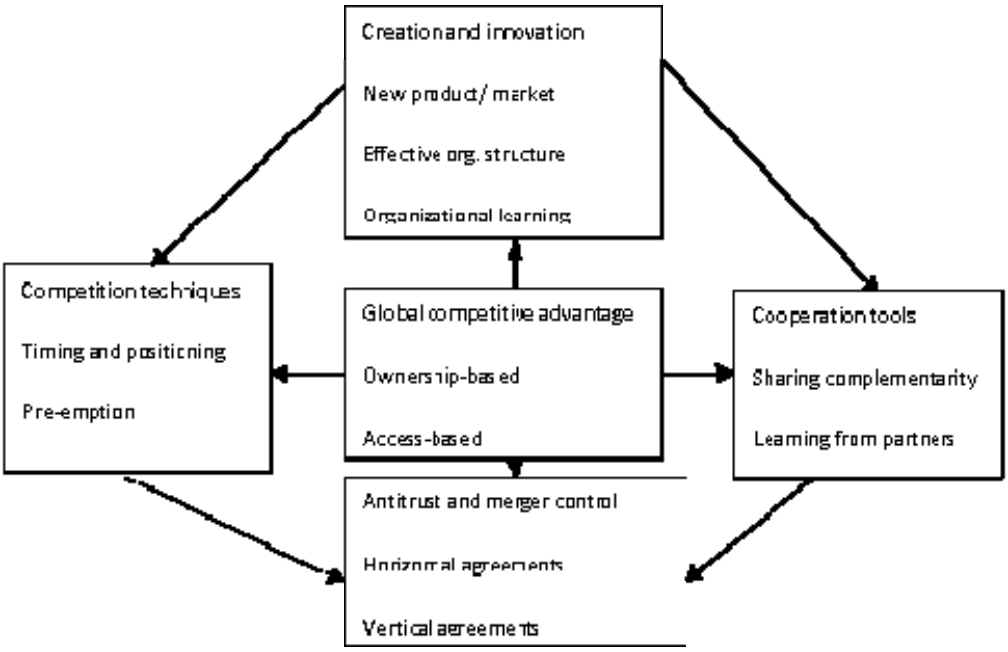

Figure 2: Tools for achieving competitive advantage

Source: adapted from Ma, H. (2004) Toward global competitive advantage. Creation, Competition, Cooperation and Co-option, *Management Decision*, 42 (7): 907:924.

The models developped by Hunt (1994) or O'Donohue (1998) suggest that greater leading breadth can raise the rate of innovation. The model further developed by Segal and Winston (2003) captures antitrust policy in a reduced form way, by assuming that it alters the profit flows that an incumbent and a new entrant can earn in competition with each other, as well as the profits of an uncontested incumbent. However, none of these suggest that innovators leaders can be also leaders of fraud in competition matters or at least play a significant role in designing competition on the relevant market using their economic power and influence gained through the competitive advantages. But there is a substantial work in economics literature which examines the factors determining innovation, with particular emphasis being placed on the role of market power (e.g. Kamien and Schwartz, 1982; Levin et al., 1985), and on establishment size (Acs and Audretsch, 1988; Brouwer and Kleinknecht, 1996).

3. Methodology

In order to correlate anti-competitive practices with innovation by IC development, we included in our analysis, based on the Global Innovation Index and EC (European Commission) and USA Department of Justice Decisions (Antitrust Division) the top 50 most innovative companies in 2008, and we examined their anticompetitive practices in 2004-2008, and their antecedents, before 2004. Seventeen of these companies received fines, during 2004-2008, for their anticompetitive practices, while twenty-seven did not receive fines. For the rest of the companies, the relevant data are missing. We have split the innovative companies in absolute innovators (positions 1-20 in the Top 50 innovative companies), relative innovators (21-40), and companies at risk (41-50), and we used one-way ANOVA in order to assess the differences between the groups. We have used probit regression in order to assess the influence of antecedents on committing fraud, and the influence of being highly innovative on committing fraud.

We trained a neural network which is able to determine, based on the antecedents, whether a company is likely to commit fraud or not, and we used probit regression in order to asses the influence on innovation on fraud. The results are presented in the following section. The companies having committed anticompetitive practices and having received fines, during 2004-2008, are presented in Table 1 below:

Table 1: Innovative companies having received fines for anticompetitive practices during 2004-2008

Name of the company	Amount of the fine (million Euros)	Fraud rank	Innovation rank	Antecedents (yes = 1, no = 0)
Microsoft	2500	1	5	1
Boeing	615	2	21	1
LG Electronics	200	3	49	0
Nokia	150	4	13	0
Amgen	100	5	45	1
Exxon Mobil	83	6	42	1
Sony	47	7	9	1
Samsung	45	8	17	1
Virgin Group	34	9	18	0
EBay	30	10	24	1
3M	20	11	7	1
Intel	12	12	19	1
Nintendo	10	13	39	1
Walt Disney	7	14	8	0
Cisco Systems	3	15	25	1
McDonald's	0.8	16	48	0
P&G	0.002	17	6	0

The companies from top 50 most innovative companies, as of 2008, not having received fines for anticompetitive practices during 2004-2008 are presented in Table 2 below:

Table 2: Innovative companies not having received fines for fraud during 2004-2008

Name of the company	Antecedents (yes = 1, no = 0)	Innovation rank
Apple	0	1
Toyota	0	3
GE	1	4
IBM	0	9
Wal-Mart	0	11
Honda Motor	0	12
Starbucks	0	14
Target	0	15
Amazon.com	0	20
Dell	0	22
Genentech	0	23
Motorola	0	26
Southwest Airlines	0	27
Ideo	0	28
IKEA	0	29
DaimlerChrysler	1	30
HP	0	31
Nike	0	32
BP	0	33
Research in Motion	0	34
AT&T	0	35
Royal Philips Electronic	0	38
VW	1	41
Pfizer	1	42
Best Buy	0	43
Merck	0	46
News Corporation	0	47

4. Results

The results of the one-way ANOVA are presented in Table 3:

Table 3: Compared means of fraud ranks, across innovation groups

rankF					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	10.750	2	5.375	.524	.613
Within Groups	71.750	7	10.250		
Total	82.500	9			

The ANOVA analysis reveals that there are significant differences between these three groups, in terms of predisposition to fraud, which are represented in Figure 3:

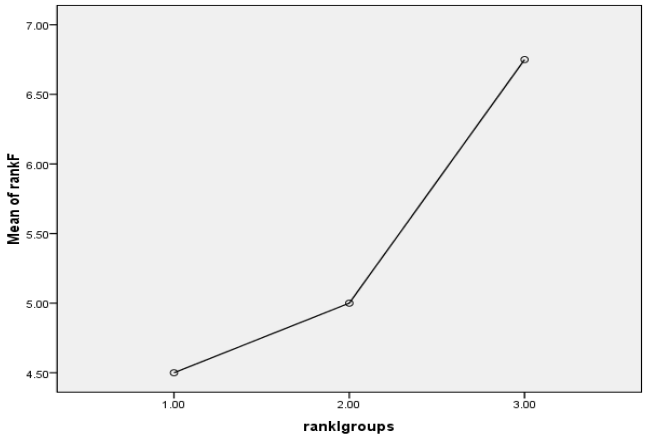

Figure 3: Means plot

The companies, which are the most innovative, have also the lowest ranks in the top of frauds. The correlations between the existence of antecedents and the fraud rank are presented in Table 4:

Table 4: Pearson correlations

		antecedents	fraud rank
antecedents	Pearson Correlation	1	.340*
	Sig. (2-tailed)		.024
	N	44	44
fraud rank	Pearson Correlation	.340*	1
	Sig. (2-tailed)	.024	
	N	44	44
*Correlation is significant at the 0.05 level (2-tailed).			

As it can be seen, the correlation is significant, the existence of previous record being a determinant of fraud in the future.

The correlation between innovativeness and fraud is not significant, suggesting that innovativeness is not necessarily a determinant of fraud. The probit regression taking into account the influence of innovativeness on fraud is presented in Table 5 below:

Table 5: Probit regression parameter estimates for innovation rank

	Parameter		Estimate	Std. Error	Z	Sig.	95% Confidence Interval	
							Lower Bound	Upper Bound
PROBIT[a]	innovation rank		.052	.007	7.302	.000	.038	.065
	Intercept[b]	0	-4.185	.350	-11.954	.000	-4.535	-3.835
		1	-2.677	.109	-24.483	.000	-2.786	-2.567
a. PROBIT model: PROBIT(p) = Intercept + BX								
b. Corresponds to the grouping variable hinnov.								

As it can be seen, about 5% of the fraud intention can be attributed to a unitary increase in innovativeness, which confirms the weak correlation between the two.

The probit analysis regarding the relationship between fraud antecedents and present fraud is presented in Table 6 below:

Table 6: Probit regression parameter estimates for fraud antecedents

	Parameter		Estimate	Std. Error	Z	Sig.	95% Confidence Interval	
							Lower Bound	Upper Bound
PROBIT[a]	antecedents		-.298	.140	-2.129	.033	-.572	-.024
	Intercept[b]	0	-1.649	.134	-12.342	.000	-1.783	-1.516
		1	-1.812	.136	-13.298	.000	-1.948	-1.676
a. PROBIT model: PROBIT(p) = Intercept + BX								
b. Corresponds to the grouping variable hinnov.								

The negative estimate suggests that companies already having antecedents of fine can be discouraged to continue with their anticompetitive behaviour, which is consistent with the correlation, significant, but rather weak, between the two. We than trained a multilayer perceptron for predicting the companies, which are likely to commit fraud, based on the entire sample of companies, some of them having committed fraud, and some of them not having yet committed any fraud. The output for the model was considered the amount of the fine, which was transformed on a decimal scale. The inputs were considered the rank on the innovativeness scale, and the antecedents of the company in committing fraud. The model summary and the independent variables importance are presented in Tables 7 and 8 below:

Table 7: Model summary

Training	Sum of Squares Error	1.607
	Relative Error	.292
	Training Time	00:00:00.063
Testing	Sum of Squares Error	.027
	Relative Error	.003
Dependent Variable: fine		

Table 8: Independent variables importance

	Importance	Normalized Importance
rankF	.552	100.0%
revenue	.278	50.3%
rankI	.092	16.7%
rankIgroups	.079	14.3%

As it can be seen, the rank in the fines hierarchy is the most important factor in accurately predicting the risk that the company behaves in an anti-competitive manner. The fitness of the model in predicting the output is modeled in Figure 4 below:

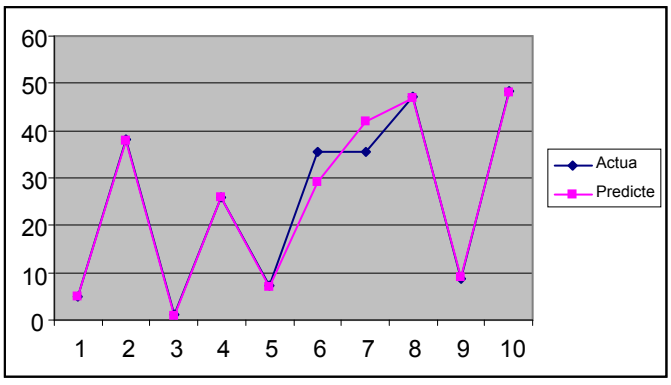

Figure 4: ANN prediction

The model is accurate (accuracy 0.985975), which means that it is able to predict correctly the probability that a highly innovative company receives a fine for anti-competitive practices, based on a training population which included seventeen companies which received fines, and seventeen companies which did not receive fines, while the rest of six companies formed the holdout sample, on which the model was tested. In other words, the sensitivity of the companies to committing fraud, based on their innovative capacities, can be adequately predicted using this type of model. This model shows that the innovativeness of a company, materialized in revenue increases, is a fair predictor of its anticompetitive practices.

5. Conclusions

Due to the role of cooperation aspect, not only competition issues and antitrust have a strong impact on innovation, but also the other way around. Innovative practices have the role of an attractor of anti-competitive practices, because companies, by trying to find the most profitable ways to increase their revenus, can easily go away, and not only outspend their competitors in innovation, but also harm them by unfair competition. Technological development questions the traditional logic of antitrust matters, which should be defined in relation to the dynamic viability of the innovation process itself, with some degree of tolerance to various forms of R&D, manufacturing and distribution agreements or abuse of dominant position when they are means to compensate for high innovative costs. Antitrust system is also being challenged by the increased privatisation of knowledge assets, pursued through the enforcement of intellectual property rights regimes at national, but especially at international levels. This process has shifted the focus of competition policy from the price/product level, at the bottom end of the productive chain, to the knowledge/technology level, at the top end. As innovation and technological change are dynamic processes, rule based governance is unlikely to provide a universally valid solution.

Our analysis revealed that innovation has a weak influence on committing fraud, suggesting that other factors are to be taken into account, as well, in predicting the anti-competitive behaviour of companies. One of these factors, as selected by us, was fraud antecedents in the history of the company. The analysis revealed that its influence is ambivalent, as, on the one hand, it seems to discourage companies already having received fines for anticompetitive practices into repeating this sort of practices but, on the other hand, it serves as a fair predictor of future anti-competitive behaviours, if they occured in the past.

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How can the Value of IT Personnel in SMEs be Assessed?

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Abstract: Over the last decade, the importance of small and medium-sized enterprises (SMEs) to the European economy has gradually been recognized. At the same time, information systems (IS) and information technology (IT) have opened up new business opportunities for some SMEs, while others are fighting for survival. Apart from economic variables like company size, industry or capital funding (or lack thereof), management awareness of the dangers and opportunities posed by IS and IT and the abilities of IT personnel to react to these have been shown to play a major role in the future of many SMEs. Based on the empirical and theoretical findings by a variety of authors, this paper will propose a model for assessing the value of IT personnel in SMEs.First, the strategic context in which IS are deployed in a company must be addressed because it is a major determinant of the value of IS to the company and of the types and levels of skills necessary in its employees. The "focus-dominance model" developed and tested by (Levy et al. 2001) will be discussed and used to cluster SMEs according to strategic focus and costumer dominance. Second, the "competitive advantage provided by IS" is proposed for measuring the success of IS in a company. The main advantage of using this measure is the fact that it has already been validated and used in an exploratory analysis by (Byrd et al. 2001) which strives to show how IS success is affected by IT personnel skills. The skills will be clustered using four dimensions: (1) technology management skills, (2) business functional skills, (3) interpersonal skills and (4) technical skills. (Lee et al. 1995) This framework has been used repeatedly in studies on IT personnel skills, e.g. by (Byrd et al. 2001), and therefore allows referring to said empirical studies. In addition to skill dimensions, skill levels – which have been neglected in much of the previous research on IT personnel skills – will be included in the model. The approach by (Dreyfus et al. 1987) and the Skills Framework for the Information Age (SFIA Foundation) will be discussed. It is expected that future empirical tests of the model will show that value and success of IS depend on available skill levels, while the availability of more highly skilled employees may be restricted due to lack of funding. When the model proposed here is tested empirically, it is hoped that it will provide some guidance to SME managers regarding their IS/IT personnel investments.

Keywords SME; information systems; IT skills; IT personnel; strategic planning

1. Introduction

As information technology (IT) and information systems (IS) are gaining more importance in conducting business, many SMEs have found themselves to be forced to submit to customers' or suppliers' pressure to introduce IS/IT into their day-to-day business. SMEs are working under severe resource constraints, the most important ones frequently being monetary constraints and time and/or knowledge constraints on the owner's side. (Blili et al. 1993; Martin 1989)

They are caught in a difficult situation: sacrifice scarce resource in order to explore IS/IT – possibly risking their firms' existence if the attempt fails – or be outmanoeuvred by competitors who embraced IS/IT and are now reaping the rewards (Street et al. 2004). IT alignment in SMEs is heavily dependent on the CEO's level of IT knowledge. (Hussin et al. 2002) This means that SME managers need to know how important IS/IT are to their business and which skills their IT personnel need to exploit the possibilities of IS/IT fully. (Fink 1998) They need to be able to pin down which types of skills, e.g. managerial IT skills or technical IT skills (Bharadwaj 2000), will help their company benefit from IS/IT.

This paper outlines the integration of previous empirical and theoretical research into an empirically testable model of IT skills' influences on the strategic impact of IS/IT on business.

SME managers can gain important insights into the value of IS/IT and IT personnel by analysing their company as proposed here. The target audience are managers of businesses outside the IT sector who have little IT expertise and financial leeway and would thus be unable or unwilling to hire IT consultants. It aims to be as easily understandable and generally applicable as possible.

2. Relevant theories, models and constructs

In the following paragraphs, the models and constructs used in this paper for model-building are described. They are taken from the body of literature that is commonly used in information systems (IS) research and management science.

This article uses the EU definition of SMEs according to which a SME is a firm that does not have more than 250 employees or a turnover of € 50m p.a. or a balance sheet total exceeding € 43m p.a. (EU 2005)
The basic, and generally undisputed, assumptions here are that information systems (IS) and information technology (IT) are not equally important for every SME and that IT personnel play a crucial role in taking full advantage of IS/IT. (Mata et al. 1995; Byrd et al. 2001)

The resource-based view (RBV), which has been used frequently to explain how IS/IT and firm strategy are connected and how the strategic value of IS might be assessed, provides the theoretical basis for this paper. (Wade et al. 2004) provide an excellent overview and review of the RBV in IS research.

The RBV posits that resources are the basis for firms' competitive advantage (CA), with some resources or resource sets providing short-term CA (ex ante limits to competition) and some providing long-term CA (ex post limits to competition). (Peteraf 1993; Wade et al. 2004) These resources must be valuable and rare in order to enable a firm to achieve temporary CA, and must be protected against imitation, transfer and substitution if the firm seeks to establish long-term CA. In addition, a firm must be able to appropriate the rents generated by these resources. (Penrose 1959; Peteraf 1993; Priem et al. 2001)

Table 1: RBV characteristics, adopted from (Wade et al. 2004)

Resource Attributes	*Explanation*
Ex ante limits to competition	
Value	Resource enables a firm to implement strategies that improve efficiency and effectiveness (Barney, 2001)
Rarity	Resource is not simultaneously available to a large number of firms
Appropriability	Rent earned by a resource can be appropriated by firm
Ex post limits to competition	
Imitability	Unique firm history, causal ambiguity, time compression diseconomies and embeddedness prevent competitive imitation
Substitutability	A lack of strategically equivalent resources which are rare and inimitable prevents easy substitution
Mobility	Imperfectly mobile or non-tradable resources prevent competitors from imitating CA by buying the relevant resources

IS/IT resources that match this description and might therefore be sources of competitive advantage are frequently labelled *IT capability of a firm*. There exist a number of approaches to define this term and to classify its components. (Wade et al. 2004) This paper will distinguish between *IT infrastructure, human IT resources,* and *IT-enabled intangibles*. (Bharadwaj 2000) As we will see in the following paragraphs, this approach is suitable for the model proposed here since it permits us to evaluate human IT resources separately, and to use RBV-based instruments for assessing the value of IT personnel.

IT infrastructure comprises the physical assets, communication technologies, shareable technical platforms and databases, thus enabling innovation and continuous improvement of products. (Bharadwaj 2000) *Human IT resources* are divided into technical IT skills and managerial IT skills. (Bharadwaj 2000) *IT-enabled intangibles* comprise customer orientation, knowledge assets, and synergy. Customer orientation in the IS/IT context describes the integration and coordination of customer management systems across the entire firm, thus creating competitive advantage through "the socially complex link between IT and other parts of the organization". (Bharadwaj 2000) Knowledge assets are derived from IT-enabled "knowledge formalization and consolidation of previous knowledge gains and their leverage across the organization." (Bharadwaj 2000) Finally, "synergy refers to the sharing of resources and capabilities across organizational divisions. (…) This interaction of IT with other socially complex organizational intangible resources is at the heart of many of the difficulties firms have when trying to imitate their more successful counterparts." (Bharadwaj 2000)

The RBV is judged appropriate as a theoretical framework for this paper because it forms the link between strategic competitive advantage and IS resources, thus permitting us to draw conclusions

about the relative importance and value of IS resources, in particular human IS resources, in a company. Opponents of the RBV have pointed out some general weaknesses of the approach, e.g. (Priem et al. 2001). This article will not attempt to resolve these issues but outline very briefly some important objections raised to applying the RBV in IS research. One objection, for example, states that competitors can buy or duplicate IT systems relatively easy, and that IT infrastructure can therefore not provide competitive advantage. However, IT infrastructures can be difficult to imitate due to time-compression diseconomies and "represent the type of causally ambiguous resources that are central to the resource-based view." (Bharadwaj 2000) Another objection frequently raised concerns the issue that it is rather easy to hire IT personnel, which violates the RBV assumptions of rarity and inimitability. This claim has been countered with the argument that specific skills and skill sets "are difficult to acquire and complex to imitate, thereby serving as sources of competitive advantage." (Bharadwaj 2000) This is especially true for skills and knowledge that is firm-specific, industry-specific or that concerns custom-built IT infrastructure. In section 2.3, a classification of human IT resources is presented which permits a somewhat more detailed analysis of which IT skills might provide CA.

In the following section, different approaches to measuring IS/IT value or impact will be discussed and two constructs will be selected for further use. The paper will not discuss IT infrastructure and IT-enabled intangibles but concentrate on the human IT resource because it is essential to gaining any kind of CA from IS/IT. (Mata et al. 1995)

2.1 Strategic context of SMEs: The focus-dominance model

The firm's environment needs to be examined and its competitive position determined before analysis of CA provided by IS/IT is possible. That is why the focus-dominance model comprises two steps: first, the SME's strategic context is explored and mapped into the quadrant as indicated by its position on the two dimensions *customer dominance* and *strategic focus*. Second, the SME's IS/IT is explored and mapped into the model analogously. Third, the positions of the SME and its IS/IT are compared, and a possible strategic mismatch can be identified (see Figure 1). (Levy et al. 2001) Other authors have suggested similar approaches to strategic IS/IT planning. (e.g., Fink 1998)

The *efficiency quadrant* describes SMEs who utilise IS primarily to control business processes and consequently view IS mostly as a cost driver. The *coordination quadrant* encompasses all SMEs which attempt to improve the effectiveness of their business processes by employing IS/IT. The *collaboration quadrant* contains those companies where "IS strategy is reactive to business strategy as SMEs attempt to capture value from having appropriate information when negotiating with major customers [or major suppliers]". (Levy et al. 2001) In the *innovation quadrant*, finally, IS are integrated with business strategy which means that "IS influence the direction of business strategy as well as reacting to it." (Levy et al. 2001)

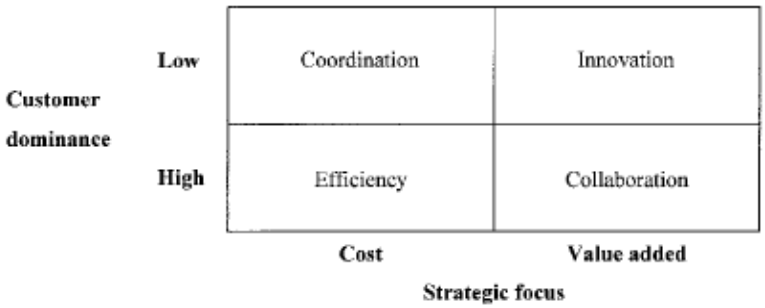

Figure 1: Focus-dominance model, taken from (Levy et al. 2001)

Empirical evidence from a series of case studies shows that successful SMEs either follow a low-cost investment strategy to enhance efficiency or a value-added investment strategy which would presumably incur higher costs. (Levy et al. 2001) Although this might be a slightly simplistic view of feasible business strategies (Porter 1998), the focus-dominance model nevertheless has its merits. It allows clustering SMEs along two dimensions which influence IS investment decisions heavily. (Fink 1998) They use a system for categorising IS that is now nearly 20 years old (Earl 1989) and deemed unsuitable for classifying today's more heterogeneous, ubiquitous and sophisticated IS/IT landscapes. Instead of using a rigid classification system or catalogue of IS/IT components and systems to pigeonhole them within the focus-dominance-model, this paper suggests utilizing the construct *competitive advantage provided by IS* (CAPIS) which will be described in the following paragraph.

2.2 Measuring IS/IT value: Competitive advantage provided by IS (CAPIS)

Many researchers have been trying to find a way to measure IS/IT value. Reviews of previous efforts to develop such models and instruments can be found in (Melville et al. 2004), (Petter et al. 2008) or (Santhanam et al. 2003). (Melville et al. 2004) posit that IT business value is generated when IT positively influences business processes and, consequently, business process performance, which in turn impacts organizational performance. This approach is very widely used in IS/IT research (e.g., Caldeira et al. 2003). They do not, however, propose instruments for measuring IT business value, but outline a general "integrative model of IT business value" (Melville et al. 2004) based on RBV. (Petter et al. 2008) present an overview over fifteen years of research into measurements and models for IS/IT success, some of which have already been validated (e.g. Sedera et al. 2004). Competitive advantage, however, is not the same as value generated by IS/IT. (Mata et al. 1995) Most constructs used to determine IT value or success thus cannot be used for our purposes.

In this context, *competitive advantage provided by IS* (CAPIS) is a most interesting construct based on Porter's Five Forces and the CAPITA construct (Sethi et al. 1994). CAPITA is designed to measure strategic impact of a single IT application while CAPIS examines an organisation's entire IS/IT (Byrd et al. 2001). CAPIS is measured on a 5-point scale and contains items pertaining to four factors, *support activity efficiency*, *primary activity efficiency*, *resource management functionality*, and *threat*. (See Table 2)

Table 2: CAPIS description, adopted from (Byrd et al. 2001)

CAPIS dimension	*Explanation*
Support activity efficiency	Impact of IS on support services
Primary activity efficiency	Impact of IS on primary (value-generating) activities
Resource management functionality	Extent to which IS/IT provides functionality desired by external user groups (needs of customers/suppliers) and internal user groups (attain strategic objectives)
Threat	Impact of IS on suppliers' or customers' bargaining power

CAPIS is used in order to find out whether IS/IT are strategically important for a SME. Adopting a comprehensive view of IS/IT enables especially managers without a strong IT background to answer the questions about their companies' IS/IT. If a more detailed analysis is needed, the original CAPITA construct by (Sethi & King, 1994) may be used to rate every application in use separately. Both *IT infrastructure flexibility* (ITIF) and *IT personnel skills* are suggested to exert influence on CAPIS. (Byrd et al. 2001) Empirical evidence suggests that IT personnel skills influence CAPIS both directly (black lines) and indirectly (grey lines) via ITIF as depicted in Figure 2.

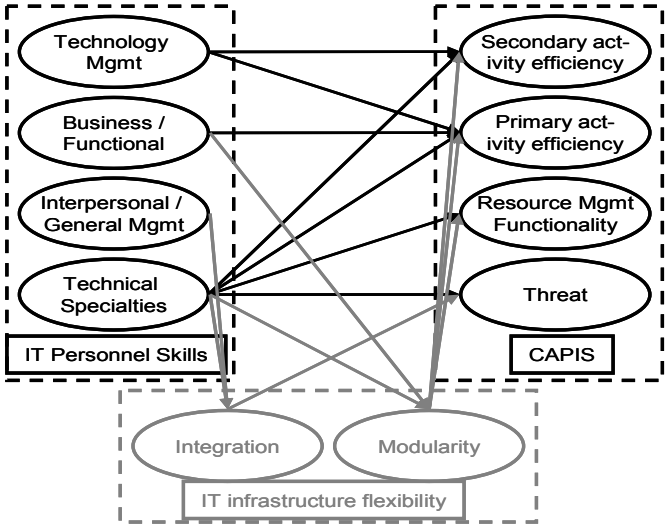

Figure 2: Influence of IT personnel skills on ITIF and CAPIS, adapted from (Byrd et al. 2001)

Analysing ITIF facilitates assessing the value of IT infrastructure and improving decisions on investing in technical IT resources. It is not integrated in the instrument here since answering the questions

pertaining to ITIF demands more detailed knowledge of the firm's IS/IT than many SME managers might possess. (see section 3 Some exemplary items for the three constructs' dimensions are shown in Table 3.

Table 3: Exemplary items for CAPIS model constructs (Byrd et al. 2001)

Factor	*Dimension*	*Exemplary Item*
CAPIS	Support activity efficiency	In our organisation, IT applications assist in reducing the cost of general management activities.
	Primary activity efficiency	In our organisation, IT reduces the cost of transforming material inputs into customer deliverable outputs.
	Resource mgmt functionality	In our organisation, IT assists the activity of upgrading a resource. (e.g., adding an additional production)
	Threat	IT assists our organisation's ability to evaluate and select the most appropriate supplier.
IT personnel	Technology Mgmt	Investments in IT are best described as long term and consistent.
	Business Skills	Our IT personnel are knowledgeable about business functions.
	Interpersonal Skills	Our IT personnel have the ability to plan, organise, and lead projects.
	Technical Skills	Our IT personnel are skilled in developing web-based applications.
ITIF	*See (Byrd, Turner 2001) for details*	Compared to rivals within our industry, our organisation has the foremost in available IT systems and connections.

One great advantage inherent in this approach is that it will not be necessary to regularly execute a costly and time-consuming update of a software/hardware catalogue (see 2.1.) or to try and classify innovative new applications into categories that do not fit anymore. Another advantage stems from the fact that each firm's individual exposure to and handling of IS/IT is taken into account. This would be very difficult, if not impossible, to capture in a catalogue of IS/IT, except in the simplest cases, e.g. word processing. These are mostly trivial, however, and therefore the insights to be gained from such a catalogue are probably smaller than the efforts required for establishing and updating it. Drawbacks result from the fact that there is not sufficient empirical evidence yet to prove beyond doubt that the model outlined above is correct. Some results are backed by other empirical research, e.g. (Lee et al. 1995).

The procedure of mapping IS/IT into the focus-dominance quadrants according to CAPIS scores will be detailed in the section 3

2.3 Clustering IT personnel skills

There are myriad possibilities how to classify IT skills. Recently, efforts have been made to develop comprehensive frameworks in order to augment the comparability of research results on related topics. (CEPIS) A major problem in this field is contradictory evidence, for example concerning demand for certain IT skills or the relative importance of certain IT skills, which cannot be resolved as long as the definitions of IT skills vary wildly. This paper uses a classification that has enjoyed considerable popularity among IT skills researchers (Lee et al. 1995) and has been used before to establish a link between IT skills and CAPIS (Byrd et al. 2001). The clusters *technical specialties knowledge/skills* (1), *technology management skills* (2), *business functional knowledge/skills* (3), and *interpersonal and management knowledge/skills* (4) are identified. (Lee et al. 1995) This classification is in accordance with (Bharadwaj 2000) distinguishing between technical and managerial skills.

What has been nearly completely neglected in the majority of IT skills research is the skills level as an important factor. Normative approaches by governments and educational establishments or initiatives are a notable exception, for example the Skills Framework for the Information Age (SFIA). SFIA assigns skills or skills sets to the business function that they are needed for, e.g. "strategy and planning" or "service provision". These business functions mirror the roles that IS/IT can play in a company. The skills are divided into seven levels, from "assist" to "set strategy, inspire, mobilise". Some skills or skills sets are available on certain levels only, e.g. "innovation", while others can be developed from low to high proficiency levels, e.g. "project management". (SFIA Foundation) Another, more abstract, approach describes five levels of skills development from "novice" to "expert". (Dreyfus et al. 1987)

According to RBV assumptions, only valuable, rare and inimitable resources can provide competitive advantage. It is assumed that low skill levels are easy and cheap to obtain for a company, for example by hiring inexperienced young job entrants, and skills can, in this case, not be a source of CA. High skill levels, in contrast, can provide CA. This distinction is under-researched in IS/IT skills research. It is included in the model proposed in the following section.

3. Results

In the focus-dominance model, *supplier dominance* will be considered in addition to *customer dominance* in order to permit linking it to CAPIS. This extension is not problematic, however, since it is part of the RBV and the model by (Porter 1998).The model by (Byrd et al. 2001) will be amended as follows: first, the cost-centred approach to determining the contribution of IS/IT to developing CA is complemented by a value-added approach as envisioned in the focus-dominance model. Originally, only support and primary activity *efficiency* were determined. This means rewriting the relevant items accordingly and adding them to CAPIS. Third, resource management functionality is divided according to the user group (internal or external) that IS/IT provide the functionality for. The model proposes that every one of the amended CAPIS dimensions affects either *strategic focus* (cost or value) or *customer/supplier dominance* (low or high) in the focus-dominance model. (Figure 3)

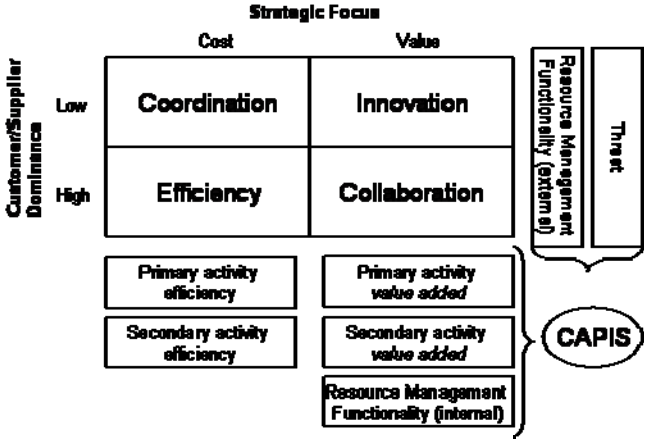

Figure 3: Matching CAPIS to the focus-dominance model

As mentioned in section 2.2, analysing ITIF is recommended for knowledgeable managers only. Since this construct influences CAPIS and not vice versa, this omission will not pose any conceptual difficulties but merely lead to less detailed results concerning IT infrastructure and the exact nature of IT skills influence (direct or indirect) on CAPIS.Second, skills levels are added to each skills class. At least two levels, high and low proficiency, need to be defined for each class. Some dimensions might be insignificant in connection with some CAPIS dimensions. The model permits testing whether this is due to low proficiency levels which cannot be a source of CA (see section 2.3). Thus, adding skills levels enhances the model's explanatory power.

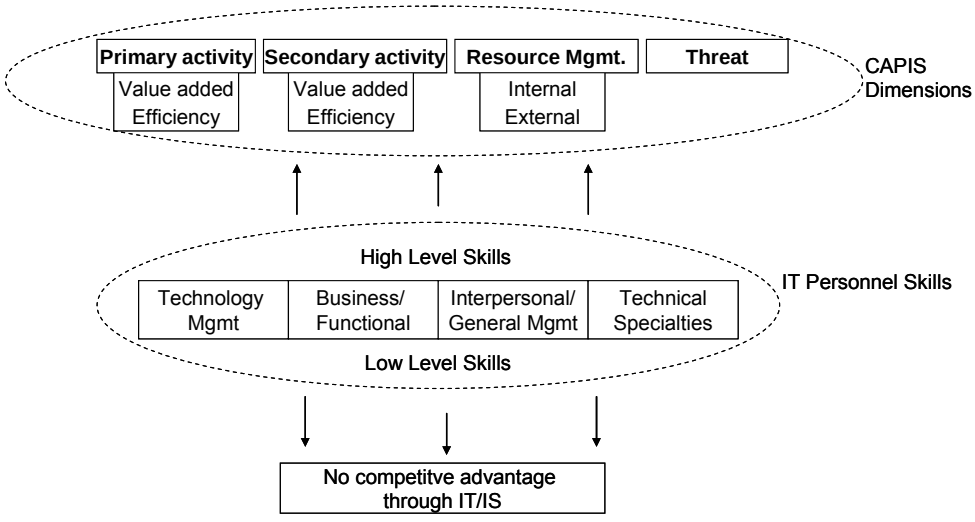

Figure 4: Amended CAPIS model

For managers, the following procedure ensues: first, they need to assess their SME's strategic position by performing, for example, a competitive forces analysis and assigning it to a quadrant in the focus-dominance model accordingly. Second, they need to answer the CAPIS items. Depending on the CAPIS scores for each of the seven factors (support activity efficiency/value added, primary activity efficiency/value added, internal/external resource management functionality, and threat), the firm's IS/IT is assigned to one of the four quadrants in the focus-dominance model. The next step is surveying available IT skills and determining how they contribute to the CAPIS dimensions. The skills classes are then arranged in descending order depending on their estimated contribution for each CAPIS dimension. Summing them up leads to (1) the estimated value of each IT skills class and (2) the estimated value of IT personnel for the company. The value of IT skills is therefore their contribution to CA realised through IT/IS.

Broadly speaking, there are two situations in which a SME manager might wish to perform this assessment. He either wishes to obtain guidance concerning a specific investment, or he is aiming to find out whether current IT/IS investment is appropriate for the company.

In the first case, the manager can determine whether realising the intended investment will change the IT/IS position, i.e. contribute to realising CA, in accordance with the strategic focus of his business. If this is the case, he will be able to look at the skills side in order to determine whether his company possesses the necessary IT skills, i.e. high level skills in the relevant areas. If not, he will know which skills classes to invest into.

In the second case, the manager will be able to identify mismatches between business and IS/IT strategy by comparing the relative positions of the SME and its IS/IT. If the positions do not match, then the SME manager needs to consider whether changing the IT strategy might be profitable for his company. The results from CAPIS assessment form a valuable basis for such IT investment decisions. If the analysis shows that the available IT skills are mainly low level, i.e. not suitable for realising CA through IT/IS, then IT/IS potential for realising CA ought to be explored. It is possible that no CA can be realised through IT/IS. On the other hand, lack of high level skills may be the reason why no CA has been derived from IT/IS. In this case, managers need to know which skills area they need to invest in since hiring the wrong kind of specialist, for example a technical specialist where a technology management specialist is needed, will not improve the situation. This analysis offers a basis on which SME managers can determine whether they have the human resources necessary for realising the IT/IS performance that benefits their company most.

4. Discussion and future research

The approach detailed above is subject to some limitations that need to be addressed in future empirical research. They will be described in the following paragraphs.

The connections between the CAPIS items and the IS/IT skills classes that were tagged as significant (Byrd et al. 2001) are depicted in Figure 2. Some of these findings have been confirmed in other empirical studies, e.g. (Gallivan et al. 2004), while for some, contradictory evidence has been found. That interpersonal/general management skills should not have any influence on any CAPIS dimension, for example, is astonishing. There are a number of possible explanations, e.g. differentiation between new job entrants and old hands, or low objectivity of the IT personnel construct. None of them have been proven beyond doubt, however, and need to be explored further.

The amendments made to CAPIS in order to permit matching it to the focus-dominance model need to be tested. The additional CAPIS dimensions have been developed on the basis of RBV theory, and the amended construct must now be shown to be valid. The IT personnel construct has been changed to reflect different levels of proficiency and needs testing also. Finally, excluding ITIF might lead to loss of explanatory power which poses a problem if the importance of IT personnel to CAPIS is underestimated significantly as a result. In that case, ITIF must be readopted into the model.

Reliability and objectivity might be an issue if the CEO only answers the questions, especially where the assessment of IT personnel skills is concerned. Combining this approach with validated competence measures, for example self-assessment by IT personnel, might be a solution for this particular problem.

This paper does not deal with industry-specific differences between companies in order to attain maximum generalisability. Some studies suggest that there may be systematic differences between SMEs in different industries, e.g. (Gadenne 1998). SMEs in the IT sector in particular are more than likely to have different needs and characteristics concerning their IS/IT planning, and are therefore excluded from considerations in this paper. Hopefully, further empirical research will shed light on this issue.

5. Conclusion

Many SMEs do not base their investment decision on expected absolute benefits and strategic outlooks. (Gadenne 1998) This might distort their willingness to invest because they look at the cost side without evaluating the benefits side. It is therefore suggested that, if SMEs had more information about their competitive position and their IS/IT position, they would be more willing to invest in IT personnel. This preposition will probably only hold true, however, if the search costs for these information are not prohibitively high. It is therefore amended: SMEs would be more willing to invest in IT personnel if they had low-cost access to information about their competitive position and their IS/IT position. The approach proposed here offers SMEs the possibility of a self-assessment that can be carried out without incurring prohibitive costs. It will hopefully contribute to improving strategic planning and IT personnel investment by SMEs.

This paper provides an empirically testable model for assessing the value of IT personnel that rests on the theoretical foundations of RBV and builds on empirically tested constructs. IT personnel skills are broken down into four skills classes that are assessed separately. The contribution of each skills class to realising competitive advantage through IT/IS, as measured by the CAPIS dimensions, represents the value of high level IT/IS skills to a company. Once the relations proposed in this model have been verified empirically in case studies and surveys, it will hopefully provide tangible evidence how value can be generated from IT/IS skills. SME managers may use it as a guide in their strategic IS/IT planning process. Even though, at present, precise statements about interdependencies in the model cannot be made, utilising the method outlined here will raise awareness amongst SME managers and introduce a more structured IT planning process.

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Transforming the Utility of IC Narrative: An Interventionist and Strategic Approach

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Abstract: The purpose of this paper is to examine, by way of a case study, the use of IC narrative in the development of a strategic plan for the Sydney Conservatorium of Music, a Faculty of the University of Sydney. The use of IC narrative in this case provides insight into the utility of IC to communicate the strategic intentions of an organisation and the initiatives required to carry it out. This paper makes a contribution to IC knowledge and practice by demonstrating how the utilisation of IC narrative in conjunction with an interpretive research approach in a particular organisation highlights the emic and etic interplay that is required to develop and articulate an IC strategy. Further, it provides an example of how value creation in an organisation can be communicated to its stakeholders and how the use of IC narrative transcends the use of contemporary accounting and IC reporting frameworks.

Keywords: Intellectual capital; strategy; interventionist research; narrative

1. Introduction

The use of narrative in the dissemination of an organisation's intellectual capital (IC) has been well established in the contemporary academic and practitioner literature (Meritum Project, 2002; Mouritsen *et al.*, 2002). The work of the initial pioneers of IC moved from the simple one page matrices that dominated the early days of IC to more complex and comprehensive documents where narrative was utilised to give meaning to the measures of IC (Sveiby, 2007). From here further studies examined the utility of narrative and determined that the usefulness of IC extended beyond just reasoning and could be used to create organisational artefacts, enable management action and as a source of data used to understand value creation inside organisations (Tull and Dumay, 2007; Dumay, 2008; Dumay, forthcoming). What most of these approaches to understanding the utility of IC narrative have in common is that the initial focus has been on the development of an organisation's past IC activities, with a later shift in focus to identifying how the organisation will develop its IC resources in the future. Thus, an opportunity exists to examine the utility of IC narratives in an attempt to understand value creation and strategic intent in an organisation prior to having it report on IC activities.

In order to do this a case study using an interventionist research approach is outlined, based on the development of an IC based strategic plan for the Sydney Conservatorium of Music. The advantage of the interventionist research process is that it allows the researcher the opportunity to continually move in and out of the organisation to develop new insights of theoretical significance. In addition it allows for hands-on experiments to be conducted (Jönsson and Lukka, 2006).

In order to present this case study the paper is divided into the following sections. Section 2 presents a literature review in relation to the emergence of IC narrative and recent research into the utility of IC narratives. Section 3 outlines the case study organisation while Section 4 outlines the methodology employed in the research. Section 5 presents the results of the study and expands on the various theoretical perspectives employed in developing the interventions utilised in creating the Conservatorium's strategy document. Finally, Section 6 presents the conclusion to the paper.

2. Literature review

The measurement, management and reporting of IC became prominent, especially in Europe and more specifically in the Scandinavian countries, in the two decades leading up to the new millennium (Petty and Guthrie, 2000). At this time, frameworks such as Sveiby's (1997) 'Intangible Assets Monitor' became popular. The emerging frameworks were in part influenced by the development of the 'Balanced Scorecard' (Kaplan and Norton, 1992) that emerged from the USA at the same time. In the mid 1990's, the Scandinavian insurance company, Skandia, combined the principles of the 'Intangible Assets Monitor' and the 'Balanced Scorecard' to develop the 'Skandia Navigator'. Skandia used the Navigator framework to externally disseminate information about its IC by way of an IC report that was a supplement to their annual financial report (Skandia, 1998).

This work has continued into the 21st century and led to a proliferation of frameworks for the measurement, management and reporting of IC and intangible assets. Authors such as Sveiby (2007) and Ricceri and Guthrie (forthcoming) identify over 30 different frameworks. Most of these frameworks were initially developed as either an explication of IC in dollar terms or as simple one page matrices representing a 'balance sheet' of intangibles (Sveiby, 2007). In contrast, some scorecard methods were developed as supplements to annual reports (see NSW Department of Lands, 2005) or as comprehensive independent documents (see Systematic, 2002). The main differentiating feature of these documents is the use of narrative to complement the reporting of the measures of IC. As a result a debate exists among academics and practitioners as to the most effective form of IC reporting. Some advocate that IC disclosure should primarily be in the form of the simple, one-page, accounting-style reports based solely on measures of the elements of IC dubbing it the "…'fourth' account of organisational performance" (Society for Knowledge Economics, 2005, p. 39). Alternately, the use of narrative is well established in the IC literature (Meritum Project, 2002; Mouritsen *et al.*, 2003) and its proponents advocate using narrative because it adds to the reasoning behind an organisation's IC practices (Mouritsen *et al.*, 2002, p. 14). Thus, narratives extend the 'accounting' of IC into a justification of IC activities within an organisation.

Using narrative solely to justify IC practices is however considered a narrow view. The contemporary literature offers different perspectives on its utility (see Weick and Browning, 1986; Llewellyn, 1999; Snowden, 2001). Three recent IC studies exemplify these perspectives. First, Tull and Dumay (2007) investigated the utility of narrative as organisational artefacts. Their analysis of an organisation's IC narrative over time exemplified not only the reasons for an organisation's IC practices but also how the narrative becomes an artefact by which changes in the organisation's operating environment and relevant managerial responses were recorded. This is seen to have wider implications from a managerial perspective, as these artefacts capture the structure of IC as viewed from within the organisation and how the impact of IC practice can be examined through the story of IC, rather than tracking changes in a series of IC indicators. This allows for the explication of not only the reasons for managing IC but extends to what Llewellyn (1999) identifies as the strategic arguments used by organisations in response to their operating environment.

A second study (Dumay, 2008) investigated the narrative disclosure of IC, initially in the form of the IC statement as a supplement to the annual report. In this study it was shown how the use of narrative extended beyond the reporting of IC and became 'routinized' in the day to day activities of management, such as in the development of reports, budgets, business plans and communication with external stakeholders. This 'routinization' is seen to be an essential indicator of the impact of IC and narratives in that it became embedded within the organisation (see Giddens, 1984, pp. 60-4). Here, narrative was no longer used to only provide the justification of IC; rather by utilising narrative in day to day activities it became a mechanism that engendered further management action and subsequent organisational change. The realisation that narrative can become an enabler of IC and management activity, instead of just offering an explanation of IC, is an important transition in thinking about narrative because it further highlights the utility of narrative, not only from the perspective of IC practice, but also from the perspective of management practice in general. It also questions the usefulness of what has been identified as 'reified' accounting frameworks to measure, manage and report on IC, as these seem not to have the same power to change organisations as has been discovered with narrative. Thus, narrative extends beyond the '*raison d'être'* and becomes the '*modus operandi',* shifting from trying to justify and account for IC to enabling it.

The third study (Dumay, forthcoming) utilised narrative as a data source rather than the outcome of IC reporting. In this study, organisational narratives were collected and analysed for IC content. From this analysis the oft ambiguous and complex relationships between different elements of IC and value creation were revealed. It showed how narrative was utilised to understand how IC works and impacts organisations, thus addressing a longstanding desire by both practitioners and academics to understand the complex nature of IC and how IC interacts to create value (Cuganesan, 2005). If such answers were known, then the take-up of IC management practices may well advance beyond what has been seen by some as slow progress (Guthrie *et al.*, 2006). More interestingly, this study highlighted how narrative was utilised to determine the measures of IC as opposed to justifying the measures already created, thus offering a forward looking approach to IC measurement rather than reviewing past performance.

This last point is a motivation behind this case study and paper because, as exemplified in the first two studies, the initial focus for understanding IC has been based on disclosing the development of IC in the past leading to identifying how the organisation will progress towards developing its IC resources in the future. This is akin to an historical accounting perspective of IC, on which the initial IC frameworks were originally based (Dumay, forthcoming) and which have been critiqued as to their usefulness in promoting IC as an alternative view for the development of organisational value (Chaharbaghi and Cripps, 2006, p. 30). As Llewellyn (1999, p. 233) indicates, narrative moves beyond explanation to allow for the construction of strategies, helping to enable a strategic argument in a way that accounting numbers cannot. Thus, a gap exists in the literature, along with an opportunity for research, as to understanding how IC narratives can be further utilised to understand value creation and strategic intent in an organisation, prior to reporting on its IC activities and identifying 'accounting' based IC measures, as is the current norm.

3. The case study organisation

The Sydney Conservatorium of Music (the Conservatorium) is a Faculty of the University of Sydney (Australia). It has a long history of developing fine musicians and is considered a world class music education institution, arguably amongst the best in the world (see Collins, 2001, for a detailed history). Its goal is to continue to build on its success and to further concrete its reputation on the world stage as it approaches its centenary of foundation in 2015.

The Conservatorium has over 600 academic and support staff servicing over 4,500 students in tertiary, secondary and community based education programs. In addition, it conducted over 170 concerts and 290 student recitals attended by more than 23,000 people in 2007. To service these activities it has a budget of about $17M, the majority of which is related to expenditure on its staff. In its current operating environment, the Conservatorium is being challenged by a number of issues, including:

- securing the necessary financial resources to carry out the mission of the Conservatorium;
- acquiring the physical and human resources necessary to carry out the mission of the Conservatorium; and
- developing and communicating the strategic intent and activities of the Conservatorium to its diverse range of stakeholders.

To plan for these challenges the Dean initiated a project in July 2008 to develop a new strategic outlook towards the Conservatorium's centenary celebrations in 2015. This project involved the help of a representative from the Board of Advice to the Conservatorium, an external consultant, the academic staff and the professional support staff of the Conservatorium.

4. Methodology

This paper is presented as a case study. Case studies are a bounded system consisting of a phenomenon related to a specific time and place (Creswell, 1998). In this case the phenomenon being studied is the development of the Conservatorium's strategic plan and the time span of the case study is from July 2008 to December 2008. In addition, the researcher was also the consultant engaged by the Conservatorium to produce the strategic plan document enabling research that can be defined as 'interventionist' (Jönsson and Lukka, 2006).
Jönsson and Lukka (2006, p.3) outline that:

> *The distinguishing character of [interventionist] research is the need for the researcher to cross the border between the etic (outsider) and the emic (insider) perspectives – there and back again. This shift between differing logics provides opportunities for new insights since the researcher wants to achieve solutions that work in the field and come back with evidence of theoretical significance.*

Here the researcher is seen to "act on that situation in concert with the host organization, observes process and outcome, and analyses findings in view of the relevant literature" (Jönsson and Lukka, 2006, p.4). As such, this paper not only reflects upon the observations of the researcher/consultant, but also on the impact of the interventions that were conducted in producing the strategic plan for the Conservatorium.

The collection of data in non-interventionist research tends to focus on interviews, supported by the analysis of historical documents, with a low emphasis on the role of observation (Yin, 2003; Jönsson and Lukka, 2006, p. 7). In contrast, the interventionist researcher does not rely so heavily on interviews as much as observation, more particularly their involvement in the process under investigation (Jönsson and Lukka, 2006, p. 7). The main advantages of this are the ability to collect more "subtle and significant data", allowing researchers to put academic theory into action, enabling participation in the change process and increasing the level of recollection when writing up the results of research (Jönsson and Lukka, 2006, p. 8). Successful interventionist research is seen as making a contribution to change processes in an organisation; this is in contrast to case study research conducted by an observer in an 'academic ivory tower' that may have little or no impact on the organisation or the ability to be 'generalized' to other organisational settings (see Lukka and Kasanen, 1995). In this project, a total of 28 academic and support staff managers were interviewed or involved in the research process and the production of the strategy document (Dumay *et al.*, 2008)[1] supported by other internal sources of information as outlined in Table 1. The participants were chosen because they represented a cross section of people across the organisation that would be impacted and involved with changes in strategic direction. Here the initial focus was on the developing understanding of the circumstances of the Conservatorium, using interviews and historical documents. This was followed by an extended period of involvement with the Conservatorium's people in the development of the strategy document.

Table 1: Data Sources

Data Source	Primary Format	Date Produced
Interviews with senior academics and support staff.	Digital voice recordings and transcripts	July – August 2008
Strategic workshop with staff	Strategic map and handwritten feed back from participants	August 2008
Online survey[2]	Excel spreadsheet	July – August 2008
Prior strategic plan	Printed document plus supporting soft copy computer files	September 2006
2008 ─ 15 Budget working papers	Spreadsheet	July 2008 – Work in progress
Various internal and external documents related to the Conservatorium	Hard copy and computer files	Various dates from 2000 to December 2008
Conservatorium website	HTML Documents	As at August 2008

5. Results

In keeping with the interventionist research perspective, this section will discuss the process and outcomes of the research project and draw on some theoretical perspectives from the narrative, IC and organisational science literature to discuss and analyse the results. The focus of the analysis will centre on the original theoretical intention of the research, which is to address the gap of how IC narratives can be further utilised to understand value creation and strategic intent in an organisation prior to reporting on its IC practices.

5.1 Developing the IC plot

Czarniawska (1998) outlines that stories (and narratives) must have a structure in order for them to be effective conduits of communication, most importantly they must contain a 'plot'. Thus, the first step in developing the strategic narrative was to develop an 'IC plot'. From a strategic sense the 'IC plot' is, more often than not, grounded in the concept of value creation (see for example Skoog, 2003; Cuganesan, 2005). But the concept of value creation is often ill defined and from the perspective of different organisations can have different meanings and contexts. Value creation can be defined in economic terms in relation to generating income and reducing costs, or from the position of the worth or importance of the services provided (see Dumay, forthcoming). At the Conservatorium, the value created is not economic, but intangible – it is music. Thus, in order to understand the value creation

[1] A copy of the public version of the document can be downloaded from Hhttp://www.music.usyd.edu.au/docs/Conservatorium_LiteFINAL19Dec_2008.pdfH

[2] As the interviews were conducted during semester break some of the staff responded via an online survey and answered the same set of questions as were asked in the semi-structured interviews.

plot, a simple way of expressing the collective strategic imperative of the organisation as expressed by its people was required. This collective vision is expressed below in

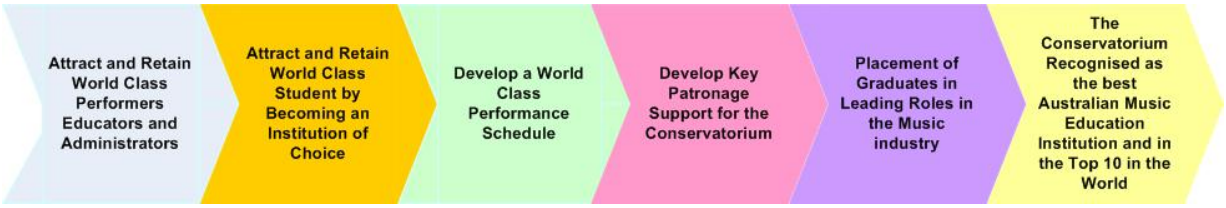

Figure 1 as the Conservatorium's 'Strategic Value Chain'.

The elements expressed in the 'Strategic Value Chain' were derived from analysing the responses to the interview and survey data, internal documentation and the researcher's observations for common themes. The purpose of the espoused 'Strategic Value Chain' is to provide a high level, simple, narrative articulation of the strategic factors that are seen to lead to the production of value by the Conservatorium. In this regards the first four factors; 'Attract and Retain World Class Educators and Administrators'; 'Attract and Retain World Class Students by Becoming an Institution of Choice'; 'Develop World Class Research and Performances'; and 'Develop Key Benefaction Support for the Conservatorium' represent the strategic inputs required to achieve organisational value outputs represented by the last two links; "Placement of Graduates in Leading Roles in Music Education and in the Music Industry' and 'Recognition as a Sydney Icon, Australia's Premier Music Education Institution and in the Top 10 in the World'. Thus, it is the elements of the 'Strategic Value Chain' that form the plot of the story to be told of how the Conservatorium plans to proceed strategically in the future. So, rather than using one of the many specific IC frameworks to outline IC strategy, the 'Strategic Value Chain' represents a flexible framework, which can be adapted to multiple settings. This is because its only requirement is the articulation of the linkages of an organisation's value creation process, regardless of the type of organisation or its setting. But the IC plot represented by the 'Strategic Value Chain' is only the skeleton of the strategy and additional flesh is required (see Laughlin, 1995, p. 81) to make the strategy whole and this is discussed next.

5.2 Developing strategic conversations

The development of the narrative surrounding the IC plot is important as the narrative needs to reflect the desires and ambitions of the organisation as articulated by its people and stakeholders. This is because when the organisation's people are left out of strategic development processes, extensive dissatisfaction amongst staff can result (Westley, 1990). It is the involvement in what Westley (1990, p. 337) identifies as 'strategic conversations' that is important here because the interviews identified that staff were not satisfied with, or had no previous involvement with, strategy development in its then current state. This is evidenced by the following comments from Conservatorium staff when asked about their perception of strategy:

> *This suggests close familiarity with the strategy. Most people don't have this, including me. When I've looked at some of these documents, I've thought that the education role was somewhat sidelined – unfortunately.*
>
> *If you had provided a strategy document to read and then asked these questions it would make sense.*
>
> *…but I can't answer... until I have read the strategic document.*

The Conservatorium's previous strategic document was created in a top-down fashion, with mainly upper level management and senior academics involved in its creation. This approach is seen as being problematic as the there is a desire, especially by middle management to become involved in strategic conversations (1990, p. 350) as they want to have access to the decision makers and they want to 'make sense' of the organisation. It was from this perspective that the strategic workshop with the academic and support staff became an invaluable part of the development of the strategic plan. The workshop permitted and developed a multidirectional (discourse and response) 'strategic conversation' among the attendees. This planted the seed for continued 'strategic conversations' over the ensuing time the strategy was being developed and served as a 'sense-making' mechanism for the attendees as it enabled greater understanding and confirmation of the strategic IC plot identified earlier. This is evidenced in feedback from the workshop participants.

> *.. many complex ideas both positive and negative – good to give voice to both sides although much still based on effectively funding strategies.*

> *It's interesting how much the comments engage with the Conservatorium's educational mission.*
>
> *Insightful experience in terms of how people view the past and present and … attitudes to outcomes.*

In addition, the workshop served to confirm the initial data collected from interviews, a mechanism for involving staff in the strategy creation process and link together individual opinions into a more cohesive 'voice' of the Conservatorium.

5.3 Developing the strategic IC narrative

The concept of sense making is important as it is considered a primary outcome of narrative (see Weick, 2001; Snowden, 2002). Thus, by developing 'strategic conversations', in conjunction with the involvement of staff in outlining the strategic intent, evidence was gathered to allow the organisation's strategic narrative to be written. By utilising the 'voice' of the Conservatorium the narrative developed for the strategic plan becomes a an artefact of the organisation's people (see Tull and Dumay, 2007). To exemplify this joint creation of voice three groups of excerpts from the research are presented, which contribute to and form the IC narrative. The first excerpt exemplifies the raw narrative obtained from the semi-structured interviews in relation to developing the 'Student profile' as part of the plot element of 'Attract and Retain World Class Students by Becoming an Institution of Choice':

> *I also see a considerable growth in postgraduate research and the research area, and that again we will have a more highly specialised and skilled faculty in a whole range of areas in music which involve research capacity, including performance and research orientation within performance, and I think that's already starting to happen.*
>
> *And when I went in 2004 to London and was told well we really don't want to send any students out there, the fact that students are now coming here and going back and forth that's one measure that shows that we've risen in international prestige*
>
> *Funding constraints and increased requirements for international accreditation are forcing institutions to reduce UG [under graduate] numbers. For example … our undergraduate courses barely have the resources to cover the basic skills, let alone the secondary skills which provide depth in future leadership.*
>
> *… students work in the profession for which they were trained, e.g., opera companies, teaching institutions… [and] students can be prepared for research or research/performance careers and be employable in these areas. Students seek out this institution at a national and international level. Staff and students are able to spend their energies achieving these outcomes.*

The second group of excerpts identifies the linkage of ideas as developed in the strategic workshop, which helped to link the above ideas into a more cohesive story. Figure 2 below shows how ideas such as research, government funding and increases in post graduate student numbers become linked.

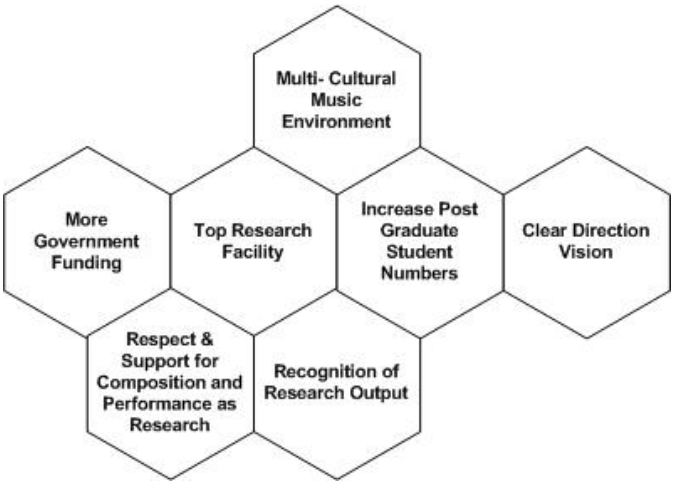

Figure 2: as the Linkages Between Strategic Concepts

The last excerpt is narrative from the text of the strategic plan and exemplifies how the ideas were brought together to explicate and flesh out the IC plot. Additionally, it identifies a specific initiative of developing postgraduate placements at the Conservatorium, thus transforming the plot into a desire for action.

> *Another core area for development is in our student profile. Over the past few years we have concentrated [on] shifting the balance between undergraduate and postgraduate students towards greater postgraduate numbers. There are four reasons for this.*
>
> *First, we are cognisant of the need for greater research output as the function of a University is for both the development of core skills and for the conduct of research. Thus, shifting the balance towards postgraduate places helps to increase our research outputs while at the same time maintaining core skill development.*
>
> *Second, the manner in which Government funding is allocated to undergraduate degrees means we will continue to be challenged to meet the cost of delivering these programs. By increasing the number of post-graduate positions the Conservatorium has the opportunity to diversify its revenue stream with income received from postgraduate student fees. These additional fees can then be utilised for improving resources for all students.*
>
> *Third, the increase in postgraduate placements allows us to respond more quickly to the changing demands of students and the music profession.*
>
> *Finally, it will afford the opportunity to increase the number of world class international postgraduate students at the Conservatorium. This is in keeping with ever increasing globalisation and with the desire of the University to increase international student numbers through postgraduate studies. This in turn assists in raising the international status of the Conservatorium.*

Within this narrative it is identified that the initiative of developing the student profile is an important area of concern because of the need to develop increased postgraduate student numbers to address research, funding and student needs. This, in turn, contributes to the desired value creation outcome of the strategy in that it helps raise the international profile and reputation of the Conservatorium. From a bigger picture perspective, the IC plot and the related initiatives are summarised in Figure 3 below. The figures illustrates how the planned activities of the Conservatorium can be articulated in a coherent and cohesive manner, devoid of argument (accounting numbers and concepts), so it can be understood by all people and not just experts (see Weick and Browning, 1986). So while it is important to have the narrative, the indicators of IC can also be of use and should not be dismissed, provided that the narrative supports their inclusion (Mouritsen *et al.*, 2002). In this case a number of IC indicators were advocated and their development is outlined next.

The development of IC indicators for the strategic document was achieved by mapping the desired strategic outcomes, as articulated in the narrative, with available or desired measures. In developing indicators it was realised that there was a high likelihood that some of the desired measures would potentially not be available, as there may have been no need to collect these metrics in the past. The measures that were gathered are in response to, and correspond with, the narrative in the document and the example provided above. These are detailed in Figure 4 below.

Figure 3 as the IC Plot and Initiatives

Measure	2005	2006	2007	2008	2009 (forecast)	Desirable Trend to 2015
Number of Undergraduate student enrolments	610	654	633	650	655	⇨
Percentage of Postgraduate students	15%	17%	19%	21%	23%	⇨
Income from student fees ($,000)	775	1036	1045	1354	1770	⇨
Percentage of international student load	6.2%	7.2%	7.1%	8.1%	8.9%	⇨

Figure 4 as the Indicative IC Measures

6. Conclusion

This paper makes two distinct contributions to the IC literature. First, from the interventionist research approach, it shows how the researcher/consultant became involved and reflective during the process of developing an IC strategy. As Jönsson and Lukka (2006, p. 3) explain, the emic and etic experiences are essential to interventionist research. In this case the researcher/consultant slipped in and out of these modes in the different stages of the development of the strategy document that is outlined in the first column of Table 2 below. This case demonstrates how more than one theoretical perspective is applied in a real setting, which is akin to how people and organisations operate in practice. This is because human beings are capable of the reflective monitoring of their actions and those of others and this influences our future actions and vice versa (see Giddens, 1984, p. 29). In doing so, human beings are able to draw upon all of their experiences during this process of reflexivity and action, as is evidenced in Table 2 by the particular issues that were identified during the research (second column) and the different theoretical ideas that were applied to resolve the issues at hand (third column). Thus, the utilisation of an interventionist approach opens new possibilities for developing insights into the application of IC in practice. Second, the paper has demonstrated how IC narrative can become the artefact of a strategic conversation between the staff and stakeholders of the Conservatorium, articulating or 'voicing' the collective desires of those involved in the process. The key point here is that there needs to be a clear articulation of an IC plot as a skeleton in conjunction with the antecedent flesh of narrative, otherwise the story has no life (purpose). In this light the 'Strategic Value Chain' concept as outlined in Figure 1 is seen as an important concept in developing a framework for the value creation narrative, which can be at times difficult to articulate (Mouritsen *et al.*, 2003, p. 18). The benefit of utilising IC narrative, as outlined in this paper, is that it demonstrates the potential of such an approach to involve numerous members and stakeholders of the organisation, who may have become disenfranchised if more traditional accounting and IC based frameworks were used because they may have little understanding of the concepts. It shows how the utilisation of narrative can replace these frameworks, thus removing the confusion about what IC framework to use to articulate the strategic intent of an organisation while at the same time being conscious of developing IC resources. Thus, the 'Strategic Value Chain', in conjunction with narrative, transcends the use of contemporary accounting and IC reporting frameworks.

Table 2: Emic and Etic Stages of the Research/Consultancy

Objective of the research/consultancy: Understanding how IC narratives can be further utilised to understand value creation and strategic intent in an organisation prior to reporting on its IC activities and identifying 'accounting' based IC measures		
Stage	Emic (Inside) – Consulting / research problem	Etic (Outside) – Theoretical Frame(s) utilised & proponent(s)
Developing the IC plot	Explicating the value creation of the Conservatorium	Narrative Theory (Czarniawska, 1998) IC Theory (Skoog, 2003; Cuganesan, 2005).
Developing strategic conversations	Addressing the need to reflect the desires and ambitions of the organisation as articulated by its people and stakeholders	Microsociological Theory (Westley, 1990)
Developing the strategic IC narrative	Articulating the 'voice' of the staff and stakeholders	Sense-making and Narrative Theory (Weick and Browning, 1986; Weick, 2001; Snowden, 2002)

The limitation of this study is that it provides another lone example of a particular organisation from which generalisations are not possible. But it is possible to extend this research to other organisations in a continual 'experiment' to test the propositions advocated in this paper and to develop new insights into the development of strategic intent. Further such research will examine the power and utility of narratives and may go some way towards developing increasingly democratic processes of organisational strategy development and subsequent change.

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The Meaning of Intangible Assets: New Insights into External Company Succession in SMEs

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Abstract: The Commission of the European Communities (2006) estimates in its report that one third of all EU entrepreneurs will leave within the next ten years. Combined with the situation that (1) the majority of Europeans prefer being an employee and (2) the changing demography will reduce the pool of potential successors over the next decades this paper argues that external (non-family) successors take on an important role and are in a position to choose the company, which best matches their expectations. A successful company succession is based on a multitude of different aspects. In the case of external succession the available funds represent a critical point. However, the assumption is that the decision for or against a company is based on other factors. It is hypothesised that the potential external successor will be interested in those companies offering potential expansions, which may, in turn, improve the likelihood of financial support. In view of the increasing relevance of intangible assets within the firm, it is suggested these assets primarily influence the external successor to go further in the succession process. Thus, it is expected that the future perspectives of the company are founded on its inherent intangibles and therefore justify a financial investment. The aim of this paper is to explore the role of intangible assets as seen from the viewpoints of external successors. The strategy of research behind this paper is the application of a mixed methods approach which is divided into a survey approach and a case study approach (given priority). Within the quantitative stage a web-survey is used to obtain data on the relevance of intangible assets in terms of external company succession in SMEs whilst addressing members of German trade corporations and chambers of commerce. The results of the quantitative study were enhanced through qualitative interviews with ten external successors in SMEs. The data which was gathered explores the role of intangible assets during their decision-making stage as to whether or not they should enter the company. Intangible assets are found to be important features for external successors. Specifically five intangibles can be highlighted: brand, partner(s), key-employees, knowledge retention, and corporate culture. The critical intangibles are summarised in a conceptual framework. The findings suggest that in the case of external succession, intangible assets have a remarkable influence on the external successor's decision-making and therefore traditional issues in the view of company succession such as tax, legal and, financial aspects should be extended to include intangible aspects.

Keywords: SMEs, intangible assets, company succession, strategic management

1. Introduction

Intangible assets linked to external company succession in SMEs have not yet been sufficiently addressed in the academic literature. An explanation could be that company succession is primary associated with legal, financial, tax and family related issues (Amelingmeyer and Amelingmeyer, 2005). However, the increasing relevance of intangibles to all companies (Roos, Pike and Fernström, 2005) and the ever-increasing number of firms awaiting transferral (Commission of the European Communities, 2006) underline the need for research. The aim of this paper is to shed some light on the role of intangible assets in the context of external company succession in SMEs. The objectives are to evaluate the importance of intangible assets to external successors and to identify the intangibles currently involved in the successor's company analysis process. External successors are defined as individuals/team of individuals from outside the family who are interested in business foundation through company succession. With regard to the succession process, the emphasis is on the preparation stage in which successors seek and analyse potential companies. In this stage the critical decision is made whether or not the company is entered, thus it provides information about the factors which make a company attractive. The research was conducted in Germany. The paper is structured as follows: firstly, a brief review of the relevant literature is presented; secondly, the methodology employed is presented. After that the discussion of the empirical results follows. The paper concludes with a framework which is derived from the results.

2. Literature review

2.1 Company succession in SMEs

Company succession can be defined as the simultaneous transition of property and/or management of a firm from one person to another (Ip and Jacobs, 2006). Szyperski and Nathusius (1999) specify

company succession as a derivative corporate foundation compared to the original corporate foundation, in which an entirely new company is created. Company succession can be treated as equivalent to business start-up with all the opportunities and difficulties related to it. Thus, corporate foundation through company succession can be described as an alternative to become an entrepreneur, although this is often ignored (Fueglistaller, Müller and Volery, 2008). Because of the increasing number of firms waiting to be transferred external successors are in a position to choose the company, which best matches their expectations. This 'investor market' is confirmed by taking a glance at the online business exchange "nexxt-change" provided by, amongst others, the German Federal Ministry of Economics and Technology, which shows a surplus of firms waiting to be transferred.

The majority of researchers agree that succession is the result of a process and not a single event (Handler, 1994). Thereby, the academic literature provides several models aiming at illustrating this process (e.g. Handler (1989) in Handler, 1994; Ip and Jacobs, 2006). This study applies the model developed by Ballarini and Keese (2006) which divides the succession process into five stages which are planning, preparation, realisation, retreat and retirement. The relevant phase for this study is the preparation stage. Accordingly, the focus is on the decisive aspects within the company analysis process taking the successor from the preparation stage to the next stage (realisation). Generally, two types of succession can be distinguished: family succession and non-family succession. Family succession describes the transfer of the company to family member(s) (Sharma et al., 2003); while in non-family situations, the company is transferred to external individual(s). These activities can be further divided into buyers from inside the company (buy-out) and buyers from outside the firm (buy-in).

Against the background presented above, company succession seems to be of considerable relevance and external succession an increasing and critical subject within this area. However, the literature review revealed that the articles dealing with the personal side of this topic are strongly focused on the other side of the business transfer process, namely the perspective of the incumbent owner (Birley, 1986; Schulte and Wille, 2006). The literature was further examined focusing on the successor. This analysis revealed mainly a consideration of the successor from the perspective of family succession (Scholes, Westhead and Burrows, 2008). With regard to the German-speaking countries Schulte and Wille (2006) suggest that an empirical discussion about the topic in general is rarely found.

The focus of this study was on external (buy-in and buy-out) initiatives of individuals and teams with a long-term focus in SMEs.

2.2 Intangible assets

The terms "globalization" and "information technology" as key driving forces have mainly triggered dramatic changes in the structure of companies. These changes combined with increased customer demands challenge companies to shift their perspective from tangible to intangible resources. In the meantime intangible assets (IA) are considered as more important than in the 1960s, 1970s, or 1980s (Lev, 2001). These resources have always played a certain role, but now their systematic handling is seen as being an essential competitiveness factor (Wiig, 1997). A central feature of IA is their future perspective. Edvinsson (2005) links intangibles to a new management perspective that is targeted to long-term rather short-term profit increase. This perspective is found in many German SMEs in which management behaviour is based on a more long-term and ethical view rather than on satisfying financial investors´ requirements (Edvinsson and Kivikas, 2007). According to Nonaka, Toyama and Konno (2001) IA represent the type of resource a potential investor is looking for. This is confirmed by Gupta and Roos (2001, p. 297) stating that IA "are the key motivation behind mergers and acquisitions".

The shortcomings of traditional accounting systems and consequently financial reporting with regard to intangibles have encouraged a mass of research leading to a multitude of approaches. Developments in terms of intellectual capital reporting are closely linked to individuals such as Sveiby (1997) and Edvinsson and Malone (1997) who wished to obtain a better understanding of value creation within the company. Apart from this, various national initiatives can be found focusing on intangible asset/intellectual capital reporting, e.g. Danish guidelines for Intellectual Capital Statements and German Wissensbilanz. Despite the development of a mass of different intangible asset/intellectual capital reporting approaches only few companies apply them so far (Zambon, 2006).

Another aspect to bear in mind is that the implementation of certain reporting frameworks such as the German Wissensbilanz presupposes that firms are accustomed to applying management instruments (Bornemann and Alwert, 2007). In the small firm setting it is doubtful that this condition can be fulfilled (Jennings & Beaver, 1997). In the meantime future driven aspects are incorporated in the rating models applied by the commercial banks, as well (Everling, 2003). The inclusion of intangible assets increases the transparency of companies leading to improved ratings (Edvinsson and Kivikas, 2007). Transferred to company succession this suggests that a stronger appreciation of intangible assets may enhance a company's creditworthiness. Nonaka, Toyama and Konno (2001) regard the creation and utilization of intangibles as the core activities of a company in order to secure its continuity. This is particularly valid with regard to the current financial crisis. Even though more and more organizations and scholars identify the prospects of taking IA into account a great problem still exists: the common language among practitioners and scholars is still missing (Marr and Chatzkel, 2004). One reason for this could be that differences arise from differing viewpoints of different interest groups or disciplines, respectively: strategy and measurement. The former is concerned with optimising the management of knowledge resources in the company in order to improve performance. The latter focuses on the setting of standards for organizational accounting in order to give stakeholders a more comprehensive picture of intangible assets in terms of traditional monetary data (Petty and Guthrie, 2000). Consequently, different definitions are in place. For the purpose of this study IA are, based on Andriessen (2004) and Lev (2001), defined as the core non-monetary resources, lacking physical substance that are able to contribute to future benefits in SMEs.

According to many authors, IA/intellectual capital (IC) can be classified into a number of distinct types of non-physical asset. These classification schemes aim to give a better understanding of what intangible assets consists of. Although with the issue of classification the same problem can be found as with the definition of intangibles discussed before, it appears that the classification of IC into human capital, structural capital and relational capital is increasingly used as a standard perspective (Edvinsson and Kivikas, 2007). From the start of this study (end of 2006) to the time of its completion the literature review related to the relevance of intangible aspects regarding company succession showed only little interest. Instead, specifically in Germany, a focus on legal, financial, tax and of family issues is existent (Amelingmeyer and Amelingmeyer, 2005). This was surprising because IA are regarded as key drivers of a company's value creation (Gupta and Roos, 2001), which is expected to be valid in terms of external company succession as well. This study aimed to diminish this gap by increasing our understanding of the role of intangible assets in external company succession in SMEs and thereby adding to the current knowledge in this field of research.

3. Methodology

3.1 Guiding framework

The classification scheme dividing intellectual capital into human capital, structural capital and relational capital was seen as suitable to link the research into the existing body of knowledge. Taking this scheme as starting point, previous empirical studies were reviewed which focused on the influence of intangibles on company success. Particular attention was paid to studies involving SMEs. The rationale behind this approach was the assumption that if these intangibles do have an influence on company success they should also be of interest to a potential successor. On this basis, it was possible to identify intangible elements that may be expected to be relevant in terms of company succession. Figure 1 depicts the intangible assets employed for the construction of the guiding framework..Human capital is divided into employees and owner. Interestingly, none of the studies analyzed took the critical relevance of 'owner' status into consideration. Because of the owner's central position in many SMEs (Ballarini and Keese, 2006) this person cannot be neglected in terms of company succession; accordingly, this aspect was included. Structural capital includes four aspects which are innovative capabilities, company culture, knowledge management, and organizational structure. Finally, relational capital comprises customers and networks.

3.2 Research design and sampling

The research design involves the application of a mixed methods approach. As Curran and Blackburn (2001) say the use of a mix of methods helps to gain some of the advantages of both and of triangulation as well as that the weaknesses of one approach are compensated by the strength of one or more others. The mixed-method approach of this study is divided into a survey approach and a case study approach (given priority). The quantitative research helped us to gain an overall

understanding of the relevance of intangible assets in an SME environment in general. Furthermore it gave us an indication as to whether the elements of the guiding framework are seen as being of practical importance by those directly concerned. Within this a web-survey, addressing members of German trade corporations and chambers of commerce, was used. Because of the small total population (135 associations), it was decided to address the total population rather than drawing a sample. A total of 51 questionnaires were received. The demographic characteristics of the participants are summarised in Table 1.

	Gallego & Rodríguez (2005)	Claessen (2005)	Alwert & Vorsatz (2005)	BMWA (2004)	Bontis (1998)
Human capital					
- employee	✓	✓	✓	✓	✓
- owner					
Structural capital					
- innovative capability	✓	✓	✓	✓	
- company culture		✓	✓	✓	✓
- knowledge management			✓	✓	✓
- organizational structure		✓		✓	✓
Relational Capital					
- customers	✓	✓	✓	✓	✓
- networks	✓	✓	✓	✓	✓

Figure 1: Guiding framework

Table 1: Demographics of participants

Items	Absolute figures	Relative figures
Organizational affiliation		
Chambers of commerce	20	39.22%
Trade corporations	21	41.18%
Missing values	10	19.60%
Employment status		
executive position	8	19.05%
employed	32	76.19%
inhouse consultant	1	2.38%
others	1	2.28%
Valuation of SMEs		
Yes	32	71.11%
No	13	28.89%
Company size advised		
Micro		
- often	41	100%
- sometimes	./.	0%
- seldom	./.	0%
Small		
- often	18	46.15%
- sometimes	19	48.72%
- seldom	2	5.13%
Medium		
- often	./.	0%
- sometimes	8	20.51%
- seldom	31	79.49%
Location of association		
Thuringia	1	2.56%
Sachsen-Anhalt	2	5.13%
Saxony	2	5.13%
North Rhine-Westfalia	7	17.95%
Lower Saxony	4	10.26%
Mecklenburg-Western Pomerania	2	5.13%
Hesse	2	5.13%
Bremen	2	5.13%
Brandenburg	1	2.56%
Berlin	1	2.56%
Bavaria	5	12.82%
Baden-Wuerttemberg	10	25.64%

The qualitative part of the study utilized the case study approach. Multiple case studies were selected for this study since this approach has been described as being similar to replication or repetition of experiments (Yin, 2003). The data were collected through interviews with ten external successors in German SMEs. This is located in the range between 4 and 10 cases which is seen as appropriate (Eisenhardt, 1989). The data gathered explores aspects of the decision-making processes conducted by external successors. In order to ensure a broad-based sample, respondents were chosen to represent different industries. General characteristics of the ten cases are summarised in Table 2. The data analysis was conducted by using a combination of inductive and deductive thematic analysis.

Table 2: General characteristics of cases

General information about the companies	Case 1	Case 2	Case 3	Case 4	Case 5	Case 6	Case 7	Case 8	Case 9	Case 10
Year of succession	August 2003	January 2007	December 2006	January 2003	August 1998	October 1995	March 2003	July 2006	July 2003	July 2003
Type of industry	Tempering technology	Hairdressing	Optician	Packaging	Mill	Interior extension	Galvano technology	Headgear for women	Construction	Printing
Number of employees	20	3	8	20	7	40	20	5	22	80
Location	Bavaria	Baden-Württemberg	Baden-Württemberg	Baden-Württemberg	Baden-Württemberg	Baden-Württemberg	Baden-Württemberg	Bavaria	Bavaria	Bavaria
Type of succession	Buy-in	Buy-out	Franchising	Buy-in	Buy-in	Buy-out	Buy-in	Buy-in	Buy-out	Buy-out
Management	Alone	Alone	Alone	Alone	Alone	Team	Alone	Alone	Team	Team

4. Discussion

In this section the discussions of the empirical findings are presented. It is started with the discussion of the quantitative findings then followed by that of the qualitative findings.

4.1 Discussion of quantitative findings

The findings suggest that a moderate relevance of IA in the setting surveyed can be found. This refers to the relevance of intangibles within the trade associations and to their member companies in terms of IA development. It is noteworthy that the members of the chambers of commerce assessed IA slightly higher, which could be explained by the broader industry-range they are dealing with. Although, IA are currently assessed on a moderate level, a great share of respondents expects a higher relevance of them or an equal weighting in relation to tangible assets in the future. This would imply that the shift in perspective, if at all, is still to come. Despite the current moderate assessment of IA within the associations and their members, the findings implied that with external successors intangibles take on a critical relevance in terms of decision-making. This result was confirmed by both associations. The overall findings indicated that the increasing interest in IA can only be partly confirmed in this SME setting.

The pre-validation of the guiding framework signified a critical outcome of the quantitative study. The findings suggest that the guiding framework comprises of IA which are suitable for further considerations. The findings referring to individual intangible aspects and their relevance during negotiations revealed that particularly factors relating to the elements “owner”, “innovation” and “customers” seem to be important. Additionally, the findings underlined a particular relevance of the brand name. This is reasonable as an already established brand can provide the successors with benefits such as familiarity in the market which is normally not given in the case of new ventures. Due to this, it was integrated into the guiding framework.

As the original eight elements of the guiding framework were assessed moderate to high, it was decided to keep all.

4.2 Discussion of qualitative findings

Intangible assets were found to be important features for external successors. The findings revealed that a multitude of intangible assets were considered and the consideration of them was given from the initial contact to the firm to the final decision. The findings referring to the critical aspect(s) that was/were responsible for having a closer look at the company in focus provided a variety of starting-points, e.g. the company was seen as model company or the firm's focus was associated with promising future prospects.

Reflecting upon individual elements the findings indicated significant differences in view of the role of the owner (incumbent) in company succession. While the academic literature highlights the great relevance of owners and their expertise and relationships (e.g. Bracci and Vagnoni, 2005), this study suggests that actual importance is primarily given in viewing them as negotiation partner. By including a range of sectors, most successors interviewed appeared to neglect the chance to benefit from the predecessor's skills, expertise and business contacts. Instead, they acted more like founders of new ventures. It has to be mentioned that the companies in focus were not distressed before succession has taken place. This finding calls for the consideration if a third neutral person should be included in negotiations with the focus on lowering the role of the incumbents as negotiation partner and instead increasing it as critical asset.

The qualitative findings further implied that company succession is a process that involves predecessor and successor only, thus neglecting other decisive stakeholders, especially employees. As most the successors highlighted the critical position of employees in general and key-employees in particular, which confirms previous research (Hofer and Charan, 1984); it was surprising that they were not closely been involved in this process. Particularly, from the successor's side as he/she has to work with them in future. Thus, this finding entails that the current procedure of company succession appears to be a matter of confidentiality with certain bounds between owner and his/her employees.

Additionally, the findings intimated that the importance of knowledge and knowledge management in the case of company succession was acknowledged by some successors only. This result is in line with Wiig (1997). Strong consideration was specifically found when the successors identified critical knowledge with employees making them key. This is of specific relevance in SMEs in which knowledge is mainly private and seldom owned by the organization (Wong and Aspinwall, 2004).
In view of measures used to keep this knowledge, shares in the companies as well as promotions were offered, thus the focus remained on keeping it personally rather than physically.

Furthermore, the study proved evidence that the existence of an established brand was regarded as critical in terms of external company succession. This asset appeared to be an essential difference compared to new venture creations. However, the high relevance of the brand contradicts the small size of studies available dealing with this topic in relation to SMEs (Krake, 2005). This should change as the findings suggest that this asset can be regarded as critical element within negotiations.

In terms of corporate culture the empirical findings suggest that it is not entirely understood. Although corporate culture seems to take on an essential relevance, the outcomes indicate that in view of intended changes the embedded culture and the occupational background of the organization members in particular as well as the involvement of staff in general is neglected. Instead, successors are convinced that the establishment of their ideal culture mainly rely on them and their setting of examples. Based on this extensive research is required specifically in the SME setting, thus confirming Choueke and Armstrong´s (2000) call. However, the quantitative findings showed that only few members of the associations view corporate culture as decisive thus work of enlightenment is also needed here.

A rather similar picture was obtained for the concept of knowledge management. The empirical results (quantitative and qualitative) indicated that the concept is not understood and/or rather unknown respectively. In terms of successors, this is sooner understandable. However, in view of trade associations providing advisory service such a result is alarming.

The organizational structure did not have the meaning as it was expected from the literature review (e.g. Zhao, 2005). However, if considered it seems to provide opportunities for improvements.

The study confirms the relevance of customers to SMEs (Wong and Aspinwall, 2004). However, the findings also showed that successors do not regard customers as a means to new information and thus ideally to new knowledge. Instead, the successors´ emphasis during company analysis was to test whether or not a too strong dependency on few customers was in place. This approach is honourable as many SMEs are vulnerable because of this (Stokes, 2006). However, the permanent exchange with customers should be a main target as this enhances not only the possibility to develop customer-driven products/services but to quickly react to changing needs of customers, too.

Moreover, the quantitative findings suggested that the associations, too, appeared to be reluctant in terms of regarding partnerships with customers as a decisive aspect in SMEs.

With regard to networks the findings suggested that it played an inferior role in company succession, which is a logical consequence of the previous discussion. However, the interview findings also implied that the new owners make increasingly use of it. Thus, a change in perspective seems to be started confirming previous research (CEN, 2004). A similar result was obtained for innovative capabilities that seemed to be neglected in the case of external succession.

In the course of the interviews four new intangibles emerged which were partner, style, strategy and quality. The aspect "partner" gave the impression that it was more critical than the company itself. All three successors who have taken over the company in a team underlined the critical relevance of this feature. However, incumbents can do relatively little to assist in the process of partner selection. Style and strategy represented crucial factors with single successors and quality were named by two successors highlighting the relation between the product quality and company success. These intangibles seemed not to be perceived and/or underestimated by the trade associations.

The findings related to the individual elements demonstrated a further aspect: The successors mainly considered each asset separately, thus overlooking and/or underestimating the interaction among them, which is specifically given with intangibles (Roos, 2005). This procedure may be supported by using checklists, which are frequently used in terms of company succession, in which each relevant factor is processed according to the list and thence the likelihood of oblivion of relational aspects are quite high. Based on the findings an accommodation of the current checklists should take place.

Moreover, the qualitative findings revealed a tendency of successors acting like new founders; thus neglecting the company's past and instead focusing on the setting of their own style to put their vision into effect. This behaviour is further supported by the individualistic appearance of most of the successors; confirming previous research stating that individualism is closely connected with the establishment of small businesses (Herbig, Golden and Dunphy, 1994). This leads to the consequence that ideas and intensions related to changes are not discussed with the organizational members but introduced assuming that the planned activity is for the good of everyone and thus appreciated.

5. Conclusions

From the results of the empirical studies a framework for the role of intangibles in external succession was derived (Figure 2). The framework highlights the critical elements within the preparation stage comprising the initial contact to the company in focus and the process of company analysis. The figure illustrates that potential successors face three different initial situations to start with their intension of taking over a company: company selection, desired company, and long-standing firm member. Company selection means that a successor chooses the best company out of a range of companies because it offers e.g. promising future prospects. Desired company symbolizes a sort of model company and a successor is only interested in taking over this company. Long-standing firm member comprises the non-family members of a firm who are ready to take over. Thus, the first two options represent buy-in initiatives whereas the last one symbolizes a buy-out initiative. The right part of the figure depicts a company's composition (tangible assets, intangible assets and financial capital); representing the scope of company analysis. As the focus was on intangibles, tangible assets and financial capital are displayed in light-grey; however, each company needs an appropriate mix of all elements in order to have success. As suggested by the findings, the factor "partner" - symbolizes a critical part with successors pursuing team succession - was also included and hence expands the scope of analysis. The key to understanding the intangibles relevance is as follows: assets including the aspect "partner" printed in bold (font) are of highest relevance, assets printed in italics are of high importance, and assets displayed in regular font are of moderate relevance. "Style" and "strategy" represented decisive aspects to only one successor each; consequently, they are illustrated as dotted (frame). "Quality" is illustrated in dotted as well. This is a consequence as this asset does take on a relevant position in terms of decision-making but on a minor level compared to the other intangibles displayed. Finally, the black arrows illustrate interconnections with another intangible asset. The figure also highlights that networks and innovative capabilities were not included because of their minor importance in this research.

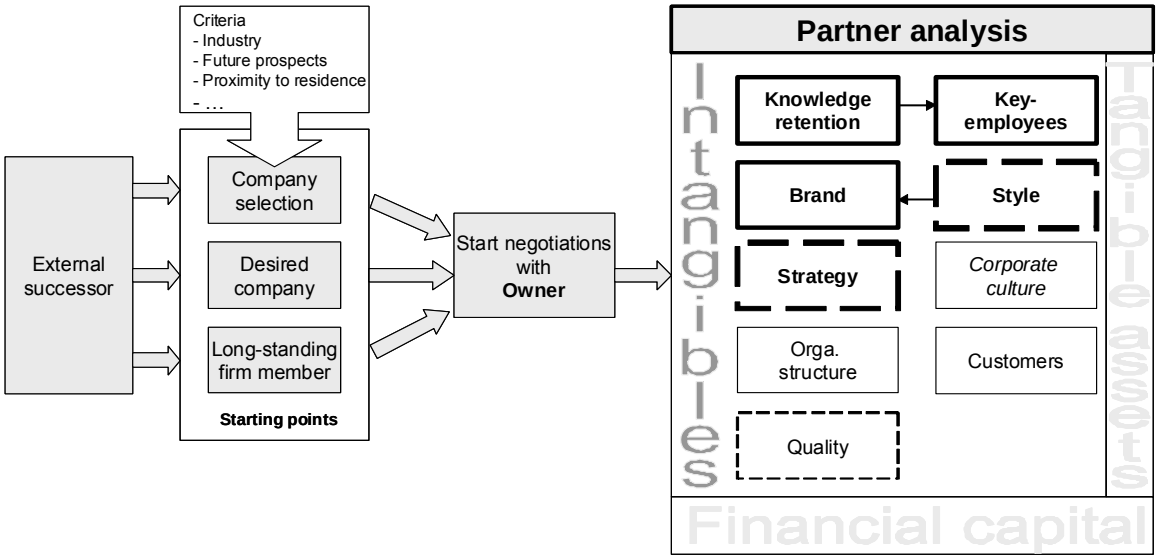

Figure 2: A framework for the role of intangibles in external succession in SMEs

This framework provides a new perspective on external company succession in SMEs as it highlights the intangible assets, which makes a company attractive to external successors in terms of company selection. Thus the framework provides insights into the process that occurs between company foundation decision and business transfer. In practical terms the framework guides the parties involved in their activities during the preparation stage. The framework may serve as visual aid for all these groups illustrating the process from the preparation stage to the realisation stage.

From this study it can be concluded that in the case of external succession, intangible assets have a remarkable influence on the external successor's decision-making and therefore traditional issues in the view of company succession such as tax, legal and, financial aspects should be extended to include intangible aspects. This is highly important in view of the increasing number of SMEs waiting to be transferred and thereby providing information on what makes a company attractive to external successors and thus allows the derivations of suitable measures to adequately deal with this topic. Furthermore, with this study an attempt was initiated to get corporate foundation through company succession out of its shadowy existence.

It is recognised that this research has a number of limitations. Firstly, the situation that this research prioritized the qualitative study only analytical generalizations (Yin, 2003) are possible. Thus, the qualitative study of the ten German successors does not allow inferences to be made as to whether the results would also apply to successors in other countries. This can also be transferred to the survey. The small number of participants provides only a very restricted view of the small firm setting and the decision to place the focus on German trade associations may have introduced a bias. An examination of these limitations might inform the design of future research.

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Social Capital and Economic Performance of SME's: A Case Study from Turkey

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Abstract: Perceived as a factor that influences the efficiency and effectiveness of key production factors in the process of economic development, social capital is defined in this study as the set of social relations that enable entrepreneurs to gain access to economic resources. The study presents findings from a sample survey carried among owners or managers of manufacturing small and medium sized enterprises (SME's) in Sivas, a province located in a rather less developed region of Turkey. In the World Value's Studies, Turkey is generally portrayed as one of the countries with a relatively low general trust. Given that there are almost no attempts to analyse its consequences at national and regional level, this study attempts to fill in this gap. Trying to find out what role social capital plays in SME's performance and which form of social capital (bonding or bridging) is much more relevant, particular focus is on how trust and business networks play a part in this performance enhancement process. In accordance with the above mentioned conceptual framework on social capital, we have used two sets of variables the first one aiming at measuring the tendencies of trusting behaviour among entrepreneurs, namely trust levels, norms and network, which we called the *"potential social capital*". On the other hand, the second set of variables which represents the economic effects of social capital and is called as *"actual social capital*" aims to measure what entrepreneurs actually do in terms of investing in networks or cooperate. These include positive benefits such as reduction in transaction costs, the extent of collective action and learning spin-offs. Trust levels are found to be generally low, institutional trust being the lowest, although most of the trust-supporting social mechanisms (such as norms and sanctions relating to cheating, business reputation etc…) do exist. In their economic transactions most of the entrepreneurs seem to be not depending on their close and strong ties. Most of the firms exhibit high transaction costs, low levels of cooperation with other firms in the industry, and rarely benefit from contributions of others including governmental supporting bodies and business associations. Our findings suggest that firms that enjoy higher levels of collective action and learning also perform better.

Keywords: Social capital, trust, networks, collective action, economic performance, Turkey

1. Introduction

The idea of social capital (SC) has enjoyed a remarkable rise in both theoretical and applied social science literature over the last two decades. The concept has been of primary interest to sociologists (Coleman 1988), political scientists (Putnam 2000), as well as to economists (Woolcock and Narayan 2000). The concept of SC addresses the economic importance of interaction and exchange between individuals within a social structure (Field 2003).

There is a growing awareness of the role SC may play in the economic development (World Bank 1998). Most development literature engaging with SC regards it as a resource which may be owned by individuals, firms, organizations and even countries (Fukuyama 1995). It is also argued that SC can explain regional economic differences (Lorenzen 2002).

Relevance of SC, without using the label itself, has also been reflected in management studies focusing on issues of trust and networking. These studies are mainly on inter-firm relationships, clusters, value chains, business associations and business systems (Nahapiet and Ghoshal 1998; Adler and Kwon 2002). SC is believed to be a major asset since it would lower transaction costs, and favour the exchange of knowledge (Boschma 2005). It is viewed as a viable and cost-effective substitute for laws and legal systems especially for small businesses (Fafchamps and Minten 1999).

There is a lack of empirical work dealing with the situation in Turkey. Work on local economic development, in particular concerning SMEs and SC is very limited. With a view to fill in this gap, this study presents findings from a sample survey carried among owners of manufacturing SMEs in Sivas, a province located in a rather less developed region, central Anatolia. The city whose population has

been migrating out significantly because of economic reasons is under the spotlight with the recent regional development efforts.

It is said that Sivas has the potential but it lacks a culture of "collective action". Searching for a basis for the city's development efforts, our aim is to deepen understanding on how to make use of SC in the SME context at the local level. The paper is structured as follows: the following section which draws an outline of the theoretical framework also includes a conceptualization of SC and our research questions. Section three involves a brief description of the methods applied. Section four provides statistical analysis of the sample profile and the results. Finally in section five we conclude.

2. Theoretical framework: Conceptualization of social capital

There does not exist yet a commonly accepted theoretical framework within economics for SC. Coleman (1988) conceptualizes SC as an individual resource arising from social relationships but also states it "inheres in the structure of relations between persons and among persons" (Coleman 1990: 302). Coleman's perception of SC focuses on how the individual can utilize the social structure in rational pursuits. Several theorists (Burt 1992; Foley and Edwards 1999; Lin 1999) have built upon Coleman's rational choice perspective.

Corresponding to Coleman's conceptualization, Putnam (1995) bases SC on the value of social networks, and uses networks, norms, and trust as aspects of SC. Putnam's research has been influential in the works of various other researchers (e.g. Paxton 1999; Schuller, Baron and Field 2000), who have built upon his conceptualization of SC as social connections having specific qualities, such as trust and norms of reciprocity.

In the literature a distinction is made between two types of SC, namely bonding and bridging SC. *Bonding SC* emerges 'within' groups, from strong ties usually based on a common identity. It tends to generate high levels of trust and cooperation, facilitating intra-group exchange, collective action and learning; but too much of it can have negative effects connected to exclusion for outsiders or getting 'locked-into' a limited economic realm for insiders. *Bridging SC* emerges from weak social ties across society in which individual and organizational behaviour is embedded (Granovetter 1985). Its strength comes from its weakness, since these "inter-group" relations are voluntary and the option of breaking up is always there. Trust is not 'ascribed' as in bonding SC, but it is 'earned'.

Weak ties can be more beneficial than strong ties. However without any bonding SC (i.e. 'groups' where people learn to socialize and experience trust), there cannot be any basis for bridging SC to emerge. Therefore both types of SC are necessary (Knorringa and van Staveren 2006).

Economic effects related to SC, dealt with in the literature (Baron, Field and Schuller 2000; Dasgupta and Serageldin 1999) have been broadly grouped into three types of economic impact: reducing transaction costs; enabling and reinforcing of collective action; and creating learning spin-offs (Knorringa and van Staveren 2006: 14).

- *i) Reducing transaction costs:* Contracts and monitoring can be costly for a small firm, but if trust is established, the firm can save time, effort and money. Trustworthy behaviour also helps to build a reputation, which is likely to generate even more trust, further reducing transaction costs. The underlying mechanism of social relations which leads to this impact is the moral value of *trust*, which takes away uncertainties.
- *ii) Enabling and reinforcing collective action:* Trust also reduces the risks of cooperation and opens up possibilities for action, which would have been unattractive otherwise (Cooke and Morgan 2000: 30-31). Firms can increase possibilities to access markets and resources by enhancing their bargaining power through cooperation and joint action. In this case, the underlying mechanism of social relations is *solidarity and/or organization*.
- *iii) Creating learning spin-offs:* By working together, workers learn from each other on the job and human capital is transmitted through learning from one company to another. Another form of learning spin-offs is through collective learning by jointly acquiring or quickly transmitting new technology (which is also helped by trust), for example, through business networks (Porter 2000). Here, the underlying mechanisms of social relations are *social cohesion and sociability*.

Following the research report prepared for UNIDO, we define SC for industrial entrepreneurs as the set of relations that enable them to have access to resources and markets. The economic effect of SC

is that it reduces transaction costs, enables collective action, and facilitates learning. With this conceptualization, a distinction is made between what SC is, and what it does (Knorringa and van Staveren 2006).

What we mean by "relations" is those ties of entrepreneurs with their buyers, suppliers, other producers, authorities and officials. All these relations would help them to have access to markets, maintain or improve their positions in the markets, and to take advantage of learning new designs and techniques, raw materials, new funds, testing and licensing facilities to apply in their business.

We define *bonding SC* as strong ties based on common identity (family, ethnicity, religious sect and region) and *bridging SC* as weak ties at the inter-group level. Although bonding SC seems to be important especially in the SME context, bridging SC is a key to extend market relationships. Business associations are assumed to have a potential role both in broadening bonding SC and in the formation of bridging SC.
Our research questions are;

- Whether *the tendency of trusting behaviour* of the owner-manager is a major source of SC opportunities for the firm or is it what he *actually does* to collaborate to improve firm's performance?
- Is bonding or bridging SC more relevant in the local context?
- Whether norms/sanctions help to prevent opportunistic behaviour and serve as a basis to rely on?
- Does efficiency of associations have an impact on performance?

3. Data and method

Data were collected by a research team using face-to-face interview and questionnaire techniques. The survey was carried out during the period from March to July 2008. The questionnaires were filled in by the owners/managers of a total of 94 companies in Sivas. Given its natural resources and socio-cultural background, Sivas is a city with important potential for development. However it ranks only 53 in 81 cities in overall Turkey. This is mostly due to the continuing process of migration to west which began in 1950s and widened regional disparities in the country. Up until 1990s there were only some large industrial state enterprises but private investments were almost none. Today industrial sector takes the most share (22,4%) in GDP but not in employment where agriculture still takes the lead. There are two "organized industrial districts" (OID) (actually one is active), and 10 "small industrial sites" (SIS). The region is covered by a scheme of subsidies at regional and national level and also by a prospective clustering programme.

The survey questionnaire was originally developed for the purposes of a wider PhD project on "SC and regional economic development: a comparative study on Sivas, Yozgat and Kayseri". Many of the questions were taken from earlier surveys and particularly from the questionnaires developed by international organizations like UNIDO, World Bank and by national organizations related to SMEs. The sample chosen for the questionnaire was every SME in the manufacturing sector located in OID and SIS, but some of the companies were closed and some of them have not accepted to be interviewed. Obtained data were evaluated statistically using SPSS V.13. For interpretation of linkages between certain variables, we used Kendall correlation coefficients, which do not imply a direction of causality but provide information about the extent of association between variables.

4. Statistical analysis of the sample profile

4.1 Social capital indicators

Our questionnaire was constructed around four sets of variables and coded answers in some questions were used to develop a number of composite variables. The composite indicators on trust, network efficiency, transaction costs, collective action and learning spin-offs are based on equal weighting of sets of questions with answer categories like "very much", "significantly", "reasonably", "not so much" and "not at all".

The variables used in the study and the relevant questions from the questionnaire are reproduced in the box below.

BOX 1: INDICATORS OF SOCIAL CAPITAL AND ECONOMIC PERFORMANCE
I) Owner type: - Business experience, education level (EDU), foreign language - Use of Information Technology (IT): internet connection, e-trade, web site. - Innovative capacity (INNOV): R&D department, patents. - Firm category: micro, small and medium sized - Markets: local, national, foreign.
II) Potential SC: Characteristics *Trust levels:* -generalized trust: World Values Study question (WVS) and trust for different groups (TRUST)* such as suppliers, buyers, other producers, strangers, public officials, local government - BR: Bridging SC - BO: Bonding SC *Norms:* - Institutional sanctions on cheating - Importance of business reputation (Rep) *Network efficiency:* Efficiency of business associations (NWeff)*
III) Actual SC: Economic effects Transaction costs (TRANSCOST)*: Relative amount of effort spent on - Finding alternative suppliers or buyers, - Monitoring compliance of transaction partners, - Achieving access to production factors (such as finance) Collective action (JOINT)*: - Cooperation with other producers on: exchange of information; sharing machines and tools; joint purchasing of inputs; joint marketing; joint product development, - Lobbying the State, Learning spin-offs (LEARN)*: Input from others in contact; feedback from buyers into the production process.
IV) Performance Performance indicators: new machinery to expand production in recent years (REINV: reinvestment), trends in output (OUTPUT), average quality of products (QUALITY), exports (EXPO); product upgrading: average speed of delivery, fashion content of products (UPGR)

*We produced composite indicators from these variables.

4.2 Descriptive analysis

Our sample which contained 94 SMEs was sufficiently representative of the small-scale manufacturing sector in Sivas. Table 1 gives a picture of our sample at the sectoral divide with firm types and market channels. Majority was small scale local companies employing less than 50 workers, and almost half of the sample labelled his place as a family-enterprise. Respondents were either the entrepreneurs themselves or the managers of the company. Having personal careers of more than 20 years, half of them were experienced in their specific fields. However education profile is much more moderate: less than one-third (28,7%) could enrol after the secondary education (to vocational schools and universities), 35% were able to attend secondary schools, while the rest could only get a primary school education. Looking at their markets, it is apparent that most of them (63%) produce for the local market and majority had almost no experience with foreign markets. 67 companies already had internet connections, out of which 48 had web sites. There are 28 companies who reported to have an R&D department, but 8 of these do not even have any registered marks or patents at all.

4.2.1 Potential social capital outcomes

In order to measure *generalized trust* we used the so called WVS question: “Generally speaking, would you say that most people can be trusted, or that you can’t be too careful in your dealings with people?” Only 33,3% of our sample believed that “most people can be trusted”. Trust towards more specific groups of people was also asked. As can be followed from Table 2, half of the respondents preferred to say “neither small nor great extent – normal” which is not a real straight preference. Evaluating the other half, we can conclude that,

- respondents trust those who are from their own ethnic background and religious sect slightly more than they trust those from another background;
- suppliers and buyers are the more trusted groups;

- trust towards local government and public officials is lower than any other category but strangers;
- majority do not trust strangers very much.

Table 1: Sample profile

Manufacturing Sector	Number of firms	Perc. Share of the sector	Firm size* (*Micro: 1-9 empl. Small: 10-49 Medium: 50-250)	Main markets* (*mkts with more than 50% share)	Innovative capacity: (No. of firms with R&D dept and patents)
Food and beverages	9	9,6 %	Micro: 44,4% Small: 33,3% Medium: 22,2%	Local (75%) National (25%)	R&D dept: 3 Patents: 1
Textiles and clothing	9	9,6 %	Micro: 11,1% Small: 55,6% Medium: 33,3%	Local (33,3%) National (44,4%) Exports (22,2%)	R&D dept: 3 Patents: 2
Furniture and wood products	25	26,6 %	Micro: 48% Small: 44% Medium: 8%	Local (68%) National (28%) Exports (4%)	R&D dept: 6 Patents: 1
Paper and paper products	2	2,1 %	Micro: 50% Small: 50%	Local (50%) Exports (50%)	R&D dept: 0 Patents: 0
Chemical and plastic products	14	14,9 %	Micro: 43% Small: 57%	Local (64%) National (36%)	R&D dept: 4 Patents: 7
Other non-metallic mineral products	11	11,7 %	Micro: 40% Small: 50% Medium: 10%	Local (55%) National (28%) Exports (18%)	R&D dept: 5 Patents: 1
basic metals and metal products	16	17 %	Micro: 33,3% Small: 53,3% Medium: 13,3%	Local (69%) National (31%)	R&D dept: 6 Patents: 2
Machinery and equipment, motor vehicles, other transport equipment	7	7,4 %	Micro: 57% Small: 43%	Local (71,4%) National (28,6%)	R&D dept: 1 Patents: 0
Jewelry	1	1,1 %	Small: 100%	National (100%)	R&D dept: 0 Patents: 1
Total	94	100	Micro: 40% Small: 49% Medium: 11%	Local (63%) National (31%) Exports (6%)	R&D dept: 28 Patents: 15

Table 2: Trust Levels

	Trust below Normal level (%)		**Normal level (%)**	**Trust above normal level (%)**	
Trust Level: How much do you trust	to a very small ext	to a small extent	neither small nor great ext	to a great extent	to a very great ext
other producers from your own ethnic background	11,7	7,4	53,2	**23,4**	**4,3**
from your own religious sect	7,4	9,6	51,1	**23,4**	**8,5**
from another ethnic background	**9,6**	**26,6**	48,9	14,9	0
from another religious sect	**10,6**	**25,5**	50,0	13,8	0
your suppliers	2,1	8,5	53,2	**23,4**	**12,8**
your buyers	2,2	2,2	52,7	**30,1**	**12,9**
public officials	**7,7**	**24,2**	47,3	15,4	5,5
Strangers	**34,4**	**30,1**	25,8	7,5	2,2
local government	**16,3**	**18,5**	43,5	16,3	5,4

Majority did not believe that a business relationship would be more trustful if it is with family members. We asked another question to better assess whether owners rely on their strong ties or not: People they normally do business with, were they from the same “group” with the respondent? The answers

supported our conclusion that *bonding SC* does not seem to be the basis for business relations in Sivas.

Eighty percent agreed that after doing satisfactory business for sometime with someone who at first was a stranger, it becomes easier to trust. We take this as they agree trust can be 'earned' and there is a basis for interaction "between groups", i.e. for *bridging SC*.

We asked two questions about *norms and sanctions* relating to cheating or business reputation, first a direct, then a control question. In accordance with the answers to direct questions, for 80% of the sample the most important thing in life was their "business reputation" and 64% trusted legal institutions. The control question was asking the respondent's reaction if his main buyer is not being fair or honest. The option of "taking to court" which is held as an indicator of trust in legal institutions, being checked only by 5 people and the option of "threatening to tell everybody about his bad behaviour", an indicator of importance of business reputation, being checked only by 3, prevents us to make a clear assessment about the existence of these social and institutional incentives.

Registering to business associations is obligatory in Turkey. Therefore SME's were either members of the local Chamber of Industry and Commerce or of the Chamber of Tradesmen and Artizans. Some of them were also members of voluntary associations. We take this network as an important asset for improving business, as far as it is efficient and effective.

Table 3 reflects to what extent producers feel their professional network is effective in various fields of associative activity. In general, they seem not to be satisfied with their organization.

Table 3: Efficiency and effectiveness of the network

Efficiency and effectiveness of the organization in	Very Effective (%)	Effective (%)	Neither effective, nor ineffective	Ineffective (%)	Very ineffective (%)
Providing a forum for meeting	7,4	16,0	33,0	21,3	22,3
Lobbying the government	3,2	14,9	28,7	20,2	33,0
Assisting producers in upgrading quality standards	2,1	8,5	33,0	19,1	37,2
Solving business conflicts	3,2	7,4	21,3	22,3	45,7

4.2.2 Social Capital in Action: Economic effects

At a first glance, owners of SME's have high *transaction costs*, the least problematic being the finance market where the type of relations is rather professional. Their past relationship with their banks probably makes things easier. However, the costs are higher in dealing with other issues like finding new suppliers or checking the trustworthiness.

The general level of *collective action* is apparently low. The highest level of cooperation is in 'exchanging information and experiences' with other producers, whereas 'sharing machines and equipment' coming after. These are easier types of exchange that can happen among a small number of producers. However other kinds of joint action which concern more people (lobbying, purchasing raw materials and marketing products, or establishing a facility etc.) are very rare.

We asked owners of SMEs to what extent they feel they have benefited from the inputs of others they are in contact. We understand they get too little in terms of *learning* by using their ties. They seem to have benefited from buyers and suppliers to a certain extent, but not from other firms or support organizations.

Almost half of the SMEs reported that they have bought new machinery to expand production. In answering the questions on whether in the last years trends in output, quality and product upgrading were in an increasing or decreasing trend, 19% reported output remained the same, around 60% reported an upward trend. Similarly product quality and upgrading was also increasing while for 25-30% of the sample they remained the same.

4.3 Results

We have looked for correlations between four sets of indicators as outlined previously in our text. Table 4 presents our main findings on levels of association between key variables.

Table 4: Kendall correlation coefficients

* Correlation is significant at the 0.05 level (2-tailed).
** Correlation is significant at the 0.01 level (2-tailed).

	Firm/Owner Type				Potential SC						Actual SC		
	Firm cat	EDU	R&D	IT	WVS	TRST	Bo	Br	Nrms (Rep)	NWeff	JOINT	LERN	Trnscost
Pot. SC													
WVS	,058	,140	-,050	,015									
TRUST	,119	-,047	-,152	-,009									
Bo	,015	-,018	,161	-,078									
Br	,187*	,076	-,006	-,017									
Norms	,147	-,054	,076	,043									
NW eff	-,206*	-,067	,062	-,035									
Econ.eff.													
JOINT	-,188*	-,179*	-,218*	-,267**	-,127	-,173*	,052	-,120	-,151	,284**			
LERN	-,096	-,189*	-,197*	-,222*	-,022	-,060	,058	-,055	-,071	,221**			
TRNSCST	-,106	-,249**	-,194*	-,176*	-,057	,015	-,138	,111	,173*	-,134			
Perform.													
REINV	,504**	,149	,296**	,377**	,088	-,034	-,097	,013	,224*	-,237**	-,241**	-,197*	-,070
Output	-,232*	-,151	-,102	-,074	-,104	,006	-,142	-,033	-,168	-,003	,042	,069	,021
Quality	-,131	-,055	-,061	-,008	-,100	-,044	-,007	,018	-,238*	,061	,112	,065	,011
UPGR	-,141	-,036	-,116	-,228*	-,157	-,105	-,048	,026	-,203*	,068	,183*	,031	,078
EXPO	-,476*	-,275	-,452	-,214	-,178	-,290	-,321	-,099	-,027	,207	,597**	,671**	,330

The *potential* SC indicators which actually are the characteristics of SC were aiming at measuring the social context and comprised six variables: a variable called WVS, a trust composite indicator, proxies for earned and ascribed trust, and network efficiency. We also used composite indicators of *actual SC* to measure collective action, transactional cost and learning.

The most important of our findings suggest that indicators measuring economic effects of SC were better associated with performance than potential SC indicators, meaning that SC has to be "in action" to provide a more useful explanation of productivity enhancement. In particular, both collective action and learning are found significantly correlated with export performance.

Looking at levels of association between the characteristics and economic effects of SC, network efficiency seems to be associated with both collective actions and learning, and business reputation with reducing transaction costs but all at low levels. Here, we can highlight the 'network efficiency' as a better indicator of potential SC, but with caution, since its level of association with economic benefits and performance is quite low.

We have generally not found statistically significant relations between variables that aim to measure individual characteristics of firm/owner and potential SC. Each and every indicator chosen to represent individual characteristics of entrepreneurs are significantly related with economic effects of SC but these are not very strong relations, while firm category seem to have a significant association with certain indicators of productivity enhancement.

5. Conclusion

This study is an attempt to fill in the gap of empirical work on SC in Turkey. We focused on SMEs in a less developed Anatolian city, Sivas, searching for a basis for its development efforts. On the other hand, with a view to deepen our understanding on how to make use of SC in the SME context, we wanted to see which indicators are better in explaining economic performance.

In this framework, we first looked for tendencies of trusting behaviour; and found out generally low levels of trust, institutional trust being the lowest. While norms and sanctions relating to cheating and business reputation 'seemingly' do exist, we believe there is a further need for social research on these issues given the contradictory results. SMEs are not dependent on their close and strong ties and seem to be 'open' for bridging SC. However firms reported discontent with their associations, implying an ineffective network, probably with little influence on the formation of bridging SC. These were the characteristics of SC which we called the *"potential SC*".

Secondly, we measured what entrepreneurs actually do, by trusting others, in terms of investing in networks. Therefore we called this set of variables as the "*actual SC".* These include economic effects like reduction in transaction costs, extent of collective action and learning. Most of the SMEs have low levels of collective action and rarely get any input in terms of learning to improve their business.

Finally we asked whether the *"potential SC*" or "*actual SC"* was better related with economic performance. Our findings suggested that economic performance is significantly related with variables grouped under "actual SC", but not with indicators of "potential SC": Firms that enjoy higher levels of collective action and learning also perform better. This leads us to conclude that social capital has to be "in action" to provide a more useful explanation of productivity enhancement.

As a policy conclusion, these results point to a need for action to activate the SC. It may not be very easy to change the characteristics of SC (trust, networks or norms) through policies, but by taking appropriate measures, it might be possible to enhance collective action, particularly in less developed regions. Trying to increase the efficiency of associations can be a starting point in this respect.

Sivas needs to develop a culture of working together, which is necessary for regional development efforts in an era of globalization. SMEs in particular, need greater attention in the years to come with a view to increase their competitive power.

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e-Knowledge, e-Learning towards e-Competence - The Development of a Model that Illustrates the Acquisition of Competences on Virtual Learning Environments

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Abstract: Tacit knowledge and competences are different names with similar meanings. Different names are due to researcher's backgrounds. The current study presents and clarifies the meaning of knowledge, competences, and learning. It draws an evolution of the concepts according to the different settings in which they emerge (managerial, academic and organisational settings). There is a growing research interest in acquiring competences on virtual learning environments (VLEs). VLEs have become popular. Virtual learning broadens access to knowledge and allows to learn anywhere at anytime at individuals' own space. It connects people, shortens distances among them, allows communication, and the sharing of knowledge. It is believed that interactive and collaborative online sessions can sustain a network-enabled learning environment by boosting discussion, exchange experiences, and sharing work. The acquisition of competences online is based on e-Knowledge and e-Learning. Therefore, e-Knowledge and e-Learning are tools to achieve e-competences. This research based on a literature review on learning systems (individual or organisational), develops a model that attempts to illustrate the acquisition of competences on VLEs. The acquisition of competences uses different learning tools, such as recorded classes, video conferences, simulators, software, CD/DVD, wikipedia, browsers, as well as different methodologies like self-study, team work and collaborative learning. As suggested by Mason (2005), learning and knowledge are strongly intertwined, and depend on the content, context and community. Knowledge helps us to learn. More individuals learn more knowledge they need as they became aware of their frontiers of ignorance. Knowledge and learning are a continuous growth loop that should be permanently adaptable to the world dynamics.

Keywords: e-knowledge, e-learning, competence, virtual competence, virtual learning environments, competences model

1. Introduction

Since early times, there has been a need to preserve and transmit memories and share knowledge, skills or competences. This is part of the evolution of human kind and consequently of human organisation.

Related to this evolution, there are some concepts such as tacit knowledge, knowledge, e-knowledge, I-knowledge, competence, virtual competence, eCompetence, individual learning, organisational learning, e-learning, e-learning 2.0, and virtual learning environments (VLE) that need to be clarified as they have been developed within the specific Information and Communications Technology (ICT) sector.

These taxonomies can have several meanings depending on the authors' interpretation. These meanings are closely intertwined and interrelated to each other; therefore it is difficult to define boundaries. In order to promote clear understanding, this research will present several definitions, illustrating their evolution and establishing the relationships among them. The aim is to understand the key elements that are embedded on the craft of VLE competence.

2. Tacit knowledge, knowledge, e-Knowledge and I-knowledge

2.1 Tacit and explicit knowledge

One of the most traditional concepts of knowledge is the distinction between tacit (non-recorded) and explicit (recorded) knowledge. The origin of these two dimensions of knowledge dates back to Michael Polanyi in 1958 and Ikujiro Nonaka and Hirotaka Takeuchi in 1991. Nonaka and Takeuchi

draw on Polanyi's work, and have called it the epistemological dimension of knowledge. For them tacit knowledge is highly nurtured by individual's personality, their feelings, their experiences, their skills, and context-specific. As it is embedded in action, is instantaneous – "here and know", it is difficult to systematise and therefore to share. According to Gourlay (2006) tacit knowledge is centred at an individual level. On another hand, explicit knowledge, is objective, rational, formal, and to be learnt and held. Tacit and explicit knowledge complement each other, as knowledge is a process (Nonaka 1991; Nonaka and Takeuchi 1995).

2.2 Implicit and explicit knowledge

Another way to typify the knowledge can be as implicit and explicit: explicit knowledge is comparable to a tree and it is organised into branches. Some of the branches have been pruned. On the other hand, implicit knowledge is a pile of leaves, the bigger the pile, the more extensive the knowledge. In this perspective, this kind of knowledge is the vision that everyone gets from snips and snaps (David Weinberger in Jay 2006).

2.3 e-knowledge and I-knowledge

e-knowledge (think Expert) and I-knowledge (think I because I make it myself) are other concepts of knowledge that needs clarification. I-knowledge can be acquired in several ways as in Google and Wikipedia which put huge amounts of knowledge within easy reach. Additionally, e-mail and the blogosphere allow the access to a broad range of people who can talk about whatever they want to. So, the Internet empowers all the users to form their own opinions and create their own knowledge (Jay 2006). Jay makes a distinction between e-knowledge and I-knowledge as a formal and informal learning, respectively. Formal learning is the only way to achieve e-knowledge and it can be reached through training departments or elementary schools. On the other hand, informal learning is the pathway to I-knowledge. For this researcher, the only viable way to test I-knowledge is through performance.

Others researchers also adopted the terminology e-Knowledge and consider that while knowledge is inextricably linked to data and information, there is not "one way" or sequence from data to information to knowledge (Mason 2005). e-knowledge is the knowledge gathering, construction and sharing on ICTs (Norris et al. 2003b). Mobile technologies (iPod, PDA (Personal Digital Assistant), mobile phones, and mp3) revolutionise the way individuals have access to information, share it and internalise and construct knowledge on a just-in-time basis (Norris, Mason, and Lefrere 2003a).

Nowadays, the "e" prefix, as shorthand to classify any activity or process that might be supported through electronic networks, has been widely used (Campbell 2004). e-learning is e-(lectronic) learning, just as e-mail is e-(lectronic) mail. The 'e' represents the means by which we receive or access learning - electronically, typically on the Web (online) via a Web browser (Clark and Mayer 2008, Clarey 2007). We share this point of view, and in the scope of this work, e-Knowledge will be considered as the available knowledge by electronic means, making a parallelism with the concept e-Learning. The use of "e" with learning (e-learning) has become a universal term used to describe education and training delivered or supported via networks such as the Internet, allowing the users learning anywhere and anytime.

3. Competence, virtual competence, digital competence and eCompetence

Another concept that we have proposed to clarify, is competence. The concept of competence was first use by David McClelland (1973). As he argued, intelligence should not be measure as a number, but should be credited by the capacity that individuals have to apply their knowledge in the workplace (McClelland in Clark 2004). Competence is broadly used in many fields and contexts. Culture, linguistic and national circumstances drive different interpretations and definitions (Schneckenberg and Wildt 2006). The understanding and the clarification of the meaning will bring accuracy across the concepts. This study clarifies the term competence, virtual competence and eCompetence.

3.1 Competence

As suggested by Ormerod (2007:1) "Competence refers to the skills, time and the ability to act of those involved in the intervention". Palan (2003:5), adds that "The terms 'competencies',

'competence', and 'competent' refer to a state or quality of being able and fit". He makes a distinction between the two concepts competence and competency. For him, 'competency' is a description of behaviour and 'competence' is a description of work tasks or job outputs. According to Schneckenberg and Wildt (2006) competence is more than the acquisition of knowledge; it is making use of creativity in a particular situation. Yoon (2008), based on the literature, developed a model that illustrates the five major components of competence obtained: Motives, Traits, Self-concepts, Knowledge, and Cognitive and Behavioural Skills. Motives are what leads individuals to carry on their goals. Trait is a consistent response to physical and emotional characteristics. Self-concept is an attitude, a sense of value and self-image. Knowledge is information that points out what the person should do. Cognitive and Behavioural Skills are the ability to perform mental or physical tasks that leads to skills.

This study adopts the term "competence" as the individuals' ability to apply knowledge into practice, influenced by their personality, and by all that can influence their attitude.

3.2 Virtual competence

Virtual competence is a critical capability of an individual to work effectively in virtual organisations. There is a relationship between higher virtual competences and performance, i.e. those that have higher virtual competences perform better than others on virtual work (Wang and Haggerty 2006).

3.3 Digital competence

Another term that appears in the literature is digital competence. Digital competence is according to the EC Recommendation on Key Competence, the facility that individuals have to access, understand, critically evaluate and apply ICT to learning, self-development and participation in society. Digital competence underlines individuals' knowledge, skills and attitudes towards the development of a knowledge society (Ala-Mutka, Punie, and Redecker 2008).

3.4 eCompetence

Finally, the topic of eCompetence. eCompetence has emerged in the eLearning context. As suggested by Schneckenberg and Wildt (2006), eCompetence is the creative applicability of individuals' competences to ICT. For these researchers there is a process leading up towards rich competence. They present a "stairway" path (Figure 1). As they explain: "The process begins with the acquisition of information. Information that is connected in a network of meaning leads, in the second step, to knowledge. If this knowledge is applied to a specific context, it can lead to ability. The ability needs to be combined, in the third step, with a specific attitude (which includes values and motivation) in order to result in an act of performance. If, in the fourth step, the action is consistent with given standards of adequacy or appropriateness, this adequate action leads to competence. In the final step, the competence, combined with a certain responsibility, will result in professionalization" Schneckenberg and Wildt (2006:30).

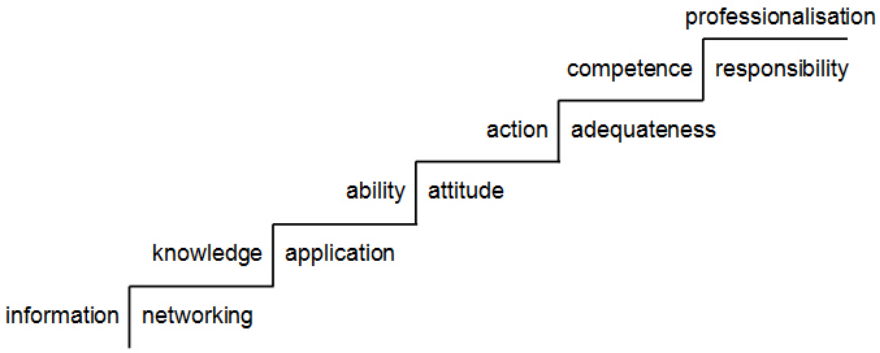

Figure 1: Steps towards professional development

Following this analysis, it can be said that knowledge is just a part of the competence acquisition process. Individuals may retain knowledge, but they may be unable to apply it. It is necessary to add emotional intelligence, skills, relationships, communication, and context to knowledge, in order to

respond to the dynamic and demanding world. Competence is the ability that individuals have to put in practice their knowledge, in a creative and added value way.

4. Learning, e-Learning and e-learning 2.0

4.1 Learning

Learning is a process. Learning activity supports each aspect of knowledge and knowing. (Allee 1997). Learning is an instinctive process, a consequence of the interaction of the individuals senses (watching, smelling, touching, tasting, hearing) and the external environment. It is fostered by the human beings natural curiosity. Each single day the interface between information, people and experiences leads us to learn something new. Whether at the workplace or alone, individuals are continuously learning (Rosenberg 2006). The learning process is entrenched, in individuals' every day organisational tasks.

4.2 e-Learning

Distance learning allows individuals to have access to knowledge, wherever they are, whenever they can: at their convenience and fitted in their own schedule. Within the academic context, e-learning allows a large number of students to have access to higher education. Constrains like, employment agendas, family, distance, and cost efficiency prove e-learnings value compared with traditional education (Hannay and Newvine 2006).

e-Learning is commonly associated with the use of ICTs for educational purposes; teaching and learning activities (Clark and Mayer 2008). For Rosenberg (2006:72) "e-learning is the use of Internet technologies to create and deliver a rich learning environment that includes a broad array of instruction and information resources and solutions, the goal of which is to enhance individual and organisational performance". e-learning is drawn up as an answer to organisation's and individual's goals. It offers information and skills towards knowledge applicability to individual or organisational settings. Websites, forum, audio, e-mail, video, videoconference, simulators, and blogs, are some tools to obtain and transfer knowledge on ICT. e-Learning is also called online learning, virtual learning, distributed learning, network and web-based learning (Naidu 2006).

4.3 e-learning 2.0

e-Learning has evolve and found creative ways to deliver information and knowledge. It uses PDA, mobile phone (m-Learning), blogs, chat, wikis, and podcasts, among others. With the increment of these new technologies, the concept 'e-learning 2.0' has come into view. e-learning 2.0, is based upon collaborative social networks. Web-based services and tools foster the development of social, interactive and conversational activities (Powell, Tindal, and Millwood 2008). e-learning 2.0 is the capacity that individuals have to learn using the concept of Web 2.0. Web 2.0 is the web supported on technologies like blogs, wikis, podcasts, and chats. Individuals are able to add and edit the information as space (Anderson 2007). Individuals continually create and share information according to their interest and get into conversation (Downes 2006). They collaboratively craft and animate an innovative "live" space in which they actively participate. Collaboration is the base of Web 2.0 (and e-learning 2.0) technologies (Clarey 2007).

5. Learning in VLEs

The VLEs can be defined in the users' perspective, as environments that simulate face-to-face learning environments using ICT (Araújo Jr. and Marquesi 2008). An electronic learning environment or virtual learning environment combines an integrated set of electronic teaching and learning tools (Littlejohn 2003).

To make clear the difference between e-learning and VLEs, e-learning is a learning context, while VLEs, is a learning setting that can encompass miscellaneous learning contexts like e-learning, b-learning, and m-learning.

Virtual learning environments include a designed information space, e-learning methodologies, social networks, and active participation of individuals. VLEs must have superior pedagogical scenarios that should enrich and facilitate the learning process (Dillenbourg, Schneider, and Synteta 2002).

VLEs have become widespread in education in recent years and are used not only in distance education but also as a complement to teaching on campus. They describe integrated learning systems that provide an environment for the students' management, delivery and assessment of studying via the web. It also enables improvements in communication efficiency, both between student and teacher as well as among students.

Rosenberg (2006), Powell, et al. (2008), developed models that describe the learning process in virtual settings. The Rosenberg model, called "a Smart Entreprise Framework" attempts to illustrate the e-learning elements of the learning and performance architecture. It includes online and classroom training (traditional Blended Learning) as well as several information repositories, communities and networks, and experts and expertises. These are the content towards knowledge management and performance. The model comprises the "Formal Learning Settings", which includes classroom training and online training and the "Informal Workplace Settings", which embraces knowledge management, performance support and monitoring and coaching.

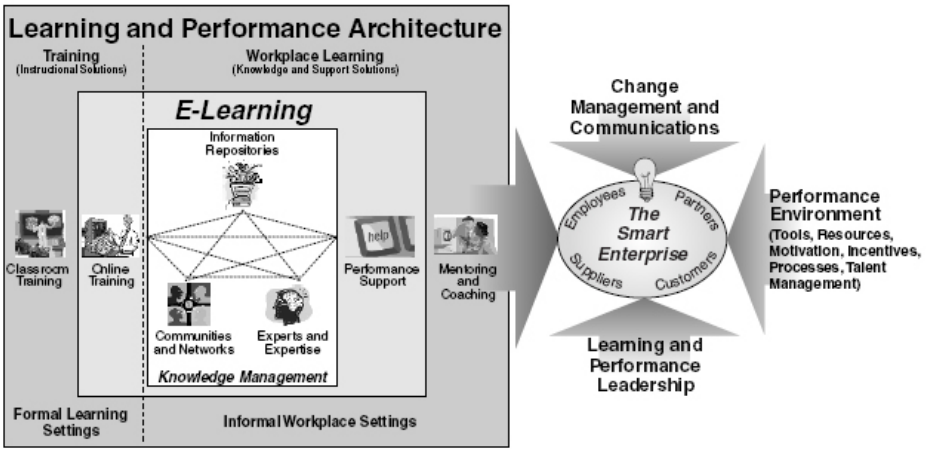

Figure 2: The Smart Enterprise Framework

Powell, Tindal and Millwood (2008) have developed a model (see Figure 3) of tailored learning that is collaborative, uses latest technologies and is accessed only online. Their work suggests that online communities are an important element when learning is centred on constructive inquiry and individual workplaces. They designed a course to have impact on the individual and organisational work practices. The model has five pillars: 1- Personalised learning, 2- Inquiry-based learning, 3- Online community, 4- Assessment for learning, and 5- Exhibition for dissertation. 1- Personalised learning is a process of negotiation with teaching staff; 2- Inquiry-based learning is learning for performance based upon action research methodology; 3- Online community is the community composed by students and facilitators that work and learn together online towards the construction of collaborative knowledge. 4- Assessment for learning, the assessment is made through the presentation of e-portfolios, e.g. media and technology such as video, audio, websites and weblogs. and 5- Exhibition for dissertation, consists of the presentation of their final outcome at their workplace. All these axes are linked and supported by internet infrastructures. The internet infrastructure is used by researcher students to develop Web 2.0 skills. The aim is to provide students with the necessary experience and autonomy for the market place.

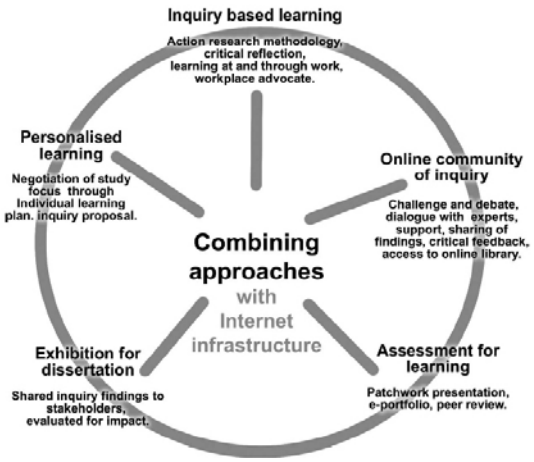

Figure 3: Model supporting work-integrated learning

Based on in-depth literature reviewed and on a critical analysis of all the components that contribute for the acquisition of eCompetences, a model was built up in this study (see Figure 4). The model combines miscellaneous elements that are entwined and are complementary to each other, portraying a richness of the meaning of eCompetence.

6. The model for competences acquisition on VLEs

Technology is important in solving current problems, it should be thought of as an enabler and not as a strategy. The implementation of learning on VLEs, depends on mixed factors like management policies, leadership, organisational culture, learning methodologies and ICT. The success of the learning process on VLEs is sustained on the output produced and the competences acquired. The acquisition of competences is intertwined with the capacity of apply the competences into practise whether in the managerial, academia or organisational settings.

The model presented attempts to illustrate the above intertwined relationships. The model encompasses five main streams for the acquisition of competences:

- The environment, whether managerial, academic or organisational, features the setting where individuals act. The environment is influenced by: knowledge management, management policies, leadership and organisational culture.
- People. People are the tutors, learners, and experts; are the actors and drivers of the learning process. They form a learner community of continuous communication.
- The VLE. The VLE is a learning platform where key elements are linked up and power each other. These elements are: knowledge, creativity, context, content, tools, skills, motivation and methodology.
- Technologies. Technologies sustain all the VLE. They allow the dynamic processes: interactivity, cooperation, flexibility, and community growth.
- Outcomes. Outcomes are the ultimate goals of the learning process. As suggested by Campbell (2004) and Boyatzis (1982), outcomes are competences in practice. The best learning evaluation is its application in practice (Campbell 2004).

As mentioned above (item 3.), VLE is sustained on key elements (see Table 1):

- Knowledge, defined as the inner knowledge (background) of individuals as well as the new knowledge obtained through the learning process. Different backgrounds and abilities are tools for knowledge development and craft different courses (Rodrigues and Assunção 2006).
- Creativity is the means by which imagination, inspiration and vision enforce the learning process (Thorne 2003).
- Context, is the various ways of structuring the learning process. Learning processes can use face-to-face, e-Learning, b-Learning, m-Learning or other learning systems.
- Content, is the materials available for the development of the activities. Within this category we can name web pages, “.pdf”, “.doc”, “.ppt” files. The activities can be reading discussing,

watching, hearing, or oral presentations. Content diversity, quality and assessment are important factors for the achievement of individual eCompetences.

- Skills (emotional intelligence). As suggested by Rodrigues and Assunção (2006) skills are an important attribute for market employability, i.e. competences in practice. Self-efficacy is also an important skill to acquire competences (Shih 2006). Golec and Kahya (2007) argued that the employees' competences for evaluation and selection (i.e. competences in practice) rely on communication skills, personal traits, self-motivation, interpersonal skills, ability to persuade, self-sell ideas, ability for decision-making, technical knowledge, career development aspiration and management skills. By analysing the literature, this study understands skill as: sensitiveness; vision; leadership, tenacity, persuasiveness, rapport building, behavioural flexibility, negotiation, adaptability, independence, self-efficacy and virtual competence (ICT skills).
- Motivation is the individual capability to be totally involved in the process of learning. Motivation is limited by stress tolerance, personal interests and learning satisfaction. Motivation influences the individuals' initiative, and the ability to learn. According to Sun et al. (2008) the critical factors that affect learners' perceived satisfaction are the learner computer anxiety, instructor, course flexibility, quality, perceived usefulness, perceived ease of use, and diversity in assessments. So and Brush (2008) shared the same point of view. Satisfaction is synonymous with an effective learning outcome perceived in terms of the value, quality of learning and motivation of the learner.
- Methodology. Learning by learning, learning by doing, life-long learning, self-long learning, self-learning, collaborative learning, self-study, active learning, learning communities or team-work, are all methodologies used to support the learning process. Most of these methodologies are learnt through the resolution of real, meaningful problems, i.e. the constructivist approach (Campbell 2004).
- Tools. Tools encompass forum, e-mail, chat, wiki, blog, video, audio, video conference, tape record, simulators, office tools, web sites, among others. Learning tools and the combination of different approaches and methods (as described above) are likely to heighten student's skills (Rodrigues and Assunção 2006).

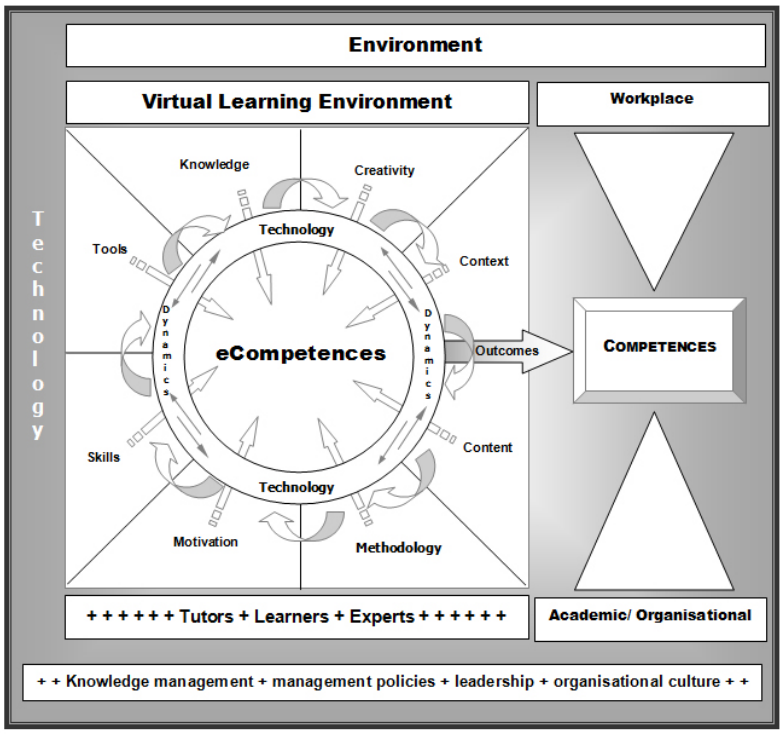

Figure 4: Model the acquisition of competences on VLEs

Table 1: VLEs components

Knowledge background new knowledge	Creativity imagination inspiration vision
Tools forum e-mail chat wiki blog video audio video conference tape record (recorded classes) simulators office tools web sites	Motivation learning motivation learning satisfaction initiative ability to learn range of interests tolerance to stress
Skills (emotional intelligence) sensitivity optimism limits awareness leadership tenacity persuasiveness rapport building behavioural flexibility emotional controlled negotiation adaptability independence dynamism self-efficacy virtual competence ICT skills	Methodology constructivism learning by learning learning by doing life long learning self long learning self-learning collaborative learning self-study active learning construction of learning communities team Works
Context face-to-face e-Learning b-Learning m-Learning	Content activities reading online Case-study activities online conferences discussion groups mentoring peer-review audio and video conferencing presentation sequences webcast diversity quality assessment
Technology hardware computer microfone for audio-conferencing video camera for video conferencing software e-mail web browser media players internet connection	- usability - flexibility - easy - quickness or speed - interactivity - effective - efficient - design - trusted
Dynamic Processes interactivity cooperation community flexibility	Outcomes competences performance

7. Conclusion

This research based on an in-depth literature review attempts to clarify the terminology used on the VLEs. By analysing the various contributions for the meaning of competence, this research proposed a model that holds the pillars of competences acquirement: the environment, people, VLE, technologies and outputs. In turn VLE is sustained on eight key elements: knowledge, creativity context, content, skill, motivation, methodology and tools. The model captures the relatedness and the interdependency of the elements that influence the learning process on VLE and its output: competence in practice.

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Internal Benefits of Human Capital Reporting - A Theoretical Appraisal

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Abstract: In our knowledge-based economy the most important assets of successful companies are intangible in nature, for example an organisations' human capital. But only a few companies provide their stakeholders with detailed information about this resource. The reason is that they are not able to detect the value of the reporting in an adequate way. Nevertheless, Human Capital Reporting can be seen as a powerful instrument to affect an organisations' financial performance and to finally increase shareholder value. But how does the Reporting of Human Capital in detail affect a company`s internal and external value drivers? What are the specific internal benefits and usages of such a reporting? Against this background a theoretical model will be developed. It will illustrate the transformation of the intangible factors of Human Capital Reporting to its' tangible outcomes. For this purpose the model considers the various cause-and-effect relations between Human Capital Reporting and company's financial performance. Similar to a Strategy Map, three dimensions with a specific number of different intangible factors will be developed. Finally, the model will show the value added of Human Capital Reporting. Along the way, this paper can be seen as a step towards an improved discussion about reporting and disclosure of intellectual capital in general and human capital in particular. Specifically the considered implications of an extended Human Capital Reporting on financial performance should lead to an increased debate about this topic.

Keywords: Human capital reporting, management accounting, intangibles, disclosure

1. Introduction – State of the art of Human Capital Reporting

An organisations' Human Capital can be seen as the most important driving force behind the creation of innovations (see Bontis 1998, p 65, Zingales 2000, p 1642 and Lev 2001, p 14). Thus it is one key factor behind a sustainable competitive advantage (see Prahalad, Hamel 1990). Moreover, in many cases Human Capital is mentioned as the most important resource of an organisation (see for example Sveiby 2001, p 345 or Guenther and Beyer 2003, p 10). Hence it is in the spotlight of the strategic management approach against the background of the 'Resource-Based-View' (see Barney 1991).

Human Capital includes the knowledge and the qualification (or rather competence) of an organisations' employees as well as their motivation to make use of those qualities. Following this definition, Human Capital Reporting can be defined as the reporting system of an organisation that provides information about the knowledge, the qualification and the motivation of its employees. A comprehensive Reporting enables its' addressees to gain a better insight into the potentials and properties of Human Capital. Hence it becomes easier to assess the organisations' market position and to evaluate the potential for value creation accurately (see Kaplan, Norton 2004a, p 52, Lev 2001, p 108). In literature and practice, a lot of different conceptions for the measurement of intangibles in general and Human Capital in special are contemplated (see for example Sveiby 1997, Edvinsson and Malone 1997, Stewart 1999b, Bontis, Dragonetti, Jacobsen and Roos 1999, Fitz-enz 2000, Lev 2001, Neely, Adams and Kennerley 2002, Sveiby 2007). In particular the indicator-based as well as the value-added approaches are often mentioned. Frequently named examples are the Balanced Scorecard (see Kaplan and Norton 1992 and 1996) or the Economic Value Added (see Stern, Stewart and Chew 1996, Stewart 1999a). But until today, neither a consistent comprehension about the reporting on intangibles nor Human Capital is available (see Wyatt, Webster and Hunter 2004, p 10).

Although companies provide the public with detailed information about their investments into tangible and financial assets, most of them neglect to provide meaningful information about the value of their employees (see for example Stewart 1999b, p 59, Lev 2001, p 38 and Lev 2004, p 110). E.g. the external reporting almost entirely focuses on financial data. Intangible values like Human Capital are inadequate considered (see Lev 2001, p 74). Nevertheless, future financial success of the organisation is mainly based on those intangible values (see Lev 2004, p 109 and Lev 2001, p 5). One reason for this disregard lies in the fact that the potential profit is not apparent and cannot indisputable attributed to Human Capital (see Stewart 1999b, p 59 and Marr 2006, p 50). In consequence this can lead to a discrepancy between the evaluation and the real economic situation of many companies. Especially the great difference between market value and book value of many

companies can be seen as the clearest manifestation of this problem (see Stewart 1999b, Sveiby 1997). Human Capital Reporting can be regarded as one step to reduce this gap (see Lev 2001, p 32) and to explain the high market-to-book ratios. But only a few companies provide the public with detailed information about their employees. Highlighting the internal usages and benefits can help implementing a comprehensive Human Capital Reporting. During the following sections these advantages will be compiled. This can help to advance the discussion about the Reporting of Human Capital. Finally there should be clarity about its value added from the reporting organisations' point of view.

2. Benefits and usages of Human Capital Reporting

To highlight the benefits of Human Capital Reporting there must be clarity about the underlying cause-and-effect relations. The reason is, that the visualisation of these relations can help to understand the transformation of those intangible factors into tangible results (see Kaplan and Norton 2004a and 2004b). Afterwards it is possible to derive the benefits and the usages of Human Capital Reporting in an adequate way. Against this background a theoretical model was developed. It constitutes a section of an organisations value-adding process with the focus on Human Capital. Similar to a 'strategy map' (see again Kaplan and Norton 2004a and 2004b) the model shows a cause-and-effect system that connects the Human Capital of the company with its financial performance while passing three levels of factors (also indirect relations between the different levels of factors as well as possible back couplings and direct cost effects in the sense of direct cost reduction have to be considered):

- Employee related factors: the employee related factors include the qualification of employees as well as their motivation and commitment, the organisational culture and the company attractiveness on the job market. Hence it is possible to equate the employee related factors with the company's Human capital. Furthermore it is obvious that all of those factors are interconnected, because they are continuously influencing each other (see Guenther, Neumann 2005). The employee related factors directly influence the company internal factors.
- Company internal factors: The internal factors include the organisational performance, the innovative ability and the ability to communicate. They describe the internal processes of the organisation and can be seen as the core competencies of the company. Those competencies are hard to imitate by competitors. They mostly result from the abilities of the employees and constitute one of the most important drivers in competition (see Prahalad, Hamel 1990). That's why these competencies are often mentioned as the 'personality of the organisation' (see Drucker 1995, p 60). The internal factors directly influence the company external factors.
- Company external factors: The external factors represent parameters outside the organisation which are relevant to success. Concerning particular stakeholders they are reflected in an organisations' attractiveness as well as in the level of need satisfaction within the service provision. The external factors have a direct influence on the market value of the company. They can be seen as the link between the company and its environment and enable a sustained creation of value. Thus, the company external factors are directly reflected in the financial outcome.

The Financial Outcome can be regarded as the organisations' output quantity. In this context it is represented by financial performance or shareholder value respectively. In particular within the value-based view, financial performance (or shareholder value) can be regarded as the main goal of the company (see Rappaport 1998, p 32). It can be influenced by increased revenues or decreased costs. All of the above mentioned factors have direct or indirect influence on the financial performance.

Human Capital Reporting can be used to influence the factors of all of these levels in a positive way. This is possible through an increased transparency and an improved controllability of the organisation considering its objectives. The benefits of the reporting can directly be derived from these factors by improving them. Between the different levels of factors the special usages of Human Capital Reporting can also be identified. Due to the cause-and-effect relations, Human Capital Reporting finally is able to positively influence a company's financial performance. During the following sections the cause-and-effect relations between the three levels of factors will be regarded as well as the specific benefits and usages of the Reporting.

Furthermore it is important to mention, that Human Capital Reporting has a fundamental function of self-analysis for the organisation, forcing it to recognize its implicit assets as well as the different links between the various types of intangibles (see Lev, Zambon 2003, p 599).

2.1 Employee related factors

The employee related factors can be divided into employee qualification, employee motivation, employee commitment (and the resulting employee loyalty), the organisational culture and the attractiveness of the company on the job market. All of those factors are directly influenced by the two effects of Human Capital Reporting, transparency and controllability. The improvement of these factors can be regarded as the direct benefits of Human Capital Reporting:*Increase in employee qualification*: Employee qualification can be defined as the capability of the employees of the organisation. It includes the competence of the employees and it results from their education and their experience. By training its' staff the organisation can influence and improve the qualification of their employees. By using Human Capital Reporting a company furthermore can improve employee qualification due to an increased transparency, an improved controllability (see Edvinsson, Malone 1997, p 166), an increased employee motivation and an improved employee commitment. Against this background the influences shown in Figure 1 come into effect. The usages which can be derived from an improved employee qualification can be seen in an increase of job performance (see Schanz 2000, p 143 and Guenther, Neumann 2005, p 18) as well as in an increase of the company's knowledge base (due to training activities the accumulated knowledge of the employees increases). This is positively reflected in the internal factors.

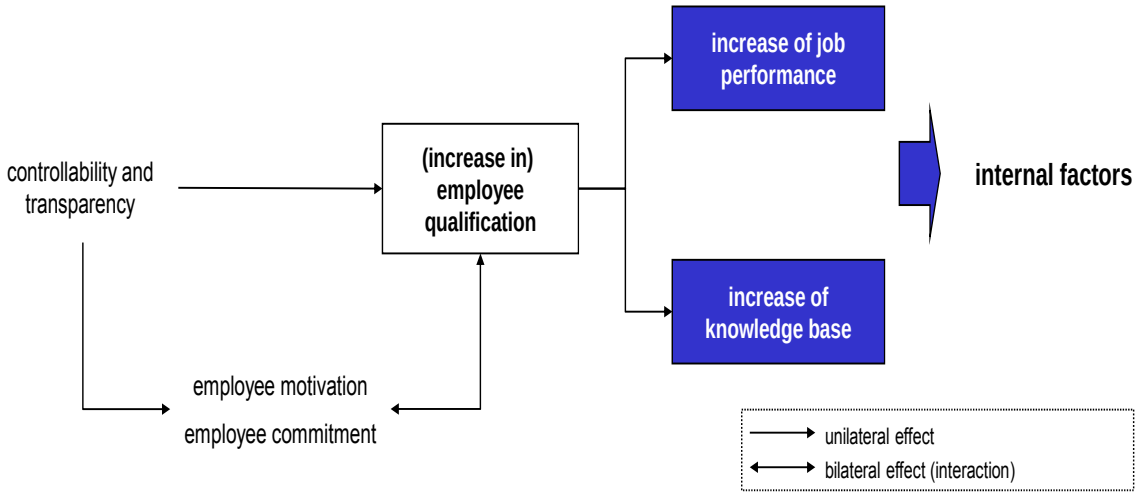

Figure 1: Effects, benefits and usages of an increased employee qualification

Increase in employee motivation: Employee motivation examines the willingness of the employees to perform with regard to the company's objectives. Together with employee qualification it has a high significance to the company (capability and willingness to perform). Through an increase in transparency, employee qualification, employee commitment, an improved organisational culture and an improved attractiveness on job market, Human Capital Reporting can lead to an increase in employee motivation (decisions and structures within the organisation are getting more transparent which influences employee motivation in a positive way). The usages of an increased employee motivation are an increase in job performance (see Schanz 2000, p 145), a decrease of absenteeism as well as an increased sharing of knowledge as a result of a higher communication among employees (see Bontis, Fitz-enz 2002, p 243).

Increase in employee commitment: Employee commitment can be described as the emotional allegiance or the identification of the employees with their organisation. It is based on the acceptance of organisational goals and values. The commitment of the employees normally leads to a high loyalty to their employer. Thus it is possible to regard employee commitment and their loyalty as one entity (see Mowday, Porter, Steers 1982, p 27). Employee commitment (and loyalty) is directly influenced by transparency and controllability as well as by the organisational culture, the company attractiveness on job market and employee motivation. The usages which can be derived from an increase in employee commitment are a decrease of employee turnover costs (less employees are leaving the organisation), an increased knowledge base of the company (the knowledge doesn't leave the

organisation continuously with leaving employees), an increased performance (due to learning curve effects as a result of longer attendance times) and finally an increase in customer loyalty (the "one face to the customer" is not frequently leaving the company). *Increase in company attractiveness on job market*: The attractiveness of the company to its' potential employees can be described as the company attractiveness on job market. Because of this attractiveness it is firstly possible to have easier access to qualified employees and secondly to improve the employees' commitment. The company attractiveness on job market is basically influenced by the organisational culture. Accordingly the primary usage of Human Capital Reporting can be seen in a simplified recruiting of new employees (see Lazear 2000, p 1359), especially when the company is able to create a positive employer brand.

Improvement of organisational culture: The organisational culture includes the entirety of values and cultural norms that exist within the organisation. It influences the actions of the organisational members through perceptual images, behaviour patterns and patterns of thought (see Bea, Haas 2005, p 463). Amongst other things the organisational culture can be influenced by well directed internal communication and an increased transparency. Organisational culture has neither a direct usage nor direct effects on the internal factors. Nonetheless it affects the employee related factors like employee motivation (see Pfeffer 1998, pp 64 – 68 or Neely, Adams and Kennerley 2002, p 261), employee commitment or company attractiveness on job market in terms of a 'multiplier'.

2.2 Company internal factors

The internal factors include the organisational performance, the innovative ability and the ability to communicate. They are directly influenced by transparency and controllability as well as by the employee related factors (and their usages). The improvement of the internal factors can be regarded as indirect benefits of Human Capital Reporting:

Increase in organisational performance: In this context the organisational performance can be seen in the current capability of the processes with regard to the creation of competitive advantages. In this short-term perspective the company's competitiveness results from the price-performance ratio of the existing products (see Prahalad, Hamel 1990, p 81). Hence it is important to focus on the efficiency of the operational sequences as an outcome of the employee related factors. Human Capital Reporting is able to improve the organisational performance e.g. by allocating human resources more effectively within the organisation (see Petty, Guthrie 2000, p 166). The usages of Human Capital Reporting which can be derived from an increased internal performance are an improved quality of products, decreased process costs and a reduction of the required processing time.

Increase in the innovative ability: The innovative ability is the company's capability to continuously create innovations which are needed to secure or to create future competitive advantages and cash flows. In this long-term perspective the competitiveness results from the company's capability to create new knowledge and to integrate it into new products (see Nonaka 2007, p 162). Hence an organisations' innovative ability can be equated to its sustainability and survivability respectively. It depends to the highest degree on the capability and motivation of the employees. Through different benefits and usages of the employee related factors Human Capital Reporting is able to positively influence the innovative ability. The expected usages of Human Capital Reporting can be seen in improved products, an improvement of product- and process-development as well as in an increased sustainability of the whole company.

Increase in the ability to communicate: The organisations' ability to communicate constitutes the skill to deliver relevant information to the appropriate addressees and to influence them in the intended way. If the addressee receives and understands the delivered information in the intended way, the communication process can be regarded as successful (see Hellriegel, Woodman, Slocum 1995, p 389). Through successful communication it is easier to make use of qualities like organisational performance or innovative ability. Human Capital Reporting supports the ability to communicate by providing a separate channel of communication. Usages of Human Capital Reporting which can be derived from the ability to communicate are the improvement of company's image, improvement of decision base and an increase in publicity.

2.3 Company external factors

The external factors consist of the organisations' attractiveness and the degree of need satisfaction considering specific stakeholders. The external factors are also directly influenced by transparency and controllability as well as by the employee related and the company internal factors (and their usages). The improvement of the external factors can be regarded as indirect benefits of Human Capital Reporting too:

Increase in the attractiveness of the organisation: The attractiveness of the organisation means the attractiveness to particular (external) stakeholders. Following the stakeholder approach the organisation can be viewed as an instrument to satisfy the needs of the different groups of stakeholders (see Roberts 1992, p 597). The organisation is individually evaluated by each group of stakeholders according to their specific needs. The goal of an improved attractiveness of the company can be seen in the creation of an acquisitive potential for the entity of stakeholders (see Zerfass 2007, p 27). The usages of Human Capital Reporting which can be derived from an increased attractiveness of the company are a simplified acquisition of new customers, suppliers, investors and new partners for cooperation as well as an easier obtaining of subsidies.

Increase in the degree of need satisfaction: The degree of need satisfaction describes the ability of the organisation to satisfy the needs of the relevant external stakeholders. Human Capital Reporting is not able to satisfy the needs of external stakeholders in a way which is comparable to the delivery of products or services. But Human Capital Reporting provides them with better information. Due to the transparency function of Human Capital Reporting the asymmetry of information is reduced. This helps external stakeholders to make easier and better decisions (see Lev 2001, p 108). That can be seen as an important way to satisfy their needs. The Reporting of Human Capital also indirectly takes effect through the improved employee related factors, the internal factors and the resulting benefits. As to the increased level of need satisfaction Human Capital Reporting directly affects the value of the organisation through the benefits of an increased satisfaction and loyalty of customers, suppliers, investors and partners for cooperation as well as through an easier obtaining of subsidies. The entity of the described factors has a direct influence on company's financial performance.

2.4 Summary – the value added of Human Capital Reporting

By help of the developed model it is possible to identify the benefits and usages of Human Capital Reporting by passing three levels of (intangible) factors: employee related factors, company internal and company external factors. By increasing or improving these factors the benefits of Human Capital Reporting can be derived. In-between these levels of factors the usages of Human Capital Reporting are also identifiable. Finally it is possible to verify the impact of Human Capital Reporting on company's value. Thus the value added of Human Capital Reporting from the organisations' point of view can be seen in the improvement of the described factors, in the resulting usages as well as finally in an increased financial (firm) performance. Figure 2 shows the described model in summary. It shows the three levels of factors (employee related, company internal and company external factors), the financial outcome as well as the effects of Human Capital Reporting (transparency and controllability). If all of these factors can get improved by the Reporting than finally there also has to be an increased value of the company.

3. Conclusion and outlook

Companies provide the public with detailed information about their investments in physical and financial assets. But they fail to provide information concerning their most important resources, e.g. their employees. This paper considers the potential benefits and usages of Human Capital Reporting. It describes how a company is able to increase its financial performance by the help of such a reporting. Therefore a model was developed which is able to show the effects of Human Capital Reporting through various cause-and-effect relations.

The contribution to practice of this paper can be seen in the detailed analysis of the internal value added which is able to arise from a comprehensive Human Capital Reporting. In the same way the contribution to literature is identifiable. It can be seen in the identification of the relevant information Human Capital Reporting has to provide to its addressees. The relevant indicators which are able to deliver this information are also visualised in the shape of the different factors identified by help of the developed model. The contribution to theory lies in an advancement of the indicator-based

approaches of performance measurement and management accounting regarding the described intangible factors and their interrelations.

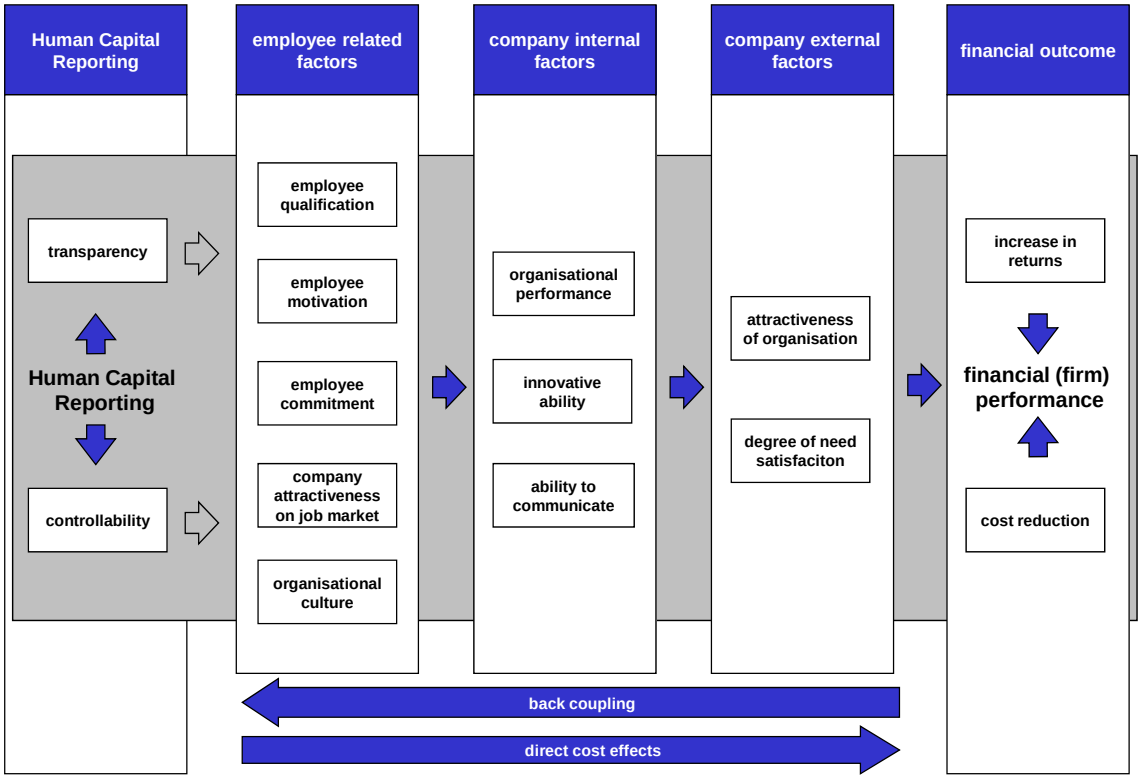

Figure 2: Cause-and-effect model of Human Capital Reporting

Nevertheless this paper offers freedom for further research. Especially the assumed cause-and-effect-relations of the developed model have to be determined, for example by help of statistical methods (e.g. regression analysis, structure equation modelling), extensive case studies or an extended literature review. Further research also exists concerning the determination of adequate key performance indicators with which it is possible to specify the value of the factors of the developed model.

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Intellectual Capital and financial performance: Evidence from the Indian Banking Industry

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Abstract: This study seeks to estimate and analyze the relationship between intellectual capital and financial performances of 70 Indian banks for a period of ten years from 1999 to 2008. Value Added Intellectual Coefficient (VAIC™) method is applied for measuring the value based performance of the companies. Financial performance measures used in this analysis are (1) return on assets (2) return on equity (profitability) and (3) assets turnover ratio (productivity) of Indian Banks. The intellectual capital (human capital and structural capital) and physical capital of selected banks have been analyzed and their impact on corporate performance has been measured using multiple regression technique. The analysis indicates that the relationships between the performance of a bank's Intellectual Capital, and financial performance indicators namely, profitability, productivity are varied. The study results suggest that banks' intellectual capital is vital for their competitive advantage.

Keywords: Indian Banks, VAIC™, profitability, return on equity, productivity

1. Introduction

Traditionally land, labour and capital were considered to be the most valuable assets in economics. Since time immemorial conventional physical assets were considered to be the main determinants of the performance of any economic activity. But the fast expansion of science, technology and finally the globalization altered the pattern and structure of the production system. The new production system is mainly driven by technology, knowledge, expertise and relations with stakeholders etc which may collectively be described as Intellectual Capital. In the new economic system, which is popularly known as the knowledge economy, intangible or intellectual assets have been eventually recognized as the prominent resources. Companies belonging to the industries like software, finance, pharmaceutical; banking, hotel etc. depend to a considerable extent on the intellectual capital for earning revenues. Production or Manufacturing companies use Intellectual Capital with its physical assets to sharpen their competitive edge. Banks maintain their existence in this competitive environment by applying innovative ideas. Bornemann et al. (1999) have found that enterprises, which have been able to manage their intellectual capital better, have achieved stronger competitive advantage than other competing enterprises. Also they have reported that companies which have been able to strengthen their own intellectual capital management compared to the others have performed better. Brennan and Connell (2000), claim that intellectual capital management plays an important role on the long-term business performance of an enterprise.

In recent years, financial institutions, especially those in the banking industry, have experienced a dynamic and competitive environment. Competition at a cross-border scale compels local banks to adjust their competitive position by achieving sustainable financial performance. The banking industry is one of the most knowledge-intensive industries. Intellectual Capital (IC) generally represents the critical resource in the value creation process.

Companies, in the knowledge economy, have been encountering a real challenge in respect of valuation and reporting of the intangibles including the intellectual capital in the annual financial statements, which do not adequately reflect them. The conventional performance measurement techniques fail to measure and monitor multiple dimensions of performance. They concentrate only on financial aspects of the organization. Benefits of intellectual capital such as management efficiency, customer relation, R&D, innovations etc are difficult to measure and quantify. This suggests that traditional measures of a company's performance, which are based on conventional accounting principles, may be unsuitable in the new economy in which competitive advantage is driven by intellectual capital (Edvinsson and Malone 1997, Pulic 1998). The use of traditional performance measurement techniques may lead investors and other stakeholders to make inappropriate decisions

when companies have a large proportion of their investment in intangible assets (S. Firer and L. Stainbank, 2003).

The present study is a modest attempt to examine weather conventional performance measures capture the intellectual capital performance or not. The analysis is based on a sample of 70 Banks operating in India.

Section 2 contains a brief summery of the relevant literature. We then describe the development of hypotheses and research method in section 3 & 4 respectively, which is followed by analysis and discussion in section 5. Concluding remarks have been presented in section-6.

2. Literature review

2.1 Definition of intellectual capital

The term intellectual capital includes inventions, ideas, general know-how, design approaches, computer programs and publications. An ex-editor of the business magazine "Fortune", Thomas Stewart describes intellectual capital as "something that cannot be touched, although it slowly makes you rich". According to Jacob Ben- Simchon (2005) the term 'intellectual capital' is used to enclose all of the non- tangible or non-physical assets and resources of an organization, as well as its practices, patents and the implicit knowledge of its members and their network of partners and contracts. Stewart (1997) defines it as 'packaged useful knowledge', Sullivan (1998) as 'knowledge that can be converted into profit', Roos et al (1997) as the 'sum of knowledge' of its members and practical translation of this knowledge into brands, trademarks and processes. Edvinsson and Malone (1997) define it as the possession of knowledge, applied experience, organizational technology, customer relations and professional skills that provide a company with a competitive edge in the market.

One of the most popular models for classifying intellectual capital(IC) is the Saint-Onge, H. (1996) model developed in the early 1990s. It divides intellectual capital into three parts: Human capital, Structural capital; and Customer capital.

A slight variant of this model developed by Dr. Nick Bontis re-states customer capital as relational capital to include relationships with suppliers.

Human capital is recognized as the largest and the most important intangible asset in an organization. Ultimately it provides the goods or services that customers require or the solutions to their problems. It includes the collective knowledge, competency, experience, skills and talents of people within an organization. It also includes an organization's creative capacity and its ability to be innovative. Although investment in human capital is growing, there is still no standard measure of its effectiveness in companies' balance sheets.

Structural capital is the supportive infrastructure for human capital—it is the capital which remains in the factory or office when the employees leave at the end of the day. It includes organizational ability, processes, data and patents. Unlike human capital, it is company's property and can be traded, reproduced and shared by, and within, the organization. Relational capital is a company's relationship with its customers and with its network of suppliers, strategic partners and shareholders. The value of these assets is determined by the company's reputation or image (MERITUM guidelines).

These elements of IC are summed up in the definition of CIMA (2001) "IC is the possession of knowledge and experience, professional knowledge and skill, good relationships, and technological capacities, which when applied will give organizations competitive advantage

2.2 Intellectual capital and corporate performance

Intellectual capital is a strong predictor of a company's performance and drivers of economic growth; (Hong Pew Tan et al.2007, Reed 2000, Drew 1999). Bontis et al. (2000), Riahi- Belkauki (2003), N. Juma (2006) have investigated the relationship between intellectual capital and performance of companies. Their study results suggest that intellectual capital is positively associated with financial performances. Study of intellectual capital on bank's value based performance shows the performance differences among various groups of banks (Mavridis 2004, Goh 2005, G.B.Kamath 2007). Maria do Rosário Cabrita and Jorge Landeiro Vaz (2005) examine the inter relationships and

the interaction effects among intellectual capital components and organizational performance, in the Portuguese banking industry context. The results of the study indicate a significant relationship between the intellectual capital and the organizational performance.

The studies mentioned above have clearly established that intellectual capital is an important determinant of corporate financial performance and this motivates the present researchers to undertake an empirical study to re-examine such relationship in the Indian context.

3. Development of Hypotheses

According to Patton (2007), the productivity of a firm lies more on its IC and system capabilities than on its hard assets. Bontis (2001) argues that leveraging knowledge assets is the key to a firm's prosperity. Such a pivotal role of intellectual capital as perceived by Patton and Bontis, in the matter of value creation needs to be assessed by means of estimating the extent to which corporate conventional financial performance measures intrinsically capture the contribution of intellectual capital resources like human resources, customer reputation and relation and innovative ideas.

The present study explores this issue empirically by analyzing the relationship between a relevant measure of intellectual capital and three commonly used measures of a company's financial performance namely 1. Return on Assets 2. Return on Equity and 3. Assets Turnover Ratio which represent profitability and productivity respectively.

Thus, in our study we predict a positive relationship between financial performance as measured by return on assets, return on equity and assets turnover ratio and the intellectual capital performance of Indian Banks. We, therefore, hypothesize that,

> *H_1: The greater the performance of banks' Intellectual capital, the greater will be the Banks' return on assets.*
>
> *H_2: The greater the performance of banks' Intellectual capital, the greater will be the banks' return on equity.*
>
> *H_3: The greater the performance of banks' Intellectual capital, the greater will be the banks' assets turnover ratio.*

4. Research methodology

4.1 Regression models

Model 1, Model 2 and Model 3 examine the relationships between Return on assets, Return on equity and Assets turnover ratio and the aggregate measure of intellectual capital ($VAIC^{TM}$). The regression models are as follows:

Model 1:
$ROA = \alpha + \beta_1 (VAIC^{TM}) + \beta_2 (ATO) + \beta_3 (LTA) + \beta_4 (DE) + \varepsilon$
Model 2:
$ROE = \alpha + \beta_1 (VAIC^{TM}) + \beta_2 (ATO) + \beta_3 (LTA) + \beta_4 (DE) + \varepsilon$
Model 3:
$ATO = \alpha + \beta_1 (VAIC^{TM)} + \beta_2 (LTA) + \beta_3 (DE) + \varepsilon$

4.2 Variable definitions

4.2.1 Dependent variables:

For the purpose of conducting the analysis in the present study, three dependent variables namely Return on assets, Return on equity and Assets turnover ratio have been used separately. At the moment, there is no specific theoretical perspective or adequate empirical evidence that supports the superiority of any specific proxy measure over the others. It is, therefore, decided that for the purposes of the present study, the commonly used proxy measures will be applied. Consequently, the proxy measures for each dependent variable are defined as follows:

(1) Return on assets (ROA): - Return on assets measured as the ratio of the net income (less preference dividends) divided by the book value of total assets, shows the degree to which a firm's revenues exceed over cost (Williams and Firer,2003; Chen, Cheng and Hwang ,2005).
(2) Return on equity (ROE): - Measured as the ratio between the net incomes (less preference dividends) divided by the book value of total equity, it shows the earnings available to the equity shareholders and is generally considered an important financial indicator for investors (Syed Najibullah, 2005).

3) Assets Turnover ratio (ATO): This is used to measure the productivity of banks which is computed by dividing income of banks by Total funds employed.

4.2.2 Independent variables:

VAIC™ is a measure for corporate intellectual ability (Pulic, 2000b), providing an easy-to-calculate, standardised, and consistent basis of measure, enabling effective comparative analyses across firms. Data used in the calculation of VAIC are based on financial statements.

The procedures calculating VAIC are as follows:
VAIC™ i = CEE i+ HCE i+ SCEi where
VAIC™ = VA intellectual coefficient for firm i;
CEE i = VAi /CEi , indicator of VA efficiency of capital employed for firm i.
HCEi = VA i /HC i; refers to indicator of VA efficiency of human capital for firm i;
SCE i = SC i /VA i; refers to indicator of VA efficiency of structural capital VA for firm i;
VA i = Output – Input (Total Income – Operating Expenses
excluding Salaries and employee benefits)
CEi = book value of the net assets for firm i
HCi = Salaries and employee benefits for firm i;
SC i = VAi - HCi structural capital for firm i.

4.2.3 Control variables

For the purpose of empirical analysis this study uses correlation and multiple regressions as the underlying statistical tests. In conducting the liner multiple regressions analysis, following control variables have been employed to isolate the contribution of intellectual capital to corporate financial performance.

Leverage (DE): -Financial leverage and debt structure as measured by total debt divided by book value of total assets is used to control for the impact of debt servicing on corporate performance and wealth creation (Riahi & Belkaoui,2003).

Size of the Firm (LTA): - Natural log of total assets of banks as reported in the annual report. It is used to control for the impact of size of bank on corporate performance.

Assets turnover ratio (ATO): It is the ratio of total turnover to total assets. This ratio is used to control for the impact of total assets on corporate performance.

4.2.4 Data

The data used in this empirical study are collected from published database of Reserve Bank of India, annual reports of respective banks and from Capitaline Database. The study confined to 70 banks consisting of 27 Nationalized Banks, 26 Scheduled Commercial Banks and 17 Foreign Banks. Regional Rural Banks and Co-operative banks are remaining out side the study because of difficulty in obtaining information.

5. Discussion of results

Table 1A contains the multiple regression results of all 70 banks for 10 years, from 1999 to 2008. The empirical results show that independent variables collectively explain 6.3% to 35.4% of the variance in return on assets which are statistically significant.

Table-1-A: Regression results of ROA and intellectual capital performance (N=70)

Independent and Control variables	1999	2000	2001	2002	2003
	t - value	t - value	t - value	t - value	t- value
Constant	1.057	0.083	0.002	-0.410	-0.076
VAIC^{TM}	2.749 β	2.419 γ	2.801 β	0.944 γ	3.423 β
ATO	-0.204	-1.70 α	-0.60	1.132	1.057
LTA	0.009	0.060	-0.03	1.856 α	0.134
DE ratio	0.431	1.738 α	0.873	-2.789 β	-2.10 γ
Adj. R^2	0.08	0.72	0.63	0.110	0.238
F- value	2.530	2.337	2.164	3.124	6.382
Sig. of F- value	0.049 γ	0.065 α	0.083 α	0.021 γ	0.000 β

Table-1-A (contd.)

Independent and Control variables	2004	2005	2006	2007	2008
	t - value	t - value	t - value	t - value	t- value
Constant	1.118	-0.450	0.330	0.022	0.748
VAIC^{TM}	0.733 α	0.250	2.119 γ	-0.587	3.702 β
ATO	1.290	0.021	1.417	1.142	1.773 α
LTA	3.614 β	3.287 β	4.567 β	2.735 β	-0.731
DE ratio	-5.343 β	-3.578 β	-5.82 β	-3.512 β	-0.778
Adj. R^2	0.319	0.202	0.354	0.255	0.394
F- value	9.071	5.371	10.43	6.895	10.413
Sig. of F- value	0.000 β	0.001 β	0.000 β	0.000 β	0.000 β

Here β, γ and α represent 1%, 5% and 10% significance level respectively.

From the above table it may be observed that excepting the years 2005 and 2007 VAIC^{TM} significantly and positively influences the profitability of banks when the latter is measured by return on assets. The impact of debt-equity ratio on profitability appears to be significantly negative in all the years except 2000. Size of the banks and profitability are seen to be significantly and positively related in the years 2002, 2004 to 2007. The negative significant association is found in case of asset turnover ratio with profitability of banks in the year of 2000 and 2008. Thus empirical results of Table 1A supports our hypothesis H_1 that is higher the value of VAIC^{TM} better will be banks return on assets. Therefore, from the results of the table it may not be unwise to claim that intellectual potentiality of banks operating in India significantly influences their profitability.

Table 1B below depicts the multiple regression results of return on equity, alternative measure of profitability, and intellectual capital performance as measured by VAIC^{TM}. The explanatory power of the independent variables and control variables used in this study about the variability of dependent variables vary between 6.2% and 61% (Adj.R^2).

The regression results of VAIC^{TM} and return on equity are statistically significant in the years 2000, 2001 and 2004. Productivity of banks and return on equity are significantly and positively associated in five (2001, 2002, 2004, 2007 and 2008) out of ten years of the study period. Size of banks is also seen to have influenced the return on equity significantly and positively from 2002 to 2006 when debt equity ratio significantly and negatively influences banks return on equity. Thus, it is very difficult to say that the sample data support the hypothesis that intellectual capital performance is positively related to a company's performance (profitability) when measured by the return on equity. From the results of this table it is apparent that return on equity in this case is influenced by factors other than the intellectual capability of the banks.

The regression results of productivity and intellectual potentiality of banks is shown in Table 1C.

Table- 1B: Regression results of ROE and intellectual capital performance (N=70)

Independent and Control variables	1999	2000	2001	2002	2003
	t - value	t - value	t - value	t - value	t- value
Constant	2.221 γ	0.073	0.33	-0.586	-0.841
VAIC™	1.161	3.338 β	1.730 α	-0.623	0.919
ATO	-0.933	-1.347	3.915 β	2.430 γ	1.433
LTA	-1.088	-0.224	-3.271 β	1.853 α	2.853 β
DE ratio	2.783 β	1.670 α	0.099	-4.960 β	-8.248β
Adj. R^2	0.062	0.190	0.207	0.266	0.518
F- value	2.144	3.110	5.490	7.252	19.55
Sig. of F- value	0.085 α	0.021 γ	0.001 β	0.000 β	0.000 β

Table-1B (contd.)

Independent and Control variables	2004	2005	2006	2007	2008
	t - value	t - value	t - value	t - value	t- value
Constant	-0.729	-1.343	-0.858	-0.856	-0.613
VAIC™	2.628 γ	-0.684	1.064	1.565	1.157
ATO	1.722 α	0.289	0.975	1.829 α	3.702 β
LTA	4.999 β	3.854 β	3.530 β	1.208	0.844
DE ratio	-4.974 β	-3.812 β	-2.453 β	1.485	0.419
Adj. R^2	0.388	0.223	0.298	0.565	0.610
F- value	11.92	5.957	8.337	23.38	23.66
Sig. of F- value	0.000 β	0.000 β	0.000 β	0.000 β	0.000 β

Table-1C: Regression results of ATO and intellectual capital performance (N=70)

Independent and Control variables	1999	2000	2001	2002	2003
	t - value	t - value	t - value	t - value	t- value
Constant	2.697 β	3.742 β	5.137 β	5.570 β	2.084 γ
VAIC™	4.091 β	2.647 β	2.388 γ	0.665	2.915 β
LTA	6.022 β	4.991 β	4.759 β	3.880 β	8.290 β
DE ratio	0.086	-0.718	-0.191	0.660	2.035 γ
Adj. R^2	0.624	0.510	0.480	0.284	0.623
F- value	39.10	24.91	22.23	10.12	39.07
Sig. of F- value	0.000 β	0.000 β	0.000 β	0.000 β	0.000 β

Table-1C (contd.)

Independent and Control variables	2004	2005	2006	2007	2008
	t - value	t - value	t - value	t - value	t- value
Constant	1.456	1.479	1.524	1.304	0.782
VAIC™	3.110 β	2.755 β	2.516 γ	3.206 β	2.513 γ
LTA	4.464 β	3.836 β	3.532 β	5.992 β	7.362 β
DE ratio	2.660 β	2.265 γ	1.372	-0.485	-2.307γ
Adj. R^2	0.583	0.580	0.651	0.735	0.704
F- value	33.21	32.70	43.95	64.91	46.91
Sig. of F- value	0.000 β	0.000 β	0.000 β	0.000 β	0.000 β

Here β, γ and α represent 1%, 5% and 10% significance level respectively.

From the regression results of Table 1C, it is found that values of Adjusted R^2 vary from 28.4% to 73.5%. Compared to the earlier regression results, the independent and control variables in the present case are seen to provide more acceptable explanation about the variability of the dependent variable in question. Regression results of assets turnover ratio and intellectual capital performance of banks are statistically significant and positive in all study years except 2002. Similarly, the size of banks as measured by natural log of total assets has significantly and positively influenced the productivity of the banks in all the years during the study period. So, the empirical results of Table 1C support our hypothesis that intellectual capital is crucial for improving bank's productivity. It implies that application of innovative ideas like internet banking, ATMs, mobile banking, core banking services, debit card, credit card etc. have improved the productivity of banks. Debt servicing of banks shows significant and positive relation with assets turnover ratio in the years 1999 and 2003 to 2005.

Out of this 70 banks, the financial performance of Indian Nationalized banks (that is, the bank under the ownership of Government of India) are shown in the following tables. Table 2A, 2B and 2C show the multiple regression results of profitability and productivity and intellectual capital performance of 27 nationalized banks respectively.

Table-2A: Regression results of ROA and intellectual capital performance (N=27)

Independent and Control variables	1999 t - value	2000 t - value	2001 t - value	2002 t - value	2003 t- value
Constant	-0.150	-0.146	-0.439	0.033	0.086
VAIC^{TM}	0.702 α	3.474 β	3.636 β	4.511 β	3.362 β
ATO	1.443	-0.362	-0.529	0.112	0.737
LTA	-1.686	-0.722	-0.388	0.421	1.037
DE ratio	0.630	2.546 γ	2.657 γ	-1.829 α	-1.808α
Adj. R^2	0.630	0.362	0.348	0.477	0.550
F- value	111.92	4.822	4.330	6.703	8.626
Sig. of F- value	0.000 β	0.006 β	0.010 β	0.001 β	0.000 β

Table-2A (cont.)

Independent and Control variables	2004 t - value	2005 t - value	2006 t - value	2007 t - value	2008 t- value
Constant	0.195	-0.079	-0.115	-0.105	0.063
VAIC^{TM}	4.102 β	0.320 α	1.407 α	0.508 γ	0.232
ATO	1.979 α	0.854	0.622	0.688	4.831
LTA	2.090 γ	0.774	1.918 α	0.458	1.540
DE ratio	-3.607 β	-0.975	-1.846	-1.198	-2.188γ
Adj. R^2	0.634	0.091	0.380	0.031	0.775
F- value	18.21	0.478	4.838	0.810	17.38
Sig. of F- value	0.000 β	0.572	0.006 β	0.244	0.000 β

Here β, γ and α represent 1%, 5% and 10% significance level respectively.

Table-2B: Regression results of ROE and intellectual capital performance (N=27)

Independent and Control variables	1999 t - value	2000 t - value	2001 t - value	2002 t - value	2003 t- value
Constant	2.071 α	-0.051	3.779 β	0.017	0.001
VAIC^{TM}	3.847 β	3.702 β	2.613 γ	4.008 β	3.025 β
ATO	-0.503	-0.449	-1.092	-0.108	-0.172
LTA	-1.574	-0.542	-0.693	-0.249	-0.212
DE ratio	2.758 γ	2.214 γ	0.910	-0.260	0.862
Adj. R^2	0.498	0.376	0.486	0.355	0.295
F- value	7.198	5.063	6.917	4.447	3.618
Sig. of F- value	0.001 β	0.004 β	0.001 β	0.009 β	0.021 γ

Table 2B (cont.)

Independent and Control variables	2004 t - value	2005 t - value	2006 t - value	2007 t - value	2008 t- value
Constant	-0.024	-0.122	-0.099	-0.157	-0.061
VAIC^{TM}	3.363 β	0.213 γ	1.510 γ	2.138 γ	0.728
ATO	0.565	0.715	0.029	0.167	3.813 β
LTA	-0.405	1.340	0.651	-0.220	-0.116
DE ratio	1.449	-0.886	0.052	1.243	-0.103
Adj. R^2	0.463	0.029	0.190	0.328	0.772
F- value	6.385	0.944	2.464	4.054	17.09
Sig. of F- value	0.002 β	0.458	0.077 α	0.014 γ	0.000 β

Here β, γ and α represent 1%, 5% and 10% significance level respectively.

Table- 2C: Regression results of ATO and intellectual capital performance (N=27)

Independent and Control variables	1999	2000	2001	2002	2003
	t - value	t - value	t - value	t - value	t- value
Constant	0.544	0.378	0.615	1.486	1.290
VAIC^{TM}	1.264	2.453 γ	1.769 α	0.626 γ	1.836 α
LTA	10.698 β	10.93 β	11.110 β	1.490	0.513
DE ratio	2.079 γ	1.057	1.225	0.954	1.741 α
Adj. R^2	0.630	0.656	0.823	0.164	0.279
F- value	111.93	194.67	100.89	2.641	4.232
Sig. of F- value	0.000 β	0.000 β	0.000 β	0.075 α	0.017 γ

Table- 2C (cont.)

Independent and Control variables	2004	2005	2006	2007	2008
	t - value	t - value	t - value	t - value	t- value
Constant	1.254	1.111	1.131	1.166	0.115
VAIC^{TM}	2.253 γ	2.187 γ	2.097 γ	2.236 γ	3.223 β
LTA	0.401	0.239	-0.534	-0.099	-0.860
DE ratio	1.831 α	2.218 γ	2.548 γ	1.746 α	1.810 α
Adj. R^2	0.335	0.427	0.393	0.373	0.687
F- value	5.193	5.457	6.386	5.956	14.930
Sig. of F- value	0.007 β	0.006 β	0.003 β	0.004 β	0.000 β

Here β, γ and α represent 1%, 5% and 10% significance level respectively.

From the regression results of Table 2A and Table 2B (previous page) it is apparent that the profitability of the nationalized banks as measured either by return on assets or return on equity shows a significant and positive relation with the value creation efficiency of intellectual capital during the entire study period excepting the year 2008. Size of bank and return on assets show a significant and positive association only in the years of 2004 and 2006. Therefore, size of bank does not have significant bearing upon the profit earning capability of the selected nationalized banks. Debt equity ratio shows positive significant relation with return on assets in the years 2000 to 2003 and in 2006. The said relationship is negative in the years 2003, 2004 and in 2008. On the basis of this result it would be unwise to say that utilization of debt capital significantly influences the profitability of nationalized banks. The multiple regression results given in Table 2C indicate that Indian nationalized banks have been able to increase productivity by applying the intellectual potentiality throughout the study period from 2000 to 2008.On the whole empirical findings speak for strong association between the efficiency of intellectual capital as measured by VAIC^{TM} of the nationalized banks and the financial performance.

Table 3A, 3B and 3C contain the multiple regression results of financial performance and intellectual capital performance of 26 Indian scheduled commercial banks.

Table-3A: Regression results of ROA and intellectual capital performance (N=26)

Independent and Control variables	1999	2000	2001	2002	2003
	t - value	t - value	t - value	t - value	t- value
Constant	1.055	-1.396	-4.851	-0.121	0.401
VAIC^{TM}	0.150	2.276 α	2.099 α	1.027 α	1.040 β
ATO	2.863 β	6.416 β	6.346 β	2.471 α	1.608
LTA	-0.304	-0.092	1.650	0.970	-1.277
DE ratio	-2.353	-1.641	-1.371	-4.987 β	-2.035α
Adj. R^2	0.345	0.760	0.730	0.511	0.087
F- value	4.295	20.762	16.54	7.019	1.594
Sig. of F- value	0.011 α	0.000 β	0.000 β	0.001 β	0.213

Table-3A (cont.)

Independent and Control variables	2004 t - value	2005 t - value	2006 t - value	2007 t - value	2008 t- value
Constant	1.858 α	-0.910	0.371	0.556	1.121
VAIC^{TM}	0.816	0.327 α	0.901 α	3.109 β	2.367 α
ATO	2.074 α	1.217	2.418 α	2.186 α	1.481
LTA	2.233 α	2.431 α	2.723 α	0.119	-0.305
DE ratio	-7.030 β	-4.686 β	-4.489 β	-1.110	-0.178
Adj. R^2	0.653	0.503	0.537	0.683	0.600
F- value	13.22	7.586	8.550	15.036	10.761
Sig. of F- value	0.000 β	0.001 β	0.000 β	0.000 β	0.000 β

Here β, γ and α represent 1%, 5% and 10% significance level respectively.

Table-3B: Regression results of ROE and intellectual capital performance. (N=26)

Independent and Control variables	1999 t - value	2000 t - value	2001 t - value	2002 t - value	2003 t- value
Constant	0.283	-1.641	2.226 γ	0.139	-0.292
VAIC^{TM}	-1.638	2.543 γ	-0.483	1.181 α	0.417 α
ATO	0.138	5.727 β	-0.150	2.836 γ	1.891 α
LTA	2.217 γ	-1.450	-2.269 γ	-0.706	-0.819
DE ratio	-2.089 γ	-0.793	-0.166	-5.646 β	-6.472β
Adj. R^2	0.104	16.59	0.294	9.955	0.606
F- value	1.726	0.000	3.400	0.000	10.593
Sig. of F- value	0.182	0.714	0.029 γ	0.609	0.000 β

Table 3B (cont.)

Independent and Control variables	2004 t - value	2005 t - value	2006 t - value	2007 t - value	2008 t- value
Constant	0.327	-0.247	0.060	-0.489	-0.246
VAIC^{TM}	1.645	0.138	-0.912	2.122 γ	1.009
ATO	1.041	0.383	1.279	2.123 γ	2.884 β
LTA	3.040 β	1.948 α	2.150 γ	-1.096	-0.881
DE ratio	-5.803 β	4.187 β	-3.042 β	1.619	1.088
Adj. R^2	0.552	0.386	0.280	0.544	0.686
F- value	90.18	5.091	3.534	8.758	15.17
Sig. of F- value	0.000 β	0.005 β	0.023 γ	0.000 β	0.000 β

Here β, γ and α represent 1%, 5% and 10% significance level respectively.

Table- 3C: Regression results of ATO and intellectual capital performance (N=26)

Independent and Control variables	1999 t - value	2000 t - value	2001 t - value	2002 t - value	2003 t- value
Constant	2.113 γ	4.310 β	9.177 β	4.476 β	1.782 α
VAIC^{TM}	0.961	1.261 γ	0.310 α	0.533	0.904 α
LTA	2.389 γ	0.698	-0.190	0.966	6.186 β
DE ratio	0.052	-0.143	-0.885	0.657	1.470
Adj. R^2	0.367	0.186	-0.045	0.047	0.666
F- value	5.834	1.786	0.673	0.653	17.64
Sig. of F- value	0.004 β	0.179	0.579	0.590	0.000 β

Table- 3C (cont.)

Independent and Control variables	2004	2005	2006	2007	2008
	t - value	t - value	t - value	t - value	t- value
Constant	1.027	0.934	0.810	0.692	0.492
VAIC^{TM}	0.914 α	1.216 γ	0.899 α	1.719 α	0.673 β
LTA	2.386 γ	2.344 γ	2.295 γ	4.050 β	9.695 β
DE ratio	0.947	0.370	0.361	-1.041	-4.325β
Adj. R^2	0.347	0.383	0.551	0.734	0.890
F- value	5.615	6.375	11.63	24.95	71.27
Sig. of F- value	0.005 β	0.003 β	0.000 β	0.000 β	0.000 β

Here β, γ and α represent 1%, 5% and 10% significance level respectively.

From the regression results it is evident that commercial banks in India have successfully employed their intellectual capital to enhance their profitability as the regression results of VAIC^{TM} and ROA of commercial banks are positive and significant during the entire study period except in the years 1999, 2004 and 2006. There is lack of consistency in the matter of relationship between VAIC^{TM} and return on equity of commercial banks. From the regression results shown in Table 3C it is evident that intellectual potentiality of banks has no considerable impacts on the productivity of the banks. Size of banks also appears to be a significant factor contributing to the productivity of the selected banks. Because of inadequacy of data, we refrain from presenting the regression results of foreign banks separately.

Conclusions

The principal purpose of the present study is to investigate the relationship between performance of intellectual capital in banks and two dimensions of financial performance- profitability and productivity. Intellectual capital performance of banks is measured by means of using VAIC^{TM} methodology. Overall empirical findings clearly indicate that intellectual capital is an important determinant of the banks' profitability and productivity. This finding suggests that a bank can enhance its profitability to a significant extent by means of managing its intellectual ability in an appropriate manner. But, in so far as the present study is concerned, the intellectual capital performance does not have a consistent positive influence on the return on equity.

Intellectual capital has been increasingly gaining popularity in the matter of ensuring sustainability of the business in the knowledge economic context. The results obtained in the present study clearly establish the importance of intellectual capital in enhancing banks' profitability and productivity. It may, therefore, be argued that developing intellectual capital base is no less important than investment of monetary capital for banks and it should be recognized as one of the important and promising investment for driving the banks' sustainable growth, together with the other factors.

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Measuring Innovation from the Source to the Value

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Abstract: Intangible assets are creating most of the bottom line value in organizations in the current global competitive environment. Quantifying and valuing investments, sales and maintenance of intangibles has proven to be a difficult task for the 21st century organization. A core objective of intangible assets is the valuing of innovation, a key outcome of the knowledge worker and the business environment. Innovation does not just occur at the portfolio level, it is an evolving and dynamic process. Recent research on innovation measurement focuses on the results only, such as new products, services, statistics or methods. There is little to no focus on the process itself, because traditionally innovation does not have a 'systemic' approach; instead it is always associated with a disruptive process. A systemic approach to the identification, measurement and management of innovation is a complex venture. There are many insights associated with knowledge spills that occur in tandem with innovation that are of significant importance. These knowledge spills need to be surfaced and their impact on the value of innovation uncovered. This paper presents a theoretical model that identifies the path to innovation that minimizes waste (knowledge gaps) in the innovation process and thus enhances the value of the innovation using a systemic approach.

Keywords: Innovation, intangible assets, knowledge assets, intangible asset valuation, knowledge valuation

1. Introduction

The economic point of view of Innovation measurement has been widely studied at local, regional and national scale (Revilak 2006). Innovation is the design, creation, development, and/or implementation of new or modified products, services, processes, systems, organizational structures, or business models for the purpose of creating new value for customers and financial returns for organizations. Innovation is an important topic for many scholars and business researchers due to its contribution to economic development and business differentiation. Innovation remains a top priority for corporate leaders worldwide as reported by The Advisory Committee on Measuring Innovation in a report to the Secretary of Commerce in January of 2008. Innovation measurement has become an important issue, as well as the identification and fostering of the innovation behavior and process in order to better manage and develop innovation in the 21st century organization. Innovation, service, quality, speed, and knowledge are the defining factors in the knowledge economy (Hope & Fraser 1997).

Seventy percent of corporate leaders identify innovation among their top three priorities for driving growth (McKinsey Quarterly 2007). Although most executives believe that innovation is critical to the company's strategy and performance, approximately 25 percent believe innovation is part of everything that an organization does (McKinsey Quarterly 2007). Fundamental to improving the knowledge spills or gaps in the innovation process is to view innovation as a system within the organization. However, researchers struggle with innovation from an engineering perspective, since it is a difficult process that has peculiar behavior, unlike other processes, in which following an ordered set of sequential or non-sequential steps leads to a concrete result, product or service. In addition, the National Endowment for Science, Technology and the Arts (NESTA), in their policy briefing of July 2008, stated that "Traditional metrics fail to adequately capture "hidden innovation": Innovation in services, the public sector and creative industries, or new trends in open and user-led innovation". This paper integrates innovation, systems engineering, and Intangible assets measurement to propose a theoretical model that defines a roadmap to innovation strategy that minimizes knowledge spills and provides performance measures to support decision-making and risk management in transforming innovation into corporate assets or property.

2. Innovation strategy

"Innovation strategy determines to what degree and in what way a firm attempts to use innovation to execute its business strategy and improve its performance" (Gilbert 2004). In the knowledge economy, a business enterprise creates value through intangibles such as "innovation, employee skill and imagination, customer loyalty, contractual relationships with suppliers and distributors, and better internal and external communications, trademarks, know-how, patents, software, brands, research and development, strategic alliances, and product differentiation" (Litan & Wallison 2000 26). Intangible assets, which include innovation, are the new valuation components in the knowledge

economy and are to be included in the value chain of a business enterprise. Specifically stated, an innovation strategy should be aligned with an organization's core mission and values. Innovation should be treated as a tool to create wealth in an organization.

3. Sources of Innovation

Innovation comes under the guise of many types and vary in complexity and scope (Gilbert 2004). Innovations can be inventions of products, services, processes and procedures that no other firm has created, or adoptions of products, services, processes and procedures that exist in other organizations (Gilbert 2004). Given these characteristics of innovation, its approach must be flexible and adaptable to accommodate its many varieties. Thus, organizations must establish tools and indicators to manage innovation and increase earnings within the business enterprise (Sullivan 1998). Green's (2008) empirical research provides significant evidence that use of a standard and consistent intangible asset taxonomy to define corporate intangible valuation models could increase a firm's ability to identify and account for more intangible assets for measurement and valuation. An intangible valuation model needs to be a flexible and adaptive model that can represent the fluid and dynamic mix of the value contribution of intangible assets. Green's (2008) intangible asset taxonomy -- Framework of Intangible Valuation Areas (FIVA) (Table 1) -- establishes a base for this dynamic mix and can be applied across all industries. There are certain characteristics within the business environment that influence the value drivers of an organization and these value components are related to the business strategy. FIVA provides a structure for an organization to map its value components to a specific value driver.

Table 1: Framework of intangible valuation areas: an intangible asset taxonomy

	Value Driver	Definition
1	Customer	The economic value that results from the associations (e.g., loyalty, satisfaction, longevity) an enterprise has built with consumers of its goods and services.
2	Competitor	The economic value that results from the position (e.g., reputation, market share, name recognition, image) an enterprise has built in the business market place.
3	Employee	The economic value that results from the collective capabilities (e.g., knowledge, skill, competence, know-how) of an enterprise's employees.
4	Information	The economic value that results from an enterprise's ability to collect and disseminate its information and knowledge in the right form and content to the right people at the right time.
5	Partner	The economic value that results from associations (financial, strategic, authority, power) an enterprise has established with external individuals and organizations (e.g., consultants, customers, suppliers, allies, competitors) in pursuit of advantageous outcomes.
6	Process	The economic value that results from an enterprise's ability (e.g., policies, procedures, methodologies, techniques) to leverage the ways in which the enterprise operates and creates value for its employees and customers.
7	Product/Service	The economic value that results from an enterprise's ability to develop and deliver its offerings (i.e., products and services) that reflects an understanding of market and customer(s) requirements, expectations and desires.
8	Technology	The economic value that results from the hardware and software an enterprise has invested in to support its operations, management and future renewal.

Source: (Green 2004)

FIVA leverages existing balance scorecard valuation models and business value chain models by extracting their value components and aligning them with performance-based activities to define a common intangible asset taxonomy of value drivers of intangible assets. The value drivers that compose FIVA are a consolidated group of value components extracted from four scorecard (SC) models -- Skandia Navigator™ (Edvinsson and Malone 1997), Intangible Asset Monitor (Sveiby 1997), IC-Index™ (Roos, Roos, Dragonetti and Edvinsson 1997), and Balanced Score Card (Kaplan and Norton 1996) – based on Svieby (2001) categorization of intangible asset management models and two value chain models -- The Generic Value Chain (Porter 1985) and the Work System Framework Value Chain (Alter 2000).

Being cognizant of the value components of an organization facilitates the alignment of these value components with objectives. FIVA aligns the value driver of intangible assets with KM objectives (Table 2) based on the understanding that the capture, use and reuse of relevant information that enhances the operation or products in an organization is known as Knowledge Management (KM).

Table 2: Knowledge management objectives

Objective	Objective Description
Innovation	The generation of new ideas to improve the efficiency and effectiveness of identifying and implementing new products, new services, advance skills, improved activities and best practices for economic gain.
Organization	The structuring of resources to improve the efficiency and effectiveness of capturing, transferring and sharing knowledge throughout the enterprise for economic gains.
Socialization	The establishment of interactions between resources to improve the efficiency and effectiveness of capturing, transferring and sharing knowledge throughout the enterprise for economic gain.
Culture	The establishment of an environment of visions and values to improve the efficiency and effectiveness of collaboration, creativity, communication, trust and sharing throughout the enterprise for economic gain.

Source: Green 2004

Innovation is a KM objective and is created through the combination, antecedents, of one or more of the value drivers. The antecedents of FIVA is a concept that allows a business to identify and link value components or performance measurements/indicators to its intangible value drivers and subsequently capture measures to monitor and evaluate leading and lagging indicators in the achievement of its KM strategy (Andreou, Green and Stankosky 2007). The goal is to link knowledge assets to their associated work functions and activities within the context of strategic intent (Bontis, Dragonetti, Jacobsen and Roos 1999). FIVA supports a link between strategic intent (goals and objectives) and intellectual capital, assets and property. To identify the antecedents, FIVA is extended to represent the different interactions between the eight value drivers (e.g., Table 4 - "Employee" value driver in combination with remaining 7 value drivers). The interactions of the eight value drivers compose thirty-nine (39) performance focus areas (Table 3), some of which contribute to the identification and measuring of innovation.

Table 3: Thirty-Nine (39) performance focus areas or business intelligence constructed from value drivers (Green 2007a, Green 2007b)

Relationship Intelligence Understanding of how the interactions between knowledge workers influence organization performance.	Competence Intelligence Understanding of how the abilities/proficiency of knowledge workers influences organizational performance.
Employee-to-Employee Relationships *Employee-to-Customer Relationships* *Employee-to-Competitor Relationships* *Employee-to-Partners Relationships* *Customer-to-Customer Relationships* *Customer-to-Competitor Relationships* *Customer-to-Partners Relationships* *Competitor-to-Competitor Relationship* *Competitor-to-Partner Relationship* *Partners-to-Partners Relationships*	*Employee-to-Information Competencies* *Employee-to-Process Competencies* *Employee-to-Product/Service Competencies* *Employee-to-Technology Competencies* *Partner-to-Information Competencies* *Partners-to-Process Competencies* *Partners-to-Product/Service Competencies* *Partners-to-Technology Competencies*
Structure Intelligence Understanding of how the organization's infrastructure environment influences organizational performance.	
Customer-to-Information Structure *Customer-to-Process Structure* *Customer-to-Product/Service Structure* *Customer-to-Technology Structure* *Competitor-to-Information Structure* *Competitor-to-Process Structure* *Competitor-to-Product/Service Structure* *Competitor-to-Technology Structure* *Information-to-Information Structure*	*Information-to-Process Structure* *Information-to-Product/Service Structure* *Information-to-Technology Structure* *Process-to-Process Structure* *Process-to-Product/Service Structure* *Process-to-Technology Structure* *Produce/Service-to-Product/Service Structure* *Produce/Service-to-Technology Structure* *Technology-to-Technology Structure*

FIVA provides a systematic way to divide a business enterprise into its discrete activities. FIVA is a concept that could be used to examine the groupings of business activities and to establish boundaries that alignment with drivers of value, both tangible and intangible. "Breakthrough innovation is associated with increases in both normal profits and economic rents" (Sorescu 2008). The alignment of strategic objectives and intangible value drivers provides a mechanism by which companies can focus their resources and activities on a set of KM objectives, such as innovation, for

achieving them more effectively and efficiently. It provides a more fluid value network model that more accurately reflects the 21st century organization, because intangible assets like innovation, relationships and expertise are far more indicative of a company's value.

Table 4: Employee interactions with value drivers

Employee – "Value Driver" Interaction	Performance Focus Area
Employee - Customer	Customer Intimacy: Find out what your customers really want that they don't already have and find a way to provide it, such that value exceeds cost for both parties (Kampmeier 1997, 75).
Employee - Competitor	Competitive Intelligence: Knowledge of what one's competitors are doing by having information regarding their capabilities, vulnerabilities and intentions (Erickson and Rothberg 2000).
Employee - Partners	Enterprise Intelligence: Scanning the business environment to gather information that can reduce environmental uncertainty with regards to business objectives (Thomas et al. 1993).
Employee - Information	Leveraging Competencies: The ability to reduce noise in information by managing effectively the complete decision-cycle and information processes that add value to the information (Nutt 2002; Simpson and Prusak 1995).
Employee – Technology	Leveraging Technology: The adoption of a people-centric framework for extending leadership, enhancing collaboration, improving operational efficiency and accelerating learning (Morello 2002).
Employee – Process	Leveraging Processes: Managing and leveraging mission critical processes for strategic advantage and capitalizing on new opportunities (Hammer and Stanton 1999; Garvin 1995).
Employee – Product/Service	Innovation Strategies: Selecting innovation strategies that will meet customer needs in an efficient manner (Schilling and Hill 1998).

Source: (Andreou, Green and Stankosky 2007)

4. A systemic approach for Innovation – A road map to measuring

Abrunhosa (2003) recognize the interactions and interdependencies between the different components of the innovation process, and the complexity and uncertainty of the process, calling for a systemic approach. The Innovation process can be seen a system. The adequate management of a system minimizes the "waste" and maximizes the "knowledge" outputs. The Innovation process seen as a system uses many inputs and creates many outputs. The value of those outputs is frequently dependent on the business needs, not in the capability building process of the company. Applying the theoretical model represented in figure 1, the organization builds an Innovation memory of performance focus areas useful for strategic direction and risk management.Figure 1, depicts the diverse components of valuation within a business and brings these elements together into a synergistic relationship. This concept:

- Identifies sources of value that align with business performance.
- Uses intelligence constructed from value chain elements of the business environment.
- Formulates a model of potential improvements and corporate ventures that include levels of abstraction that apply to the business environment, which increases the capability to identify significantly more innovative activities and their contribution to organizational performance.
- Develops hypotheses as the nature of improvements or corporate ventures being investigated.
- Verifies the findings or results rendered from the outcome.

The foundation of the theoretical model is formulated based on:

- A System Component: Organizations need to construct maps to include the details of the coherent picture to distinguish the high- from low-leverage changes (Senge 1990). Businesses must view intangible asset valuation as a system within the context of the business enterprise and take a system approach that requires businesses to think about and define a language, for describing and understanding, the forces and interrelationships that shape the behavior of a valuation system (Senge 1990). System engineering provides tools and methods to understand almost any group of interacting elements and its adequate use guarantees the interaction of many "systems" in a coordinated way.
- A Cognitive Component: - A holistic approach to the construction of a performance-based valuation system places concentration on organizations understanding and constructing mental

models of complex business systems. Senge (1990) defines mental models as deeply ingrained assumptions, generalizations, or even pictures or images that influence how we understand the world and take action. Organizations must identify the components of intelligence (Green 2008) that compose the context of the organization.

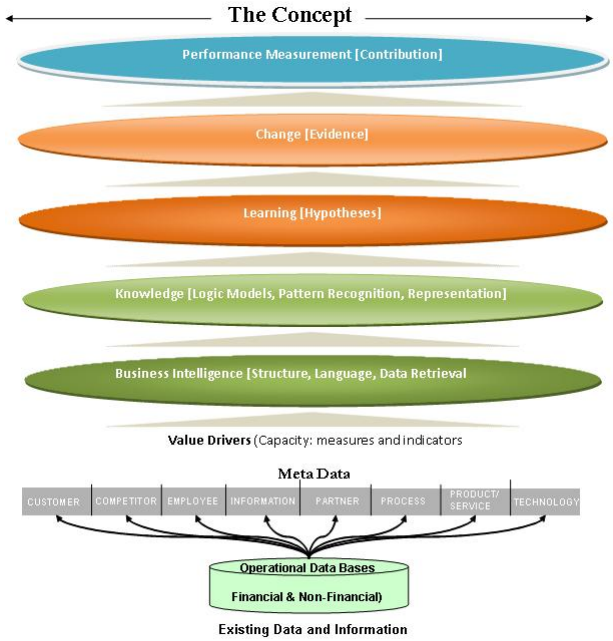

Figure 1: Theoretical model of a valuation system

Figure 1 provides the roadmap of "sources of value" to measurement based on the disciplines of systems engineering and cognition. The goal of road-mapping is to create an innovation strategy that supports the selection and execution of the right things. Effective road-mapping should lead to more efficient and effective development and management of corporate portfolios. The theoretical road-map consists of the following components depicted in figure 1 above. The following components are outlined in a bottom-up evolution.

- **Operational Data -- Indicators & Measures (financial & non-financial) (Existing Data & Information):** "*Capacity is the value-creating ability of an organization, an ability that takes in a wide variety of resources" (*McNair & Vangermeersch, 1998, p.1). The valuation model seeks to incorporate the basic economics of business within its structure by identifying a core set of value adding activities (VAC), transformations, and transactions performed by the enterprise. It seeks to provide attributes that have a direct or indirect relationship with the identification of profit, waste and nonvalue-adding activities on resources. Capacity is defined for every resource or value driver (Green 2007a). Capacity is tied to the decision making process of the organization (McNair & Vangermeersch 1998). Capacity utilization is a primary goal of the operational, tactical, and strategic decision-making processes. Capacity should be represented in four categories of diagnostic information (Drucker 1998) -- foundation, productivity, competence and resource-allocation. Drucker (1998) identifies these categories of information to provide results that inform and direct tactics and strategy development. The union of the value drivers and capacity creates a body of knowledge for the construction of enterprise value and provides a basis for taking action to manage and improve performance. This body of knowledge is constructed in the form of an enterprise value data base. The content of the enterprise value data base is extracted, transformed and loaded from operational data and information. This step is to provide a method to capture data and information that creates an institutional memory that compliments the traditional measurement style of Innovation, which is measured by inputs/outputs such as resources invested (money and human) and products obtained (patents, publications, products). The institutional memory provides a path to capture many activities associated with knowledge that are valuable to capture, but many times are hidden nuggets of knowledge and wasted.
- **Business Intelligence**: Organizations seek to have a view of negative and positive impacts on performance based on intangible assets, which requires a body of knowledge that drives the goal of valuation. Operational data provides a wealth of information that addresses the problems that face the enterprise in achieving its goals. The data and information are captured via the business

functions of an enterprise and encoded for retention and recall (institutional memory) for use in making decisions with respect to the business value chain. Operational data grows intelligence, which is the ability to comprehend, understand and profit from experience (Wiig 1994). The modeling of intelligence seeks to identify the major independent components of intellectual behavior and determine the importance of and interactions between value drivers such that the degree of intelligence can be measured or evaluated. Structure and function are identified and defined as the conduit by which intelligence is achieved. Business intellect is extracted from operational data and transformed into business intelligence, which must be aligned with business objectives and goals -- the 39 performance focus areas. Business intelligence supports the modeling of business reasoning, problem-solving, decision-making and learning. Business intelligence is the initial introduction of inquiries. Newell (1998) states in his definition of theory as it relates to his unified theories of cognition – "to state it positively and in general, let there be some body of explicit knowledge, from which answers can be obtained to questions by inquiries. Some answers can be obtained to questions by inquiries. Some answers might be predictions, some might be explanations, and some might be prescriptions for control". If this body of knowledge yields answers to those questions for you, you can call it a theory." A theory is an explicit body of knowledge, from which answers can be obtained by anyone skilled in the art" (Senge 1990). The modeling of business intelligence introduces a new level of abstraction that allows the conventional naming of interactions between value drivers and the elevation of them into strategic, tactical and operational enterprise business models via a business intelligence data base that can be used in business reasoning, problem-solving, decision-making and learning.

- **Knowledge**: Business knowledge is needed to deliver quality service and products to sustain competitively viable performance within the work place. "We postulate that the single most important factor in making the organization intelligent-acting is to make appropriate knowledge available and accessible – and to make sure it is used" (Wiig 1994, p.11). Knowledge in the enterprise, to be effective, is well planned and implemented with deliberance, competence and momentum (Wiig 1994). Knowledge models are based on the identification of business events that can be symbolized and manipulated to achieve expected business results like innovation strategies. Enterprise business models utilize the routine and special statistical, financial, forecasting, management science, and other quantitative models that provide analysis capabilities (Turban & Aronson 1998). A business logic model base is established on the knowledge needs, such as innovation, for making business decisions and takes into consideration accounting, tax regulations and compliance components and their affect on corporate transactions and profits. Some common measures of economic income include profit margin-gross or net, return on investment-measured as total assets, net assets, or owners' equity, and net cash flow-before tax or after tax, before debt service or after debt service (Reilly & Schweihs 1999). Economic income measures can involve any increment in economic income or decrement in economic costs (Reilly & Schweihs 1999). The business knowledge level provides the holistic view of the value creation of the intangible.
- **Learning**: An organization learns when it adds to its store of information or body of knowledge through organizational inquiry (Argyris & Schoön 1996). Thus agents of an organization can only learn from what information and knowledge it captures, becomes aware of, discovers and uses in its decision making process. Intelligence and knowledge models support the identification of patterns, similarities and differences in business functions and activities. These insights, via the patterns, similarities and differences narrow the focus to specific performance focus areas that can be leveraged to improve organizational performance. We don't just instantly implement something new, what is learned must be investigated and validated to ensure the value of its contribution to performance.
- **Change**: Senge (1999) views change as the combined inner shifts in people's values, aspirations, and behaviors with outer shifts in processes, strategies, practices, and systems. Senge (1999) identifies that learning is part of profound change as organizations not only do something new, but build a capacity for doing things in a new way. Learning promotes organizational inquiry that can result in thinking and acting that yields a form of change in the design of organizational practices (Argyris & Schön 1996). Change measures the progress towards achieving goals.
- **Performance Measurement**: Dealing with the implementation of an organization's strategy is performance measurement (Kaplan & Norton 1996). When based on the use of a balanced measurement system, performance measurement is used to identify and control critical factors that lead to success. The aim is to measure success factors from different perspectives, like

customers, employees, business processes and financial success, as well as from the perspective of past, current and future performance, such that these different aspects of performance can be measured and managed (Okkonen, Pirttimaki, Lonnqvist, & Hannula 2002). Performance measurement at the short-term or operative level is used for guidance, control and managing quality, whereas in long-term strategic issues it has a dual role in implementing and updating strategy (Okkonen, Pirttimaki, Lonnqvist, & Hannula 2002). Performance measurement is translating a strategy into concrete objectives; communicating the objectives to knowledge workers; guiding and focusing knowledge workers' efforts towards achieving these objectives; controlling whether or not the strategic objectives are reached; using double-loop learning to challenge the validity of the strategy itself, and visualizing how individual employee's efforts contribute to the overall business objectives ((Neely 1998) (Simons 2000) (Kaplan & Norton 1996)).

This theoretical model incorporates the integration of strategy, culture, and viability that starts with value drivers and their capacity, evolves through intelligence, knowledge, learning, change and translates into performance measures that identify and control critical factors aligned with success to meet the ultimate goal of identifying and controlling the contribution of innovation capital, assets and property.

5. Conclusion

Understanding the nature and causes of innovation requires analysis of its scope. It is necessary to quantify its results and characteristics with hard, objective data through indicators capable of reflecting Innovation of all types, both tangible and intangible activity. The increased recognition of the importance of innovations as supported by The Advisory Committee on Measuring Innovation in the 21st Century report to the Secretary of Commerce in January 2008 identifies an elevated need for tools that facilitate the identification and implementation of innovation strategies. This comprehensive theoretical model that identifies the path from key performance indicators to performance measurement seeks to address an industry requirement of valuing innovation. The basis of its structure is intangible asset valuation using a systems engineering approach. The integration of key components establishes a path from the body of knowledge aligned with value through the measuring of performance. This path:

- Incorporates the enterprise value drivers of intangible assets,
- Aligns measures and indicators from strategic operational data with the enterprise value drivers to establish a core "body of knowledge",
- Uses the "body of knowledge" to construct business intelligence,
- Uses business intelligence to construct business knowledge,
- Learns from knowledge gained to improve productivity of its enterprise value drivers,
- Identifies similarities and differences that support changes to business practices that are aligned with organizational performance.
- Measure the achievements of the business enterprise by using its capacity as it's measurement of performance

Using innovation to improve organization performance is difficult. Most companies struggle with achieving positive returns on investments in innovation because they lack the tools to make innovation part of everyday practice (Scott, Johnson, Sinfield, Altman 2008). This theoretical model establishes the roadmap to construct institutional memory and facilitates the analysis, evaluation, monitoring of value obtained not just to the company but for all stakeholders in the innovative process. Today's technology integrated into this model would create a platform to measure innovation from the source to the value within today's 21st century organization.

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Mindsh@re in Finmeccanica: An Organizational Model Based on Communities of Innovation

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Abstract: This paper presents the past, and ongoing, experience within the Aerospace and Defence (ASD) sector of how an advanced technology organization can create value innovation through the implementation of a knowledge management model, which is based on interdisciplinary communities involving external researchers, suppliers and also competitors. The aim of this paper is to analyze the empirical results of a challenging model of 'Communities of Innovation' (CoI). MindSh@re is the so-called "meta-organization" that implements Finmeccanica's (the Italian ASD Company) technical knowledge network by utilizing all the available intellectual resources as a lever to promote "open innovation". MindSh@re is an extended organizational model aimed at adding value to the existing technological knowledge within the Finmeccanica Companies, the assessment of its knowledge resources and competencies, and at the sharing of best practices. It is designed with the goal of connecting people within a network and acting by multiplying the generation of new ideas, products, talent and is the engine for real value innovation through the "Technological Community", a flat organization which is aimed at providing focus and sharing research on those topics considered as leading industrial points of view. The resources involved in MindSh@re come mainly from the Engineering and Strategy Directions, with close ties to the Commercial, Marketing and Human Resources functions of the companies. This mix increases focus on targets, whilst at the same time, ensures innovative development and the growth of those resources committed to it. The present case study presents the model in the body of knowledge and depicts deeply its organization and philosophy. Three key elements are highlighted as being pillars of its success; people are at the core of this "engine", corporate management directly governs the project by assuring continuous alignment with business strategy and performance assessment, finally innovation emerges as a result of organizational knowledge.

Keywords: Organizational model; community of innovation; knowledge management for open innovation; industry case study

1. Introduction

Companies have entered a new age where knowledge, which becomes a factor of growth and development when applied innovatively (Nath, 2001), is one of the exclusive resources which allows the acquisition and maintenance of competitive advantage. As a consequence, since knowledge adds new values to conventional managerial resources (Nomura, 2002), development and promotion of knowledge is as important as the management of conventional managerial resources such as people, material resources and money.

Because knowledge is not simply data or information, but is rooted within human experience and social context, its successful management is due to the people and culture as well as the organizational structure and information technology. Companies must develop ways of ensuring that the organizational culture that has been recognized as a primary determinant within knowledge management (KM) is conducive to knowledge management initiatives.

The need to better understand KM is a necessary prerequisite to nurture it in a more structured and systematic manner (Lemon and Sahota, 2004). In particular, KM entails the enhancement of corporate competitiveness by identifying, sharing and utilizing knowledge and best practices existing both inside and outside the company (Nomura, 2002).

The objective of KM is to directly enhance corporate value according to business strategy by means of developing personnel with competitiveness, increasing the speed of problem solving, or creating new business and products/services. KM within the firm is expected to be in alignment with the organization's strategic objectives (Malone, 2002).

To do this, primarily the company needs to recognize its knowledge position and to define the suitable initiatives to eliminate the knowledge gaps, which may exist in critical areas where knowledge requires to be improved, and to exploit the surplus, which is the unutilized knowledge within the organization and the areas in which its knowledge resources are superior to those of competitors.

Consequently, to be effective in achieving the business goals, KM would not be exclusively built on one of the following initiatives, such as the capture of tacit knowledge; the conversion of knowledge from the tacit to the explicit; the internalization of explicit knowledge; the generation of new knowledge that has not been used before to offer a product or service; the combination or the application of available technological knowledge. Rather, a company should consider KM as the implementation, in a continuous cycle, of the available knowledge, firstly identified and disseminated within the organization, then applied in the innovation process, and finally capitalized in order to start up a further process of new knowledge generation. KM must be understood in a broader sense as the encouragement and promotion of innovation, considering the potential of employees and customers in creating knowledge.

All this requires supporting KM through a peculiar management model. Since a firm's success depends not only on its technologies, resources, and core processes, but also on its strategic management and integration. By recognizing in knowledge a fundamental coordination role, companies should define and implement an organizational model which connects knowledge workers in order to create, share and utilize knowledge, establishing an atmosphere fit for the corporate culture and work style, and which organizes a community for the sharing and creation of important knowledge and maintaining future competitive advantage.

The paper proceeds as follows: section 2 describes the evolution of the team and group perspective from Communities of Practice through to Community of Innovation. Section 3 presents a case study based on the definition and implementation of MindSh@re, an original organizational model based on Communities of Innovation, which represents the key pillar of the technology governance of Corporate Finmeccanica. By applying a community's perspective to our case study, section 4 highlights and summarizes the strategic and organizational processes that contributed to MindSh@re's success.

2. Community of innovation in knowledge management

A great deal of academic and research output has been generated in the area of understanding knowledge as identified with an organization (Purani and Nair, 2007). It is well known how companies are increasingly rethinking the fundamental ways in which they generate ideas and bring them to market. Team working is fundamental and the skills balance of a team is important in determining innovative capacity. This balance within teams, or the emphasis given to different skills, should vary according to the technological or social emphasis of the work (Lemon and Sahota, 2004).

Within an organization, knowledge-creation plays a key role in value creation and hence in innovation. Value creation in knowledge-creating companies emerges from interactions among individuals (both internal and external personnel or researchers) and is not restricted to the physical place.

The concept of "Ba" was originally proposed by Nishida (1990) and was further developed by Shimizu (1995). The "Ba" can be thought of as a shared space for emerging relationships. What differentiates "ba" from ordinary human interaction is the concept of knowledge creation. "Ba" provides a platform for advancing individual and collective knowledge. "Ba" exists at many levels and these levels may be connected to form a greater "Ba". "Ba" is of fundamental importance for knowledge creation, and this creative process is amplified when all the "Ba" conjoin to form a community.

The establishment of Ba to support communities is one of the most important strategies for a company to maintain its future competitive advantage. It is important for the company to design and organize a community structured by people with a number of experiences and knowledge on a specific object in order to create and share important knowledge (Nomura, 2002; Wenger and Snyder, 2000).

Communities of practice (CoPs) are defined as knowledge creation and sharing networks of individuals bound by informal relationships, which share similar work roles and a common context (Coakes and Smith, 2006; Cross et al 2001; Kimble and Hildret, 2005; Wenger, 1998). CoPs differ notably from conventional units of organization, such as teams or working groups. Teams and groups are task orientated, are often launched for a specific purpose, and have formal requirements for membership. CoPs, by contrast, have an informal membership that is often fluid and self-organizing in nature. The concept of "practice" refers to the dynamic process through which individuals learn how to do their jobs by actually performing tasks and interacting with others performing similar tasks (Lesser and Prusak, 2000).

When appropriately supported by the formal organisation, Communities of Practice are one of the major building blocks in creating, sharing, and applying organisational knowledge. Successful membership of a community implies support for the culture of that community and a shared vision by the members.

Unlike Communities of Practice, knowledge communities, which are small groups of people who have worked together over a period of time and distinguishes by teams and tasks force, are networks of collaboration organized by the firm for the purpose of supporting specific subject needs within an organization, filtering knowledge for potential value, and accessing the expertise of units horizontally across the company. Knowledge communities, usually, are formed with the aim of facilitating available knowledge domains, common interests across the organization, and synergies through sharing of internal best practices.

A particular form of CoPs is constituted by Communities of Innovation which are self-organizing groups of highly motivated individuals working together towards a common goal, not because of orders from their superiors, but because the members of a Community of Innovation share the same goal and are convinced of their common cause.

Communities of Innovation can be considered one of the supporting organisational forms for innovation, since they are very specifically dedicated to the support of innovation, and their formation and sustainability are the responsibility of those individuals charged with organizational entrepreneurship (Coakes and Smith, 2006). More specifically, Communities of Innovation work through collaboration with other communities, organizations, and also communities in other organisations - inter-and intra-organisationally.

The current environment, characterized by flat organizational structures and the interdependence of tasks, requires a network approach in the design and establishment of team working. X-teams, which are externally oriented and adaptive teams, have emerged to meet that need (Ancona et al., 2002). In particular, X-teams manage across boundaries and work in connection with other groups both inside and outside the company.

The evolvement from Communities of Practice towards Communities of Innovation and X-teams can be developed and extended from a group to an organizational perspective. For years, the approach to innovation has consisted of research based on the "right way" to bring new ideas to market; companies have invested in internal R&D in order to discover the best and greatest number of ideas with respect to competitors. Nowadays, companies are developing a new innovation approach, which refers to the “Open Innovation” model. According to this model, an organization should not restrict the knowledge that it uncovers in its research to its internal market pathways and should commercialize its own ideas and the innovations from other firms in order to seek ways to bring its proper ideas to market by deploying pathways outside its current businesses (Chesbrough, 2003). A company that is too internally focused is prone to miss a number of opportunities of innovation, since many of them could fall outside the organization's current business, or may need to be combined with external knowledge, technologies or ideas of application to unlock their potential.

3. The case study

This section analyzes a case study based on the definition and implementation of MindSh@re, which is an original organizational model based on Communities of Innovation, that represents the key pillar of the technology governance of Corporate Finmeccanica.

3.1 The business context: A complex patchwork of different in nature companies

Finmeccanica is the second European player in the Defence Electronics market and the sixth worldwide. This position stems from the recent agreements with BAE Systems (in the UK) that led to a cluster which includes Selex Sensors and Airborne Systems and Galileo Avionica, Selex Communications, Selex Sistemi Integrati and DRS Technologies (in the US). These four companies are active respectively in avionics, military and secure communications, air traffic control and management. The group also includes Elsag Datamat, which designs and produces information technology systems and solutions for automation, security, transport, defence and space. Finmeccanica is also the world leader in the helicopter and tilt rotors market, manufacturing state of the art complete tactical airlifters, combat aircraft, training aircraft and unmanned air vehicles for both

civil and military applications.

In the Space sector, with the French company Thales, Finmeccanica has created Europe's leading operator in the form of two joint ventures, Thales Alenia Space and Telespazio, which operate in satellite construction and satellite services management respectively. Finmeccanica is also a world recognized technology leader in the design, development and production of missile systems, torpedoes, naval artillery and armoured vehicles, where it is active through the MBDA joint venture, the major European missile systems company, and it's wholly owned subsidiaries Oto Melara and WASS, each of which is a leader in its field.

Finally, in the Energy and Transportation sectors, Ansaldo Energia, Ansaldo STS and AnsaldoBreda are Finmeccanica's specialists in the production of energy, railroad signalling and rolling stock for mass transit systems. These diverse and advanced business areas are proof of technological excellence and strategic value for European Industry.

The energy put into identifying new and redefining possible reasoned scenarios combines and seamlessly mixes with an activity of technological governance, which involves an entire group of over 70.000 people and relies on a widespread and continuous alignment between the skills owned and those identified as necessary.

In pursuing the approach to retain its central position in industrial policies, investments need to be made within a wide, though precisely defined, strategic framework in which the passage from technology to products and from these to strategies is constantly focused on the need to keep strategies, organization, processes, human resources and culture of the Group and its operative companies always aligned. This is what mainly spurs the will to connect people in a fertile knowledge network aimed at multiplying the possibilities of sharing know how.

3.2 The MindSh@re project

Since 2002, the Finmeccanica Chief Technical Office, with its Headquarters sited in Rome, has dreamed of creating an organizational model that would harness the skills and the creativity of people throughout several companies and give them a place to share common focus and express themselves by overcoming any limits from the perspective of companies and departments.

For example, people with an aerospace background have reinvented their knowledge within the Energy sector; those from the Energy sector have applied their technical knowledge to the Transportation sector. Transportation people found new stimulus to prove new solutions for dual use (both for military and homeland security) and… so on and so on.

Without that kind of culture of innovation, implemented by a project that has become an organizational model (as will be depicted in the following), innovation in sectors strongly conservative as ASDET is far more difficult to achieve.

The MindSh@re project is the establishment of a disciplined, repeatable and scalable knowledge model, a process of creating organizational and funding mechanisms that support KM and innovation creation, designing a social system that can spark new ideas and enable critical pro-activity.

MindSh@re's Vision is to be the "Unconventional Engine for Value Innovation" within Finmeccanica. The MindSh@re Mission (Figure 1) is represented by 7 key elements, each of which is a specific working area that needs to be addressed in order to allow each Community to become an Unconventional Engine for Value Innovation. Each area is presented with a number of suggested actions (the list is not exhaustive), which will help each Community to identify objectives and steps in line with MindSh@re's overall Vision.

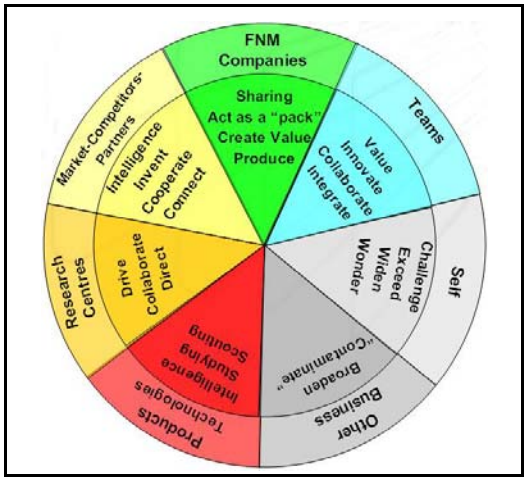

Figure 1: MindSh@re Mission

The following paragraphs present an in depth analysis of the MindSh@re organizational model, but through Figure 2 it is possible to represent this organizational model as a 3-tier meta-organization though more than 30 Companies that have adhered to this Corporate initiative.

3.2.1 Top-level organizational structure

At the first tier, the organizational framework of MindSh@re is composed by 4 entities:

- MindSh@re Board (MB),
- MindSh@re Project Team (MPT),
- MindSh@re Communication Office (MCO)
- MindSh@re Secretary (MS).

All these small teams are composed by Finmeccanica Spa (Corporate) people and specialists from external consulting companies, which altogether represent the Chief MindSh@re Office (CMO). The CMO has in its charge the strategic governance and coordination of the existing communities. Since it is made up of several top-managers from the Chief Technical Office of the Corporate, it represents the key sponsors within Finmeccanica and the live link to the other key Departments of the Corporate involved in the project (internally), such as Human Resources and Strategy, and to the Operational Companies' Top Management (externally).

Hence, the CMO is set of those 4 bodies and is committed to run the implementation of the whole project and to represent the strategic decision board.

In particular, the MB plans strategic activities of all communities of innovation by allocating investments at corporate level; it represents the table where Chairmen of communities draw the Strategic vision of the project and its operative arm is the MPT, whose role is to support the MindSh@re Board in the implementation of the strategies, to continuously assist the chairmen of communities, and to monitor performances by means of the MindSh@re Performance Monitor (MPM) Furthermore, the staff body is completed by the MCO, which is a team focused on marketing and advertising the activities and the MindSh@re brand internally to Finmeccanica's Companies, as well as externally to Universities, Customers and even Competitors. Finally, the MS completes the structure; it is responsible for the improvement programmes of MindSh@re's people (i.e. organization of seminars, coaching and logistic support, skill inventory, etc.)

It is important to consider that the CMO is the only body in MindSh@re where hierarchical relationships exist among managers (Board) and personnel (Project Team, Communicators, Secretaries and Consultants); elsewhere the structure is absolutely flat and de-structured, as to form a meta-organization. A fundamental feature to sustain this structure is the social relationship style that people have to acquire acting in MindSh@re: it should be direct and informal because people have to feel important (and they really are) and free to express themselves with each other.

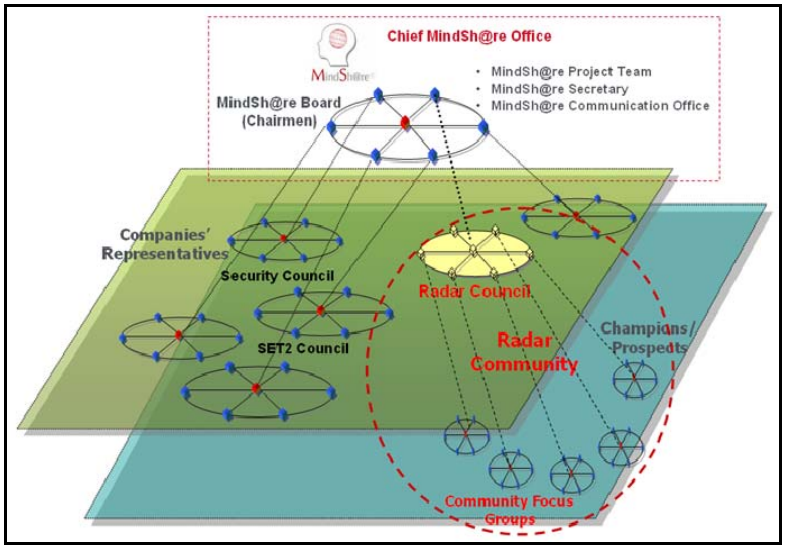

Figure 2: The overall structure of MindSh@re

3.2.2 Middle-level organizational structure

The second tier of the model is formed by the Communities. Since the reference model is the communities of innovation, the original solutions put in place to govern hundreds of involved people coming from diverse company cultures, managerial styles, and behaviours consist in forming an initial board composed by the official delegates of the companies that together set up the Community Council. Council members represent the formal interface between MindSh@re and the operative Group's Companies in order to guarantee the alignment of their own strategies and objectives (at company level) within the general strategy defined for a specific community by the MindSh@re Board (at corporate level).

Currently, there are 6 active communities; Homeland Security, Advanced Materials and Enabling Technologies, Radar Technologies, Logistics and Services, Simulation for Experimentation Test Evaluation and Training, Integrated Environments for Design & Development and Process Improvement. A further two communities are to be created: Intellectual Properties Management and Avionics Software Technologies. Each community gathers the best in excellence of all the Finmeccanica companies in to a single field so as to create a network. The main activities consist of sharing knowledge, spreading and stimulating implementation of best practices, as well as developing innovative projects involving companies belonging (internal) and not belonging (outside) to the Group.

Each Community of MindSh@re is structured along the following different organizational levels:

- Community Steering Committee (CSC),
- Community Council (CC),
- Community Focus Group (CFG),
- Community Project Office (CPO).

The CSC is guided by a designated Chairman and attendees are high level Functional Managers of the Companies. Its responsibilities consist of controlling and coordinating all activities carried out by a community and assuring the dissemination and the concrete transfer of results within their own companies.

The CC is chaired by a Chairman and its members are knowledgeable and experienced employees of companies which should own an in-depth knowledge of the technological and strategic themes relevant to the respective Company. CC begins as a working group that performs start up activities, however once the community is established, it will continue to provide ongoing organizational and strategic thinking support, as well as performance evaluation of projects and the assessment of the achieved results.

On average, each community is active in 6-8 CFGs at the same time. The CFGs are the real engine of the MindSh@re model. They are thematic teams (10 to 15 people) aimed at developing and reaching specific objectives committed by the CC to enhance the knowledge that the CC has identified in its preliminary Assessment (often a Technology Appraisal through the Group's Companies). The specifying functioning of CFG will be explained in the next paragraph.

Moreover, every Community is required to have its own CPO, to support the Chairman and Mentors of CFG. Specifically Project Officers, other than Council participation (at community level) and to the Project Team (at corporate level), have the responsibility of keeping the Strategic Plan of their Community up to date in order to monitor the work ongoing in the Focus Group and be continuously aware of how a community is moving with respect to other communities and the whole MindSh@re evolution.

Any misalignment is be reported to the Chairman and Council and the situation is tracked through the use of a tool know as the MindSh@re Performance Monitor (MPM), which will be presented in paragraph 3.3.

3.2.3 Bottom-level organizational structure

CFGs are Communities of Innovation based on flexible networks of people who share a common interest in a specific area of knowledge. Each CFG is focused on a specific emerging or "disruptive" technology, and operates as an "X-Team". In particular, CFGs are driven by a "Mentor", a coordinator with remarkable leadership qualities. They are composed, in turn, by experts of the various companies with different levels of professional experience: "Champions" have strong expertise on some specific themes and their experience shall be shared as a basis to enable the group to be innovative, pro-active, strongly collaborative, free and creative. "Prospects" are young people with 2-3 years of experience, with emergent talent and strong orientation to growth. These characteristics shall be mixed to feed Prospects with well-proven know-how from the Champions, and vice versa to renew champions know how with younger minds-attitude (Figure 3).

Communities can vary widely in their characteristics. Some have existed for years, while others have disappeared once the purpose has been achieved, both at Community level and at Focus Group level. CFGs maintain and enlarge the external network with Universities and third parties.

This concrete space of team-working provides a vehicle for developing, sharing and managing knowledge (a concrete "Ba"). CFGs generate new knowledge in response to problems and opportunities. Having access to expert help to expand horizons, each member gains knowledge and seeks help in addressing work challenges and provides a non-threatening way to explore or test new ideas.

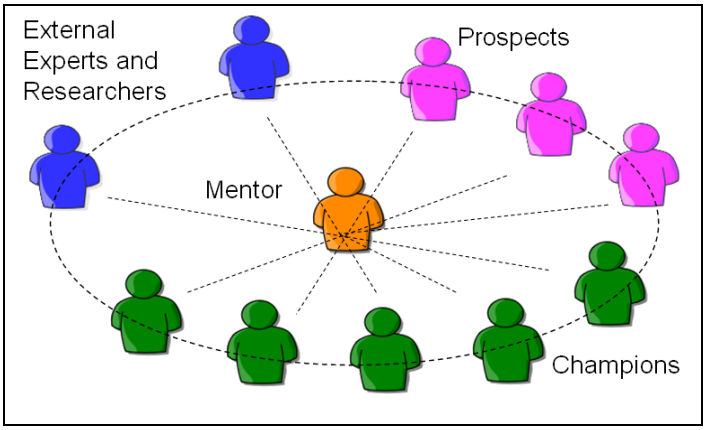

Figure 3: Community focus group

3.3 MindSh@re performance monitor and MindSh@re improvement programme

The MindSh@re Performance Monitor (MPM) is a tool built to support the Council of a specific Community, as well as the whole Community, in the process of monitoring and assessing its performance with respect to the core dimensions of MindSh@re. These are people, process, innovation, and financial results. Each one of the four dimensions is assessed through a number of key items and metrics, which are then compared to pre-assigned target scores. The aim is to achieve a snapshot of the activities and level of growth of the community with reference to the MindSh@re four core dimensions. The MPM is not strictly concerned with the topic of present study.

Whereas MPM provides information to the Council on the basis of performance on strategic objectives, the MindSh@re Improvement Programme is the tool created with regard to people involved in the project and is concerned with their way of communicating, their approach to team working and feeling part of the MindSh@re culture. The MIP was created to help the existing communities to become more efficient, effective and handle common issues and challenges.

The MindSh@re Improvement Programme consists of a structured framework for developing communities of innovation within MindSh@re. The existing communities access at different levels of support and resources based on their achieved maturity level within MindSh@re (Figure 4). The framework is structured in four different levels, which represent the different steps at which a community has to take in order to enter and use the programme: engage, align, innovation, ambassador. As with the MPM, the MIP is not strictly concerned with the topic of present study.

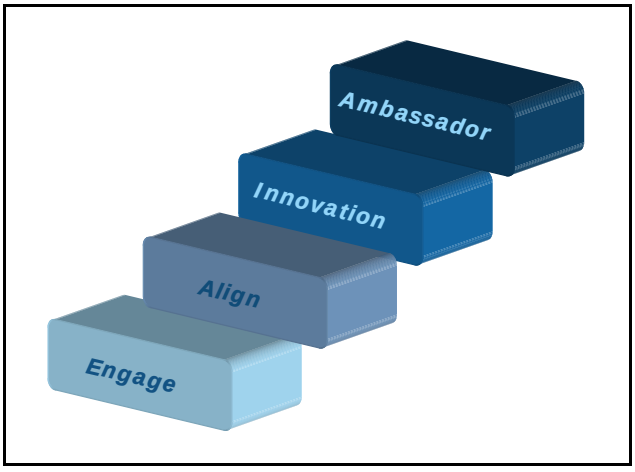

Figure 4: MIP growth stages

4. Results and discussion

This case study provides a concrete impact example of a KM organizational model in pursuing a real culture transformation by using an integrated mix of processes and methodologies applied to people, technologies and knowledge.

In companies, such as Finmeccanica, where KM has not been compressively introduced from the very beginning, there's no doubt at all that the ideal tool for mining innovation, corporate integration and business-related knowledge capitalization is a pervasive KM organizational model.
The following results illustrate the benefits derived from the implementation of MindSh@re:

- More than 600 of Finmeccanica's best resources are currently involved per year. Since 2002 over 2000 engineers, sales managers, business development managers, consultants and external experts and researchers, from 30 Italian and 4 UK companies, have been involved in MindSh@re.
- Around 40 CFG are active at the heart of a collaboration network (more than 3500 external resources involved) of with one hundred Universities, Centres of Excellence and Research Institutes spread across Italy and Europe.
- Over 70 M€ external grants have been received from National and European funding bodies.
- More than 10 M€ of internal savings have been achieved.

- 5 M€ has been invested in sponsored R&D Projects on emerging technologies.
- 4 inter-company laboratories (Systems Engineering, Mechanical Design and Digital manufacturing, Electronics and Radar technologies) have been put in place.
- More than 300 Technological Workshops have been organized.
- Two national conferences were organized in 2006 and 2008 (MindSh@re Event), in collaboration with the Italian Minister of Defence, to promote innovative solutions born in MindSh@re's CoI.

Certainly, one key to a successful KM approach is a close connection with ongoing business activities that can stimulate employees to share their minds in order to grow themselves. This is possible only by a well-oiled instrument focused on enabling employees to communicate and exchange their know-how through a continuous and pervasive support of strategic actions, languages and tools, meetings (both physical and virtual), and a high-level commitment.
It is the opinion of the authors that MindSh@re is all of that. The following key organizational pillars represent the empirical evidence of the achieved results:

- Strong governance and commitment to the project from the Corporate Level (**MindSh@re Board)**;
- Strong central recognition of people and the effort on supporting their evolution (**Improvement Programme)**;
- Strong monitoring of performances in pursuing the strategic objectives (**Performance Monitor)**;
- Extensive use of project management best practices applied to communities through the planning, execution and monitoring of activities (**Community Strategic Plans**).

Naturally, several problems have been already overcome. Firstly, the reluctance of companies (i.e. commitment to the project, attitude to change, will to share crucial or distinctive technological knowledge) that in some cases are still competing with other companies of the Group. Secondly, the strong difference between the company social climate and MindSh@re culture; finally, the multi-nationality and languages barriers.

In conclusion, MindSh@re's success may be measured by its ability to be a vehicle for the establishment of a common culture of innovation within a great corporate. As human factors foster innovation, the generation of new ideas and new talents have found a place where Finmeccanica employees can express their knowledge and mind-attitude to be innovative.

Acknowledgements

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Knowledge Management for Small and Medium Enterprises in Developing Countries – Uganda: A Studio Based Approach

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Abstract: In developing countries, many Small and Medium Enterprises (SMEs) collapse at start-up, due to complex factors. Knowledge shortage and incomplete information are their key challenges as a result of obsolete technology and exposure. However, the Government of Uganda plans to establish nationwide knowledge service centres to serve as one-stop-shops in its Vision 2035 (CWS, 2007). These are meant to provide entrepreneurs with complete information with an aim of increasing survival rates and improving knowledge circulation. Viable solutions are at stake for developing countries due to their level of infrastructural development. However, to enable them to leap frog into the future, Information and Communication Technology (ICT) can facilitate their knowledge sharing. SMEs survival is determined by the amount of knowledge they have and how they manage it in decision making. This paper promotes the studio based approach as a practical solution to enable SMEs bridge knowledge asymmetric problems. This paper will benefit local communities in developing countries and the academic field. The studio will provide service sharing and decision enhancement to SME stakeholders and supplement techno-centric, social-cultural centric and access-centric Knowledge Management (KM) approaches. The problem this paper aims to answer is "What are the KM approaches available that can provide effective support to facilitate national and regional ICT-enabled knowledge service centres to act as one-stop-shops for improved knowledge sharing in the context of a developing country like Uganda?" The scope of this paper will entail a literature review of KM approaches. This will be achieved by exploration of existing information in key KM journals. This paper aims at providing a theoretical backup for the use of KM studio in Uganda's knowledge service centers. As a result the KM studio will be a viable solution to SMEs in other developing countries.

Keywords: Knowledge Management, SMEs, Studio

1. Introduction

The recent decades have shown keen interest in Knowledge Management (KM) (Kalkan, 2008; Mchombu, 2007; Nunes *et al*., 2006; Turban *et al*., 2004; Finneran, 1999; Chan and Chao, 2004; Graham, 2004). Techno-centric mechanisms are increasingly being used for knowledge sharing (Van der Leeden, 2007; Mchombu, 2007; North and Hornung, 2003; Canton, 2003; Tapscott, 2003). Knowledge has become one of the critical driving forces for business success. As a result, it is treated as a tangible resource, business currency and a key to organizational power shift (PWC, 2008; Wong, 2005; Dalkir, 2005; Stiglitz, 1999; Nonaka and Takeuchi, 1995). Stiglitz (1999), emphasizes the need for indigenous techno-centric KM solutions as we shift to a knowledge-based economy.

Nonaka and Takeuchi, (1995), first conceptualized KM in large manufacturing Japanese firms as the reason for their dynamic innovation. Initially, KM was considered for large, multinational, international companies that could afford luxurious positions like Chief Knowledge Office (CKO) (Wong, 2005; Van der Leeden, 2007). However, the KM inferno slowly caught up with the Small and Medium Enterprises (SMEs) as they could not afford to be left in the "sea of backwardness" in this modern Internet era. SMEs realize the need to maintain KM repositories which are on the increase (Van der Leeden, 2007; Graham, 2004; Sujatha, 2007). In order to remain relevant in the current business circles, it is vital for SMEs to venture and invest in KM. Nonaka and Takeuchi, (1995), claim that such SMEs will always have a higher competitive advantage and survival in comparison to those that do not venture in KM. KM is significant for SMEs since they are relatively dynamic, agile and more ready to learn as compared to larger ones in a new business environment (Handzic, 2006; Nunes *et al*., 2006; North and Hornung, 2003; Kremp and Mairesse, 2002). It is in this view that SMEs should invest in KM techniques.

In Vision 2035 (CWS, 2007), SMEs are considered key components of Uganda's economic development agenda. This is a national plan for the long term economic development of Uganda

which accords SME development high priority (CWS, 2007). The SME sector is required to not only contribute significantly to the national economy but also to become the primary foundation of the country's industrialization and poverty alleviation programmes (EIB, 2008; CWS, 2007; Ssewanyana and Busler, 2007; Ssewanyana, 2007; Kasekende and Opondo, 2003; Farstad, 2002; Mantica and Ssendawula, 2002). SME techno-centric KM approaches have received global UN support to all African countries (Annab, 2001). This is in line with the Millennium Development Goals (MDG's) and Poverty Eradication Action Plan (PEAP) goals 2015 which aims at "eradicating extreme poverty and hunger" (MDG, 2003; PEAP, 2003). In order for Africa to leap frog into the future, Annan, (2001), persuades African leaders to participate in the information society.

It is Uganda's aspiration in Vision 2035 (CWS, 2007) to achieve the following:

- 4 million operational SMEs,
- SMEs to contribute 40% towards GDP,
- SMEs provide employment to 5 million people,
- SMEs contribute 40% to the export earnings,
- 40% of the SMEs involved in manufacturing activities,
- 50% of SMEs are owned by women,
- 5% of SMEs are involved in agriculture and related services and survival rate of SMEs is at least five years.

The governments plan is to establish nationwide "Knowledge Service Centres" to serve as 'One-Stop-Resource Shops' for complete information sharing which includes: project profiles, project reports, market surveys, sales promotion, trade fairs, inter-regional trade promotions, selection of technology, plant and machinery details, joint ventures, and bids for public contracts. Therefore, there is a great need to establish ICT knowledge service centres to serve the purpose of information and knowledge sharing regionally and nationally.

For purposes of this paper, the researcher used the following definitions of Knowledge Management, SMEs and a studio. According to Awad and Ghaziri, (2004), **Knowledge Management** is defined as a process of creating, collecting, organizing, refining, disseminating, and maintaining knowledge such that it is utilized by the stakeholders within an organization.

A Small Enterprise employs maximum 50 people, annual sales/revenue turnover of maximum 360 million Uganda Shillings (UGX) (approximately United States dollars (USD) 215,000, or Euro (€) 137,000) and total assets of maximum 360 million UGX. A Medium Enterprise employs more than 50 people with a maximum of 500 people; annual sales/revenue turnover of more than 360 million UGX (approximately USD 215,000, or €137,000) and total assets of more than 360 million UGX (UIA, 2008; Hivos, 2008; CWS, 2007; UBOS, 2007; Okello-Obura, 2007; Ssebugwawo, 2007; Hinton, 2006; Kasekende and Opondo, 2003).

Keen and Sol, (2008), define a **studio** as an interactive environment in which suites are deployed and often implemented as web portals with a clear purpose of decision enhancement. They further state that studios bring together stakeholders, lead announcers, chairpersons, teachers, facilitators and content expert guides to coordinate discussions during decision making.

2. Objectives

The aim of this paper was to provide a KM approach for the establishment and design of knowledge service centers in Uganda.
The specific objectives of this paper were:

- To explain the various KM approaches in literature.
- To establish the studio based approach as a suitable method for knowledge sharing.

3. Methodology

The researcher used an exploratory research approach to identify the key KM contributions from literature. Various approaches were identified and analysed based on their strengths, weaknesses and opportunities. This was carried out with an aim of identifying a viable solution for developing

countries like Uganda. The literature review was carried out over a period of six months revealing three major KM approaches from its inception as illustrated in the results section below.

4. Technology description

A studio is a modern approach used in developing countries with various ICT constraints (Muniafu, 2007; Mulira, 2007). In addition, a studio combines services that enhance tacit knowledge sharing. For purposes of trust and openness, the group support system concept is adopted in knowledge sharing (Woo, 2005). The diagram below looks at the four major decision enhancement facets namely: stakeholders, suites, expertises and the decisions with a domain (Keen and Sol, 2008). In a studio, invitations are made by participating stakeholders hence bringing domain experts and suite designers in a shared environment.

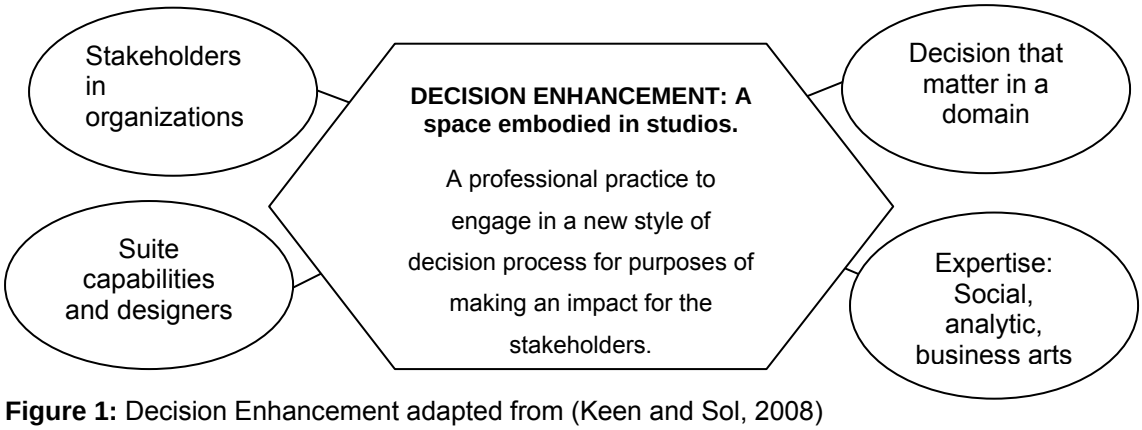

Figure 1: Decision Enhancement adapted from (Keen and Sol, 2008)

A studio is the base for recipes and suites bringing decision enhanced services into action for contextual problem solving. It uses proven off-shelf software, like group support systems to ensure quality and minimise human error (Keen and Sol, 2008). During active studio interaction, knowledge is generated and stored for future reference. This can be accessed by other stakeholders at their time of convenience using available, affordable technology. This KM approach will place ICT in Uganda at its fore place as an enabler to all KM asymmetric problems.

5. Developments

The studio based approach is a term formulated by (Keen and Sol, 2008) as a suitable means of handling complex, wicked, ill-structured, and conflicting issues in society. The studio based approach has been used in solving complex problems as explained below.

A learning studio for coordinating distributed work (Laere, 2003; Keen and Sol, 2008). This studio was built as a simulation game to enable teams of the Amsterdam police coordinate distributed work. It enabled the police to evolve their decision principles for a new mode of tackling the conflict of division of functions, and expertise in an integrated way. The learning studio was successful and the police were able to achieve effective coordinated activities.

ICT Logistic Studio in transition countries (Muniafu, 2007): Muniafu, (2007), was able to handle a complex situation of transport scheduling in a rural transition country that is South Africa - Karoo. His aim was to get a solution to conflicting interests of transportation parties using ICT services available.

Implementing Inter-organizational Service Systems (Mulira, 2007): Mulira, (2007), was able to come up with a studio that supported inter-organizational service systems in volatile contexts. The study was in Uganda handling collaboration within three universities that is Makerere University, Kyambogo University and Uganda Martyrs University Nkozi. The studio was used to enhance decision making within the inter-organizational service systems, among independent actors with divers technical infrastructure and scarce resources.

Business engineering and mobile services (Wang, 2007): Wang (2007), developed a simulation studio that supported the effectiveness of business engineering and mobile services. His aim was to visualize how order generation, scheduling or dispatching, service execution, service reporting and

billing procedures would be accessed using mobile services to enhance decision making. The studio enabled the stakeholders simulate and forecast using mobile technologies to support business functions.

6. Results

From the exploration of literature over a period of six months various KM approaches were identified as in the table below. There are three major KM theories namely: techno-centric/information era, learning-centric (social-cultural centric), and access centric.

Table 1: Knowledge Management approaches

Knowledge Management Approaches	Contributors	Knowledge Management Issues
1.Techno-centric	(CMC, 2006; Mchombu, 2007; EKC, 2008; Skyrme, 2002; Skyrme, 2005; Nonaka and Takeuchi, 1995; Boisot, 1987; Canton, 2003)	Technology centred and focused on delivering information to support a task.
2.Socialcultural centric	(Liebowitz and Wilcox, 1997; Demerest, 1997; McAdam and McCreedy, 1999; Kidwell *et al*., 2000; Mchombu, 2007; Wiig, 1999; Canton, 2003)	Knowledge as a new source of competitive advantage. KM success during this era relied on social and cultural changes.
3.Access-centric	(Tapscott, 2003; Estacio, 2006; Van der Leeden, 2007; O'Dell, 2008; EKC; 2008; Canton, 2003; Malhotra, 2004; CMC, 2006)	Total knowledge visibility across the supply chain and within the organization. Emphasis on social computing, wisdom of crowds, and social networking.

Techno centric KM approach was the first generation that focused on delivering information to support specific tasks. It handled knowledge and individual performance but was not concerned with knowledge creation and organizational learning. During this era, the terms "tacit" and "explicit" knowledge were formulated (Nonaka and Takeuchi, 1995; Boisot, 1987). Simultaneously, this age focused on business technology enterprises which centred on storing, categorizing, and delivering information (Canton, 2003).

The second generation of KM was social-cultural centric. This era regarded knowledge as a new source of competitive advantage. It focused on knowledge as an intellectual capital asset and was concerned with knowledge creation, sharing, and diffusion (Liebowitz and Wilcox, 1997; Demerest, 1997). During this era, KM success relied on social and cultural changes which linked knowledge within the social and learning processes of organizations (McAdam and McCreedy, 1999; Kidwell *et al*., 2000). This age mainly considered two approaches that is the system-oriented and peoples centric criteria (Wiig, 1999). At some stage in this era, business technology progressed into e-business and e-commerce (McAdam and McCreedy, 1999; Kidwell *et al*, 2000; Canton, 2003). In analysis, this stage furthered the techno centric approach and improved on the human and machine interaction.

The current generation of KM is access-centric or knowledge liberation era. It focuses on total knowledge visibility across the supply chain and within an organization (Tapscott, 2003; Estacio, 2006; Van der Leeden, 2007; O'Dell, 2008; EKC; 2008). In this emerging generation, technology will progress into knowledge driven enterprise networks (knowledge engineering). This is concerned with packaging of content, and knowledge reuse. The capacity of organizations to find the right information and get it to the right person at the right time is improved (Canton, 2003; Estacio, 2006; Van der Leeden, 2007). This era spans all four phases of KM in organizations namely: construction, dissemination, use, and embodiment of knowledge (O'Dell, 2008). The theme of this emerging era is access to the right knowledge at the right time and the recognition of the crucial role of social capital. Social capital allows shared commitment to others which makes collective action possible in this modern organization (Malhotra, 2004; Estacio, 2006; O'Dell, 2008). Within many companies, collaboration involves generating distinct types of communities of purpose like: teams, task forces, or groups with a focused mission and set of deliverables (CMC, 2006).

We are in a new edge of KM where three forces are at work: Social computing, wisdom of crowds, multiple generations and social networking (O'Dell, 2008). In addition the locus of control is moving from institutions to individuals, communities and self-organized networks. Users pick and use tools of choice to invite, collaborate with whom they want. Studies carried out by O'Dell, (2008) reveal that 1/5 of the worlds internet users have profiles on world wide registered social networking sites some of which include: my space with approximately ~100 million, facebook ~69 million, linked ~20 million, and Twitter with nearly 1 million clients. In addition, the numbers are wikis, blogs, mashups, and folksonomies and mobile computing technologies (, 2008;, 2007).

This research will seek to support and forward techno-centric, social-cultural centric and access-centric KM approaches by combining them in a holistic studio based approach desired to provide support to the knowledge service centre for SME stakeholders in Uganda.

7. Business benefits

The studio environment enhances decision agility as illustrated below. It creates opportunities for speedy, adaptive, coordinated, collaborative, and innovation among its participants.

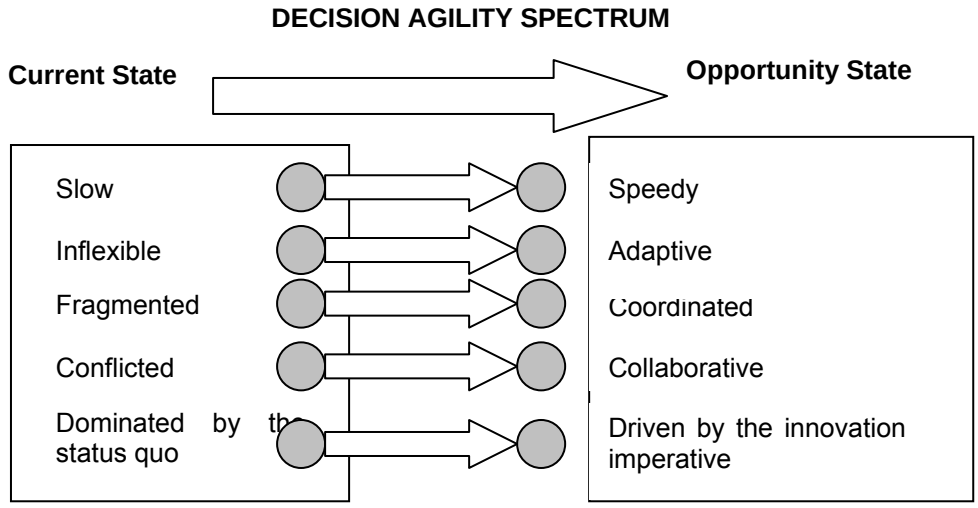

Figure 2: Decision Agility Spectrum Adapted from (Keen and Sol, 2008)

Keen and Sol, (2008), suggest that business agility is for our generation since it acts as a stepping stone to the next generation. It has the following characteristics:

- **Businesses** are moving towards inter-organizational dependency, alliances, value networks, erosion of public-private dichotonomy, large business enterprises and SMEs getting involved in KM with an aim of survival.
- **Decisions that matter:** an environment of unprecedented complexity, volatility, competitive pressures, pace of change and uncertainty, where the future is constantly at risk.
- **Executives:** enlarged responsibilities, demands for leadership, collaboration as an imperative and recognition which is an issue for organizations innovation.
- **Technology**: multimedia interfaces, data resources, websites, intranets, new web services, networks, mobile communications, and visualization.
- **Organizational arrangements:** networks rather than hierarchies and functional departments, geographically distributed teams, the virtual organization as a reality rather than a neat concept, co-sourcing/out-sourcing partnerships in core business process, constant re-organization, empowerment, re-engineering, restructuring and think global act local as the watch word.
- **Knowledge**: resources, distributed information, need for mobilization of teams in a flexible and adaptive unit of work.
- **The economy** demands for shareholder value, capital efficiency, immense pressure on revenues and margins, constant cost tresses and budget crunches.
- **Society**: In the 21st century, everything seems different, nothing certain, and the future full of risks, including the risk of ignoring key trends until too late.

- **Security** as the primary requirement for access to the portals. As the number of links increase, it gets difficult and sophisticated to manage balanced access control, communication and information security.

The studio based approach will allow customization of information and knowledge in the knowledge service centres to be established in Uganda for enhanced decision making and collaboration among participating stakeholders.

8. Conclusions

This paper presented an overview of the studio based approach as an appropriate, holistic, and preferable approach of KM in the setup of knowledge service centres in Uganda. Despite SMEs facing financial constraints, the studio based approach remains a suitable, viable solution that will enhance collaboration between stakeholders. It will further boost knowledge exchange, creation, collection, organization, retrieval, dissemination and knowledge reuse. The major aim of this paper was to seek viable KM solutions for developing countries like Uganda. However, in order to establish knowledge service centers in Uganda, there is a great need to establish requirements from SME stakeholders on what and how they can participate in its content as key users. This will enhance the studios effective usage and adoption for knowledge collection, sharing, dissemination and retrieval.

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Intellectual Assets and Small Knowledge-Intensive Business Service Firms

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Abstract: The increasing economic focus on knowledge has spurred the growth and development of knowledge-intensive business service (KIBS) firms. This paper focuses on how small KIBS firms manage their knowledge-based processes, or what we term intellectual assets, as part of their strategic management approach for creating competitive advantage. Intellectual assets are defined as recordable intangible corporate assets, including assets such as the name of a firm or organisation, reputation and goodwill, as well as brands, trade secrets, business processes and know-how. We develop a typology of intellectual assets consisting of organisational capital, network capital, and intellectual property. The methodological approach is novel in that it utilises the results of an online benchmarking tool allowing firms to gauge their intellectual asset base in comparison with other firms. Based on data from a sample of small KIBS firms located in Scotland, we find that approaches to the strategic management of intellectual assets varies significantly according the size and type of KIBS firm. Differences in these approaches impact on the development of effective innovation processes, with resource deficiencies in smaller firms constraining their innovation capability. It is argued that intellectual assets are critical in securing competitive advantage among knowledge intensive firms. It is found that the relative development and accumulation (resource base), effective utilisation (value creation), and value (strategic importance) attached to particular types of intellectual asset varies considerably. Many firms have prioritised development and investment in ICT infrastructure and less so assets such as customer development, quality accreditation, and competitor intelligence. Overall, the inability to create value from intellectual assets, especially those relating to new product development, is restricting the development of effective innovation processes, with innovation more likely to be undertaken via less formal and systematic channels. New technology-based KIBS firms are less likely than their traditional professional service KIBS counterparts to have effective formalised learning systems in place, and generally operate within a more 'fluid' working environment. As well as sub-sector, firm size is strongly associated with the accumulation of intellectual assets. Smaller KIBS firms generally possess less resources related to both their organisational and network capital, as well as intellectual property such as patents, copyrights, and trademarks. Measures of absorptive capacity indicate that firms perceive gaps in their ability to assimilate and apply knowledge which they recognise to be of strategic importance. It is concluded that small KIBS firms face particular challenges in managing the innovation process and establishing sustainable knowledge management practices, and may benefit from targeted policy intervention.

Keywords: Intellectual assets; knowledge-intensive business services (KIBS); small firms; resource-based view; value creation; absorptive capacity; innovation

1. Introduction

The increasing economic focus on knowledge has spurred the growth and development of knowledge-intensive business services (KIBS) to such an extent that they have become one of the fastest growing sectors in advanced and developing economies, as well as an increasingly important source of innovation (Miles and Boden, 2000; Wong and He, 2002). The KIBS sector covers activities such as computer services, R&D services, legal, accountancy and management services, architecture, engineering and technical services, advertising and market research (Miles, 2005). KIBS firms are a subset of business services and can be grouped into two main categories, namely: traditional professional services, such as advertising, marketing and architectural services; and new technology-based KIBS firms, consisting of software design, engineering services and computer-related activities (Miles, 2005). Unlike other studies of KIBS firms, which usually concentrate on how KIBS firms support other firms in the management of knowledge and generation of innovation, this paper focuses on how small KIBS firms manage their own knowledge processes as part of their strategic management approach for creating competitive advantage. The paper operationalises the concept of intellectual assets, which we distinguish from intellectual capital – assets being based on ownership or proprietorship, and capital on stocks – to study a sample of small KIBS firms located in Scotland, a region of the UK with a high preponderance of small firms. The methodological approach is novel in that it utilises the results of an online benchmarking tool allowing firms to gauge their intellectual asset base in comparison with other firms. The study draws on concepts from the strategic management literature, such as the resource-based view of the firm (Wernerfelt; 1984; Barney, 1991)

and absorptive capacity (Cohen and Levinthal, 1990), to understand how small KIBS firm value, accumulate, and utilise their intellectual assets.

2. Conceptual framework

The terms intellectual assets and intellectual capital are often used interchangeably are part of the discourse examining knowledge-based resources. However, we identify differences between the two concepts. Intellectual assets are part of the stock of institutionalised knowledge a firm *owns* over time, while intellectual capital is the total stock of knowledge a firms may have access to at any given time (Walsh and Ungson, 1991; Subramanian and Youndt, 2005). We define intellectual assets as recordable intangible corporate assets, including assets such as the company name, reputation and goodwill to the company, as well as company brands, trade secrets, business processes and know-how. Intellectual assets are context specific and what a firm can and cannot influence depends on many factors, which may make one firm include as an intellectual asset something that another firm would not (Bontis et al., 1999). In defining intellectual capital, Edvinsson (1997) provides a classification consisting of human capital, organisational capital, and customer capital. Adapting this classification, we propose a typology of intellectual assets consisting of organisational capital, network capital, and intellectual property. As a means of determining the role of intellectual assets in small KIBS firms we draw upon a number of concepts from the strategic management literature, such as competitive strategy, the resource-based view of the firm, value creation, competitive advantage and absorptive capacity. Firstly, the concept of competitive strategy refers to means by which firms are able to compete more effectively to strengthen their market position (Porter, 1980). Clearly, a key means of competing effectively is through strategic planning to ensure the optimum allocation and investment of a firm's resources. The resource-based view of the firms recognises that a firm's resources, including their application and transferability, are critical factors in creating and sustaining competitive advantage (Wernerfelt, 1984; Barney, 1991; Rangone 1999).

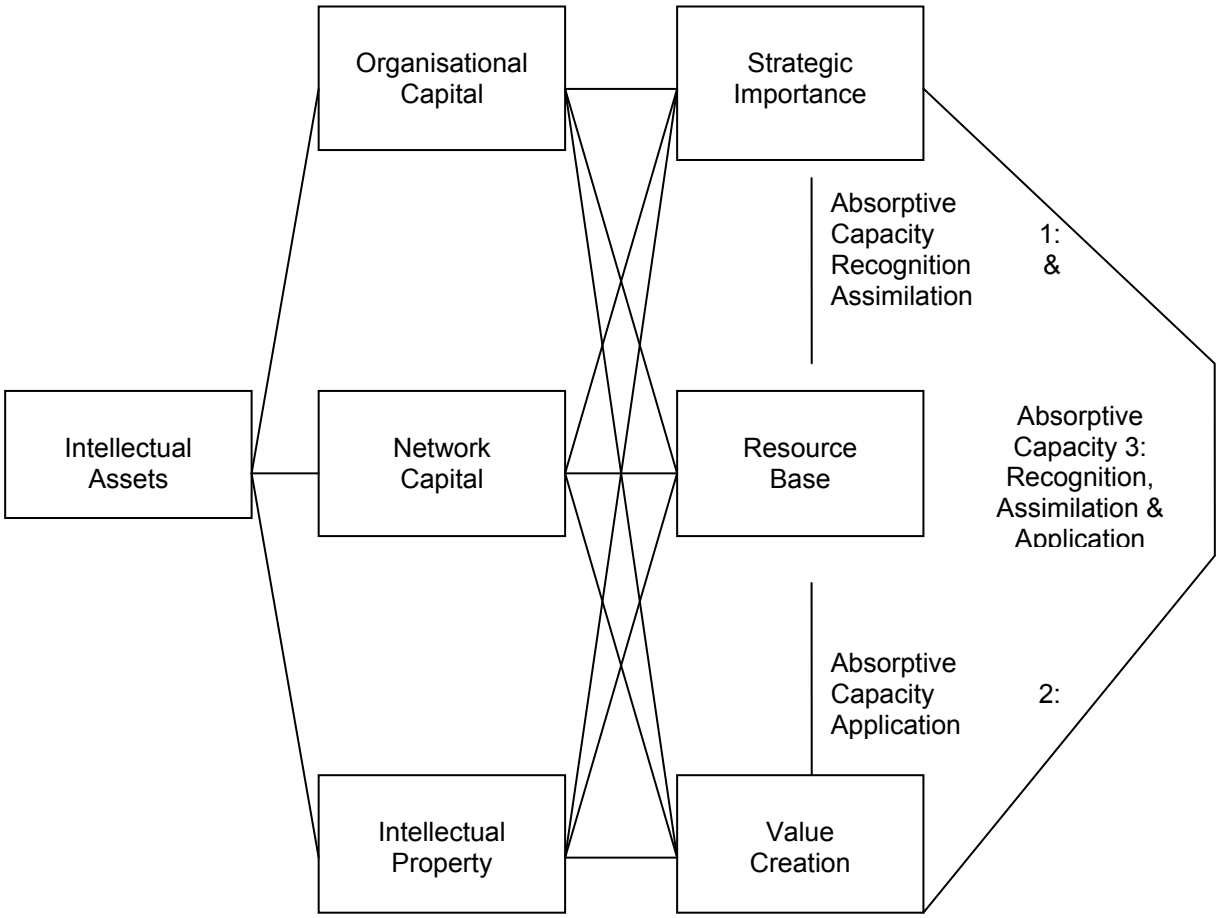
The knowledge-based view of firm is firmly focused on the role of the individual (within a firm) as knowledge carriers and recipients, with the competitiveness of firms dependent on the capacity to aggregate this knowledge (Grant, 1996). This view is consistent with our notion of intellectual assets as the providers of strength and cohesion between individuals and processes (Brooking, 1996). As Grant (1996) highlights, aggregation capacity is dependent on the ability of recipients to absorb transferred knowledge. Cohen and Levinthal (1990) define this ability as absorptive capacity, referring to the capacity to identify, assimilate, and exploit knowledge from the environment. A recent adaptation of the absorptive capacity concept by Lane et al. (2006) identifies three forms: exploratory learning - recognition and understanding of knowledge; transformative learning - assimilation of knowledge; and exploitative learning - application of assimilated of knowledge. As part of our framework, we seek to operationalise these three forms as well as incorporating Zahra and George's (2002) concept of 'absorptive capacity efficiency', defined as the ratio of realised to potential absorptive capacity. Figure 1 summarises the overall conceptual framework underlying our study. In essence, the three forms of intellectual assets can be analysed (and measured) based on their relative strategic importance, resource, and value creation within firms. Absorptive capacity efficiency is analysed (and measured) based on the relationship (and performance differences) between strategic importance, resource, and value creation.

3. Methodology

This study focuses on the role of intellectual assets amongst a group of small KIBs firms in Scotland based on data collected via an online benchmarking tool designed to provide firms with an analysis of their intellectual asset and knowledge management in comparison with other firms. The benchmarking tool was launched in 2006 by Scotland's Intellectual Asset Centre (a public sector agency funded to research and apply leading knowledge management techniques across the Scottish Economy) and takes the form of an electronic questionnaire. As well as collecting background information on responding firms, it collects scale data responses to a series of questions regarding intellectual assets. In total, nineteen different forms of intellectual asset are identified. For each asset an initial definition is provided. Three questions are then asked for each asset relating, respectively to: (1) resource base; (2) value creation; and (3) strategic importance. In the case of resource base, the respondents choose from five options (for which we allocate a five point scoring system). This questioning technique has the advantage of not assuming a priori the relative importance of any asset compared to another, and also allows for clarity in terms of what a particular asset constitutes and its relative resource base strengths and weaknesses. Furthermore, by looking at differences in scores

across the three parameters we are able to assess the relative absorptive capacity for particular assets. Before its launch both the questionnaire and the online system were piloted across a range of firms.

Figure 1: The strategic management of intellectual assets



The online benchmarking tool stores the responses for all completions and provides a report to all respondents. However, as well as being of use to respondents it also provides a useful database for research. In this case we extracted and analysed the responses for 48 KIBS firms operating in Scotland. These firms were requested to complete the benchmarking exercise as part of initiatives operated by the Intellectual Assets Centre between 2006 and 2007. The firms are small in size with the largest having 60 employees, with 73% having less than 10 employees. The average number of employees per firm is 8.5. In terms of sub-sector, 52% operate in the traditional KIBS sectors and 48% operate in the newer technology-based KIBS areas. In the majority of cases, those individuals completing the benchmarking tool were the chief executive or managing director of their company, although in a few of the larger companies the task was undertaken by those with responsibility for personnel/human resource issues.

4. Resource base, value creation, and strategic importance

Initially we provide a comparison of the relative development and accumulation (resource base), effective utilisation (value creation), and value (strategic importance) for each form of intellectual asset. Table 1 presents the average scores for these assets based on the scale system highlighted in the previous section (converted to a percentage), along with the average score across the three areas. The assets which firms have been most effectively able to accumulate and develop as part of their resource base are IT systems, website systems, contact lists, and administrative systems. The focus on information and communication technologies is perhaps unsurprising given the focus of many KIBS on areas such as software and technology service provision. It is also resonates with other findings which suggest that new and small firms engaged in high growth activities tend to significantly invest in and integrate such technology as part their growth plans (Gray and Gonsalves, 2002; Lucchetti and Sterlacchini, 2004).

Table 1: The Resource Base, Value Creation and Strategic Importance of Differing Forms of Intellectual Asset (% of Maximum Score)

	Resource Base	Value Creation	Strategic Importance	Mean Average
Documented Procedures and Technical Information	58.2	61.3	68.6	62.7
Management Systems	57.4	57.1	66.7	60.4
Brand	56.9	62.4	81.4	66.9
Sales Systems	40.3	53.3	73.9	55.8
Distribution Systems	39.3	53.6	64.3	52.4
Administrative Systems	67.3	69.0	75.0	70.4
New Product Development Systems	48.2	45.1	74.4	55.9
Website Facilities	78.8	58.4	75.3	70.8
Intranet and Shared Drive Systems	48.8	51.9	56.3	52.3
Training Systems	47.6	46.3	65.2	53.0
IT Systems	80.0	78.8	80.0	79.6
Marketing and Communication	46.3	45.6	61.3	51.0
Quality Standards, Awards and Accreditation	30.6	48.1	57.5	45.4
Organisational Capital	**53.8**	**56.2**	**69.2**	**59.8**
Contact Lists	67.7	72.0	74.4	71.3
High Profile Customers	65.2	65.2	73.4	68.0
Customer Loyalty and Retention	30.5	30.5	42.1	34.3
Alliances and Collaboration	60.4	59.8	66.5	62.2
Competitive Intelligence	45.0	46.6	63.8	51.8
Network Capital	**53.8**	**54.8**	**64.0**	**57.5**
Intellectual Property	**49.4**	**39.9**	**55.5**	**48.3**

The effective utilisation of intellectual assets for value creation correlates strongly with resource base allocations, indicating that KIBS firms are generally utilising their assets in line with their relative accumulation and development. Those assets firms are most effectively utilising are IT systems, contact lists, and administrative systems. IT systems and administrative systems (in this case defined as relating mainly to financial processes – invoicing, budget tracking, etc.) refer to the basic internal organisational architecture of a firm, while contact lists refer to its network capital and the formalised management of information on external actors with which it is linked. In small KIBS firms the effective management of network contacts is likely to be paramount from a range of supply-chain and horizontal network perspectives, especially knowledge of associates and partners. These actors may be important external knowledge sources, and there is a wealth of complementary evidence highlighting the role of external knowledge acquisition in establishing competitive advantages for small firms (Keeble et al., 1998; Romijn and Albu, 2002; Lechner and Dowling, 2003; Kingsley and Malecki, 2004; Pittaway et al., 2004). The final perspective from which we measure the intellectual assets of KIBS firms is the strategic importance placed on particular assets as a means of creating value. All assets score more highly for strategic importance than for value creation or resource base, reflecting possible gaps in absorptive capacity, which we analyse in more detail later. The assets rated of highest strategic importance are brand, IT systems, website facilities, administrative systems, new product development systems, and contact lists. The ranking of brand at the head of the list is an indication of the perceived importance of reputation within the KIBS sector, with a high density of small firms competing for clients and procurement contracts. Technological advances means that small firms are increasingly able to leverage their brand and reputational resources through website and other electronic media, which also reflects the high strategic importance given to these assets (Feindt et al, 2002; Prashantham and Young, 2004).

5. Traditional and new KIBS firms

As well as viewing small KIBS firms 'in the round', it is also instructive to assess how different types of KIBS firms value, accumulate and utilise their intellectual assets. Table 2 breaks down the aggregate scores presented in Table 1 according to whether firms operate in 'traditional' or 'new' KIBS sub-

sectors. This distinction between new and traditional has been adopted in other KIBS studies (Miles et al., 1995; Muller and Zenker, 2001), with traditional KIBS firms being those providing professional services such as marketing, advertising, management consultancy, accounting, legal services, and architectural and environmental services. New KIBS firms are those whose activities are related the specialist use and application of new technology, such as software, telecommunications, technical engineering, training in new technologies, R&D consultancy and high-technology 'boutique' firms. As new KIBS are necessarily operating in emerging and often fast growing and changing sectors of activities, it considered that their management strategies, as well as constraints on growth and development, may differ from more traditional KIBS firms (Miles et al., 1995; Muller and Zenker, 2001). As Table 2 highlights, our data offers some support for this hypothesis, with there found to be significant differences between traditional and new KIBS firms in resource base, value creation and strategic importance for a number of organisational capital elements. The gap in organisational capital between new and traditional KIBS firms indicates that newer technology-based firms have less formalised internal systems and workforce development activities. In traditional KIBS firms, administrative and management systems are likely to be at the heart of the professional services they offer, while in technology-based KIBS they are more likely to be perceived of less importance, as operations function on a more fluid project-by-project basis (Miles et al, 1995; Miles, 2005). The wide gap in training systems between the two types of firms suggests that learning-by-doing acts as the mesh between individual-level development and firm-wide innovation.

Table 2: Differences Between 'Traditional' and 'New' KIBS Firms

	Resource Base	Resource Base	Value Creation	Value Creation	Strategic Importance	Strategic Importance	Mean Average	Mean Average
	Traditional	New	Traditional	New	Traditional	New	Traditional	New
Documented Procedures and Technical Information	67.5*	47.7*	73.3**	47.7**	76.0*	60.2*	72.3**	51.9**
Management Systems	69.0**	44.3**	67.4**	45.5**	71.4	61.4	69.3**	50.4**
Brand	62.0	51.1	63.4	61.4	84.0	78.4	69.8	63.6
Sales Systems	47.3	33.0	59.8	46.6	73.9	73.9	60.3	51.1
Distribution Systems	45.2	33.3	50.0	57.1	65.5	63.1	53.6	51.2
Administrative Systems	81.0**	53.6**	77.4*	60.7*	81.0*	69.0*	79.8*	61.1*
New Product Development Systems	47.5	48.8	43.8	46.4	70.0	78.6	53.8	57.9
Website Facilities	77.6	79.8	52.0	64.3	66.3*	83.3*	65.3	75.8
Intranet and Shared Drive Systems	50.0	47.6	47.4	56.0	51.3	60.7	49.6	54.8
Training Systems	63.2**	34.1**	60.5**	34.1**	72.4**	59.1**	65.4**	42.4**
IT Systems	76.4	83.0	77.8	79.5	75.0	84.1	76.4	82.2
Marketing and Communication	48.6	44.3	51.4	40.9	62.5	60.2	54.2	48.5
Quality Standards, Awards and Accreditation	29.2	31.8	50.0	46.6	58.3	56.8	45.8	45.1
Organisational Capital	58.8*	48.6*	59.5	52.8	69.8	68.4	62.7	56.6
Contact Lists	75.0	61.4	78.9	65.9	75.0	73.9	76.3	67.0
High Profile Customers	65.8	64.8	63.2	67.0	68.9	77.3	66.0	69.7
Customer Loyalty and Retention	28.9	31.8	28.9	31.8	42.1	42.0	33.3	35.2
Alliances and Collaboration	65.8	55.7	60.5	59.1	72.4	61.4	66.2	58.7
Competitive Intelligence	47.4	42.9	46.7	46.4	59.2	67.9	51.1	52.4
Network Capital	56.6	51.3	55.7	54.1	63.5	64.5	58.6	56.6
Intellectual Property	48.7	50.0	36.2	43.2	51.3	59.1	45.4	50.8

** $p \leq 0.01$; * $p \leq 0.05$ (student's t-test)

6. Firm size

Differences in the size of KIBS firms (and to some extent, by default, their maturity) may be associated with differences in their intellectual asset bases. As already highlighted, the smaller a firm is the more likely the possibility of constraints on the development of intellectual assets, restricting the growth and competitiveness of the firm. Table 3 indicates the relationship between the size of KIBS firms and the resource base, value creation, and strategic importance of their intellectual assets. There is a significant relationship between firm size and the resource base across the three broad types of assets, the strongest association being with organisational capital. In particular, new product development systems, quality accreditation, and sales systems are subject to more progressed development and investment in larger firms. The association with new product development systems suggests that firm size is related to innovation processes and systems, and is a constraining factor in small firms. This confirms existing evidence concerning small firms and innovation (Wiklund and Shepherd, 2003; Thorpe et al., 2005), but further indicates the potential limitations on the development of innovation processes even with highly knowledge intensive environments. In terms of network capital, firm size is also positively associated with alliance and collaborative resources, as well as the means to monitor competitors, which again may restrictive innovation and competitiveness.

Larger KIBS firms are more likely to have in place systems to protect intellectual property. As Miles et al. (1995) argue, small KIBS are unlikely to be able to take advantage of intellectual property protection due to underlying regulatory systems favouring larger players. Indeed, protection may even restrict innovation as it locks firms into redundant and lagging strategies, reducing the capacity for the type of open innovation processes considered to offer the most scope for new knowledge exchange and creation (Chesbrough, 2003). As KIBS firms grow, however, there is more likelihood they will seek to develop measures to protect their intellectual property. There is still a lack of systematic evidence on intellectual property rights within service sectors, but our findings suggest that while such rights are not perceived of high importance among small KIBS firms, they are associated with the evolution of these firms. Furthermore, if size is seen as a proxy for the evolution KIBS firms, then the accumulation of key intellectual assets appears to accelerate as these firms grow and mature.

Table 3: Firm Size (number of employees) and the Resource Base, Value Creation and Strategic Importance of Intellectual Assets (correlation coefficients)

	Resource Base	Value Creation	Strategic Importance
Documented Procedures and Technical Information	0.26†	0.04	0.19
Management Systems	0.23	0.14	0.09
Brand	0.14	0.16	-0.04
Sales Systems	0.39**	0.21	0.19
Distribution Systems	0.33*	0.18	0.22
Administrative Systems	-0.03	-0.18	-0.11
New Product Development Systems	0.38**	0.22	0.11
Website Facilities	0.10	0.16	0.06
Intranet and Shared Drive Systems	0.29*	0.18	0.19
Training Systems	0.22	0.22	0.17
IT Systems	0.22	0.08	0.16
Marketing and Communication	0.29*	0.24†	-0.06
Quality Standards, Awards and Accreditation	0.38**	0.25†	0.08
Organisational Capital	**0.42****	**0.27†**	**0.26†**
Contact Lists	0.00	-0.07	0.08
High Profile Customers	0.14	0.23	0.10
Customer Loyalty and Retention	0.19	0.33*	0.11
Alliances and Collaboration	0.28*	0.25†	0.29*
Competitive Intelligence	0.31*	0.26†	0.21
Network Capital	**0.32***	**0.34***	**0.24†**
Intellectual Property	**0.39****	**0.22**	**0.23**

** $p \leq 0.01$; * $p \leq 0.05$; † $p \leq 0.1$ (correlation coefficient)

7. Absorptive capacity

Following Zahra and George (2002), we seek to measure the absorptive capacity efficiency of KIBS firms. We derive three absorptive capacity measures as follows: (1) recognition and assimilation - resource base score minus strategic importance score (expressed as a percentage of resource base score); (2) application – value creation score minus resource base score (expressed a percentage of value creation score); and (3) recognition, assimilation and application – value creation score minus strategic importance score (expressed as a percentage of value creation score). The rationale behind this methodology is that negative gaps between the first and second scores are an indication of absorptive capacity inefficiencies since greater strategic importance is being allocated to an asset than its accumulation or utilisation, or utilisation lags the resource base. Such a gap analysis provides an indicative understanding of how absorptive capacity varies on an asset-by-asset basis. As highlighted by Table 4, the largest registered gaps concern recognition and assimilation, indicating that while firms may recognise a particular asset to be of strategic importance they are unable to effectively invest in and develop this asset.

The final column of Table 4 highlights the difference between asset value creation and strategic importance, which is perhaps the best overall measure of the relative absorptive capacity of each asset. The biggest efficiency gap is for new product development systems, followed by training systems and intellectual property. This confirms the potential under-absorption of these assets, particularly in relation to innovation processes, and reflects deficiencies in firm responsiveness, i.e. the capacity to implement actions of which there is awareness (Liao et al., 2003). Other research has found that responsiveness in small firms is associated with a 'well developed internal knowledge dissemination capability' which underpins high absorptive capacity (Liao et al., 2003). For small firms operating in knowledge intensive sectors, where innovation is a clear source of competitive advantage, the necessity to focus absorptive capacity externally on value and supply-chains may weaken their internal absorptive capacity capabilities (Meeus et al., 2001; Thorpe et al., 2005). While there is variability across each asset type, small KIBS firms do appear to face greater absorptive capacity issues for internally, rather than externally, focused intellectual assets.

Table 4: Intellectual Assets and Absorptive Capacity Efficiency (positive scores equal perceived positive absorptive capacity efficiency, and negative scores vice versa)

	Recognition and Assimilation	Application	Recognition, Assimilation and Application
Documented Procedures and Technical Information	-17.8	5.0	-11.9
Management Systems	-16.1	-0.6	-16.8
Brand	-43.0	8.9	-30.3
Sales Systems	-83.4	24.5	-38.5
Distribution Systems	-63.6	26.7	-20.0
Administrative Systems	-11.5	2.6	-8.6
New Product Development Systems	-54.4	-6.8	-64.9
Website Facilities	4.4	-34.8	-28.8
Intranet and Shared Drive Systems	-15.4	6.0	-8.4
Training Systems	-37.2	-2.6	-40.8
IT Systems	0.0	-1.6	-1.6
Marketing and Communication	-32.4	-1.4	-34.2
Quality Standards, Awards and Accreditation	-87.8	36.4	-19.5
Organisational Capital	**-28.6**	**4.3**	**-23.1**
Contact Lists	-9.9	5.9	-3.4
High Profile Customers	-12.5	0.0	-12.5
Customer Loyalty and Retention	-38.0	0.0	-38.0
Alliances and Collaboration	-10.1	-1.0	-11.2
Competitive Intelligence	-41.7	3.4	-36.9
Network Capital	**-19.1**	**1.9**	**-16.8**
Intellectual Property	**-12.3**	**-23.7**	**-38.9**

8. Conclusion

This paper has operationalised the concept of intellectual assets as means of understanding how small KIBS firms seek to manage their knowledge base. It is argued that these assets are critical in securing competitive advantage among knowledge intensive firms. It is found that the relative development and accumulation (resource base), effective utilisation (value creation), and value (strategic importance) attached to particular types of intellectual asset varies considerably. Many firms have prioritised development and investment in ICT infrastructure and less so assets such as customer development, quality accreditation, and competitor intelligence. Overall, the inability to create value from intellectual assets, especially those relating to new product development, is restricting the development of effective innovation processes, with innovation more likely to be undertaken via less formal and systematic channels. New technology-based KIBS firms are less likely than their traditional professional service KIBS counterparts to have effective formalised learning systems in place, and generally operate within a more 'fluid' working environment. As well as sub-sector, firm size is strongly associated with the accumulation of intellectual assets. Smaller KIBS firms generally possess less resources related to both their organisational and network capital, as well as intellectual property such as patents, copyrights, and trademarks. Resource deficiencies in small firms further constrains their innovation capability and measures of absorptive capacity indicate that firms often perceive gaps in their ability to assimilate and apply knowledge which they recognise to be of strategic importance.

This paper adds specificity to the literature on knowledge and its management within small firms. While much of the literature on KIBS firms portrays them as efficient providers of knowledge, linking creators and utilisers to generate innovation, this study demonstrates that small KIBS firms themselves face particular challenges in managing the innovation process and establishing sustainable knowledge management practices. This raises a number of implications. As Starbuck (1992) argues, small firms – especially very small ones - compete most successfully if they take advantage of their peculiarities and the peculiarities of their environment. In the case of KIBS firms, one of their peculiarities is that knowledge forms their commodity and marketplace as well as their source of competitive advantage. Among small KIBS firms, the shortfall in intellectual asset building suggests a divide between these two knowledge forms. For example, while a small technology-based KIBS firm may develop advanced software and web-based facilities for a client, it may not be in position to undertake the same level of investment and development of such facilities for itself inhibiting the origination of process innovation, i.e. a hand-to-mouth scenario restricting long-term growth or sustainable competitive advantage.

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IC as a Developmental Tool for Municipalities

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Abstract: The emerging literature on community-level intellectual capital has so far concentrated on the forerunners in knowledge-intensive areas. However, besides the cosmopolitan high-tech and creative hubs of the world, other cities and municipalities are facing many challenges that are related to knowledge-based issues. This paper examines the applicability and utility of the IC perspective for average municipalities, by inspecting four Finnish cases, and thereby widens the context of IC application for communities.

Keywords: Intellectual capital, municipalities

1. Introduction

As we have entered the era of the knowledge economy, knowledge has taken the place of land, labor and capital as the most important factor of production, and the ability to manage knowledge and to leverage intellectual capital (IC) has become the key competitive factor for all types of organizations. The first wave of the IC literature concentrated on intangibles in business organizations, whereas recently it has been argued that the IC perspective could also be beneficial for cities, communities and nations (e.g. Edvinsson & Bonfour 2004).

Some applications of IC models to regions (Pöyhönen & Smedlund 2004; Schiuma & Lerro 2008) and nations (Bontis 2004) have been presented in the literature. Moreover, knowledge cities or intelligent cities (Edvinsson 2005; Komninos 2002) have been discussed. Most of the examined cities in the literature have been, as the concept of knowledge city illustrates, forerunners in knowledge-intensive areas. However, we claim that besides the cosmopolitan high-tech and creative hubs of the world, currently other cities and municipalities are also facing many challenges that are related to knowledge-based issues. For example, the approaching retirement of the Baby Boom Generation threatens the maintenance of the accumulated tacit knowledge of municipalities, thus emphasizing human capital issues. Increased efficiency requires intensified collaboration across municipalities, meaning that municipalities need to develop their relational capital. Furthermore, the need to continuously adjust to new processes and systems pose demands for the development of structural capital. Consequently, in this paper we will examine the applicability and utility of the IC perspective for average municipalities.

More specifically, this paper explores the applicability of the IC approach as a framework for 1) identifying the most important intangible assets in municipalities, 2) assessing the current state of these knowledge assets, as well as 3) demonstrating the most important developmental needs. We do this by empirically examining the process and outcome of IC evaluation in four municipalities located in Southeastern Finland: Lappeenranta, Joutseno, Lemi and Taipalsaari. For constructing an evaluation of the municipalities' IC, we use archival data and semi-structured interviews with the leading political and office-holding decision-makers in the municipalities.

2. Literature review

IC has been widely discussed from many perspectives as regards business organizations, even though there is relatively little research on IC on the communitarian level, i.e. in cities and municipalities. The terms *city* and *municipality* mean basically the same thing, but municipalities also more generally refer to smaller cities as areas of administration. As public organizations, municipalities are non-profit organizations, and their main task is to produce services to their citizens' needs. Services are essentially intangible; therefore, to meet this challenge most effectively and professionally, their foundation is in intellectual capital. Cinca, Molinero and Queiroz (2003) have highlighted the difficulty to quantify intellectual capital especially in the public sector. Differences between public and private sectors have to be taken into account when applying IC methodologies.

There are many different views to approach intellectual capital. Andriessen (2004) has highlighted 25 methods to approach intellectual capital. The history of intellectual capital began in the early 1980s, as managers, academics and consultants around the world began to notice that firms' intangible assets were important to their profits (Sullivan 2000).

Traditionally intellectual capital research has been based on the so-called Konrad Group studies. Based on the concept of *Knowledge Organization*, Sveiby outlined (first book in 1986) a theoretical framework for the public reporting of intangible assets and built the concepts *Structural Capital* and *Human/Individual Capital*. The concept of intellectual capital can be used interchangeably with the term *intangible assets*. (Sveiby 2001.)

Andriessen has presented four ways to determine value (Andriessen 2004). These four methods are financial valuation, value measurement, value assessment and measurement. The measurement method is not exactly a method for valuation, but measurement is often used in the Intellectual Capital community. Measurement has always been important in management, but it is only one aspect of IC valuation. Important factors of valuation are the use of value as criteria, the use of money as the denominator of value and the observability of the criteria or measured variable. (Andriessen 2004.)

Table 1 presents some examples of the methods to value intangibles. Financial valuation is not altogether relevant in the public sector, because it is not reasonable to ask what the market value of a city council is. For the municipal sector the most appropriate models are those based on scorecard methods, which attempt to identify the various components of intangible assets. (Cinca et al. 2003) There is evidently some kind of disagreement which are value measurement methods and which are measurement methods. Value is nevertheless a kind of a yardstick to interpret the results. (Andriessen 2004.)

Table 1: Four ways to determine value (adapted from Andriessen 2004, 15; see also Cinca et al. 2003)

Four ways to determine value				
	Financial valuation	Value measurement	Value assessment	Measurement
Examples of the methods	Many methods and different scopes. These are not so much used in the municipalities	(Scorecard models) Based on Structural Capital, Human Capital and Relational capital	CICBS, CSICM	Skandia navigator, Corporate longitude (Scorecard models)
Important factors				
Observability of the variables	Variables could not be observed	Variables could not be observed	Variables could not be observed	Observed variables
The use of value as criteria	Value could not be translated into observable criteria	Value could be translated into observable criteria	Value could not be translated into observable criteria	There is no value scale
Money as the unit of the value scale	Money is the determining factor	Money is not the determining factor	Money is not the determining factor	Money is not the determining factor

This kind of division into four is common in the IC literature. Andriessen has summarized and analyzed these approaches as methods for the valuation of intangible resources. These methods tell *how* IC could be evaluated. It is also important to question why; namely, *why* is it important to value or measure IC? One significant reason is to improve internal management. (Andriessen 2004)

Cinca et al. (2003) presented that the models of IC in the municipalities have to highlight how intangible assets are used to improve the quality of services. Because of this they recommend that scorecard methods are the most appropriate IC models for municipalities. The components of IC in the public sector are internal organization (know-how, ability to innovate and structural organization), external structural capital (services, image, transparency), human capital (aptitude of civil servants, permanent training, conditions of service) and social and environmental capital (social and environmental commitment).

Viedma (2004) has analyzed IC in municipalities with his model, the cities' intellectual capital benchmarking system (CICBS). This model is based on the well-known Skandia navigator. It is a new methodology for measuring and managing IC in municipalities. The IC navigator includes the following categories: financial capital, human capital, process capital, market capital, and renewal and development capital.

Viedma (2004) has presented a model based on the CICBS model, namely, the cities' specific intellectual capital model or the CSICM. It is a longitudinal approach that deals specifically with each city's relevant economic activity or relevant economic microcluster. This model includes the following phases: vision, segment demand, output, products and services, processes, core competencies, and professional core competencies. The purpose of this model is to measure and manage the intellectual capital of each relevant industry microcluster that exists in the municipality.

The Cities general intellectual capital model (CGICM) is a more general model for measuring and managing the intellectual capital of municipalities, and it is based on the nation's Navigator model. The process is based on five phases: 1) creating the vision, 2) identifying the core activities needed to realize the vision, 3) identifying the core competencies needed to realize core activities, 4) identifying the indicators for each core activity and each core competence, and 5) assembling the indicators into different intellectual capital categories. In Phase 5 the indicators that have been identified in Phase 4 are assembled into different intellectual capital categories. These categories are human capital, process capital, market capital, renewal and development capital. (Viedma 2004.)

According to Viedma (2004), *human capital* includes knowledge, wisdom, expertise, intuition, and the ability of individuals to realize the task and goals of the city. Human capital is the heart of the city – that it is the property of the individuals. *Process capital* includes cooperation and the flow of knowledge, and these require structural intellectual assets. These assets are the information system, hardware, software, databases, the organizational structure, and the management focus. This structural capital stays with the city when the employees go home. *Market capital* includes customer capital, and in the city citizens are the customers. This capital also includes customer–city loyalty, the satisfaction, and the value of brands and so on. *Renewal and development capital* includes investments in research and development, patents, trademarks, and start-up companies. After setting up these processes, there must be ongoing feedback from the latter phases to the earlier ones, and vice versa. It is like an ongoing benchmarking process. Both these approaches, the CSICM and CGICM use benchmarking techniques when building the future vision of the city. These models are made to encourage cities to manage IC more effectively.

Edvinsson (2005) has proposed that in a growing complexity we need mapping systems to assure us on the angle of longitude navigation into the future. His measuring system is named *Corporate longitude*, and it has also been used in the public sector, but there are no references to municipal cases. Conventional accounting systems are beyond the contribution from intangibles such as trust, brain efficiency and collaboration. The value of the relationships also needs to be measured. The Edvinsson model includes windows for those new value-creating spaces. Corporate longitude is a model where there is a lateral dimension of the intangibles inside and outside the firm's vertical balance sheet. Value is created in the interaction between people (human capital) and organizational structural capital such as R&D processes. (See also Edvinsson & Bounfour 2004.)

However, intellectual capital has mainly been conceptualized as statistic assets rather than with regard to the relation of management. Mouritsen and Larsen (2005) have published a paper where their purpose was to analyze the transition from measurement to management in relation to intellectual capital. The question is how information about the IC will help managers and other actors to intervene into the processes of organizational knowledge development, sharing and application. This is different from the traditional IC literature. (Mouritsen & Larsen 2005.)

There are different approaches to modeling IC. Measuring approaches are only one way to manage IC. Andriessen (2004) has distinguished four ways to determine value. One of them is value measurement. Value measurement is doing improving internal management it seems to be also a good way to determine IC of municipalities.

3. Methodology

To examine the process and outcome of IC evaluation in municipalities we employed the case study research strategy. The preferred strategy when the questions *how* or *why* are being posed, case study is also applicable when the investigator has little control over events, and when the focus is on a contemporary phenomenon within some real-life context. Case study is a usable study strategy for organizational and management studies. Case studies rely on many of the same techniques as history, but it includes more evidence: direct observation and systematic interviewing. Their unique strength is their ability to deal with a full variety of sources, namely, documents, artefacts, interviews and observations. (Yin 1993.)

Our cases were four municipalities located in Southeastern Finland: Lappeenranta, Joutseno, Lemi and Taipalsaari. Two of the municipalities, Lemi and Taipalsaari, are so-called rural municipalities and they have fewer inhabitants. Joutseno and Lappeenranta are bigger municipalities. Lappeenranta has 59 118 inhabitants and Joutseno 10 851 inhabitants. These border municipalities have also mutual cooperation. For example, Joutseno and Lappeenranta have very intense cooperation. The financial situation is fairly good in each municipality. (See below table 2.)

Table 2: Case municipalities

Municipality	Inhabitants	Staffing
Joutseno	10 851	715
Lappeenranta	59 118	3 892
Lemi	3 052	170
Taipalsaari	4 963	204

Finland has two levels of democratic government, the state and 416 municipalities. The municipalities represent the local level of administration. They must follow the laws enacted by the state, but they also make independent decisions. Neighboring municipalities cooperate in sub-regional and regional organizations. The municipalities have both political and official actors, the political actors being elected to office. Municipalities in Finland are independent organizations dedicated to the solving of local problems. They provide welfare services such as schools and health care, which are under national control, and thus they have an important public service role.

For constructing an evaluation of the municipalities' IC, we used archival data, drawn e.g. from the published human capital reports of the municipalities. In addition, we conducted eight semi-structured interviews, consisting of an interview with the Municipal Manager and Chairman of the Municipal Board for each of the four municipalities. Together these parties represent the leading political and office-holding decision-makers in the municipalities.

The data was gathered in January 2008, the interviews lasted for 40–60 minutes. They were taped and later transcribed. For the data-analysis, all interview transcriptions were read carefully, divided and categorized into themes, built up from earlier research. After that the data were grouped and classified by types to search similarities but also divergent cases.

Intellectual capital themes in our research municipalities included the following: Human capital is divided into skills, knowledge and education. Relational capital refers to relationships with interest groups and inhabitants, image and reputation. Intensifying collaboration between the municipalities is an important strategic goal of the municipality and service structure reform. Structural capital refers to values, organizational culture, work climate, processes and systems. In the interviews we had questions concerning human capital, relational capital, and structural capital. We had also questions concerning future challenges.

The literature presents different ways to approach the IC of municipalities. We finished up this three-fold classification because we wanted to investigate case municipalities and the situation of their IC. This three-fold classification is close to the classification of Cinca et al. (2003); the structure has merely been simplified. Personnel statement is a popular IC report model in Finnish public organizations. It includes a three-fold classification. Generally all measurement approaches are based on this classification. Relational capital is not usually included in the personnel statement, even though cooperation is important for municipalities. Relational capital could also be named internal capital, like Cinca et al. (2003) have suggested.

4. Results

Next we present our municipality cases and determine the state of intellectual capital and the challenges in developing it in the case municipalities Joutseno, Lappeenranta, Lemi, and Taipalsaari.

In *Joutseno* the number of total staff was 715 in the end of year 2006. The IC report of this municipality focused on the introduction of the working hours of the personnel and payment costs. The report also includes investments in personnel including training, the development of competencies, maintenance of working capacity and occupational health care. The maintenance of working capacity received 25 00 euros. The educational level and competencies of the personnel were not compiled in the statistics.

The interviews produced more information. Human capital was taken well into account in this municipality where the skills of the staff are developed through training and cooperation with other municipalities. One interviewee also mentioned that they have in some sphere of authority taken tacit knowledge into account. The other interviewee saw this as an important development area. When asked, what importance competence has in the municipality, the interviewee said:

> *"It is important for municipalities that staff is motivated and skillful."*

About the structure capital we focused on the working atmosphere and management culture. The working atmosphere was at an average level. One interviewee mentioned that there have been changes in the management culture. The other interviewee mentioned that in their municipality everybody is taken into account in the management culture.

> *"The working atmosphere is in an average state, we have now a lot of changes in our municipality."*
>
> *"I hope that the management culture is the kind that we take everybody into account."*
>
> *"Our management culture has changed in the past few years, and in my opinion it is close to concern management. The municipal spheres of authority operate independently. "*

We also got more information about the relational capital from the interviews. Partners in cooperation are very important for this municipality. Interviewees considered the image of their municipality good. They develop the image by keeping services on a good level.

> *"The development of the image is long-running, and it demands practical success, for example, in trade policy."*

In *Lappeenranta* the number of staff was 3 892 in the end of year 2006. The educational level and competencies of the personnel were not compiled in the statistics in the IC report. The IC report of this municipality focused on the introduction of the number of the personnel and payment costs. Investments in personnel included training (1 million euros), maintenance of working capacity, and occupational health care. The working capacity is measured by sick leaves, accident information, and an employment satisfaction inquiry. Educational focuses were the development of municipal operation and flexible containment of the state of changes. The working atmosphere was measured in year 2006, and according to the report, the image of the municipality for an employer was safety.

The interviews revealed that human capital is taken well into account in this municipality, and the staff is developed through training. One interviewee also mentioned that they have taken tacit knowledge into account in some level. The interviewee also mentioned that they do not have any practical action yet. When asked, what importance competence has in the municipality, the interviewee responded:

> *" Without skilful staff the municipality could not manage its tasks appropriately."*

About the structure capital we focused on the working atmosphere and management culture. The working atmosphere is on a good level and it is interlocutory and confidential. One interviewee mentioned that the management culture is open and positive to change. The other interviewee mentioned that in their municipality everybody is taken into account in the management culture.

> *"The working atmosphere is generally in a good state, and also based on the results I deem it very good."*
>
> *"I could characterize the management culture as open and positive to change. "*

The interviews also revealed more information about relational capital. Partners in cooperation are very important also for this municipality. Interviewees considered the image of the municipality good. They develop their image by investing into marketing.

The number of staff in *Lemi* was 170 in the end of year 2006 which was the first year, when this municipality applied a more extensive IC report. IC report is a tool for personnel management. The educational level of the personnel was compiled in the statistics. The working capacity included information about sick leaves and retirement. Payment costs were also given, but there was, for example, no separate investment for the training or development of the personnel. Development discussions and atmosphere measurement are not mentioned in the IC report.

Interviews also showed that competencies are important for the municipality. This municipality develops staff by training which is outsourced (see below). Tacit knowledge was also mentioned in the interviews, but it is important and new for this municipality. One interviewee mentioned that they develop the usability of tacit knowledge, but there are no practical actions.

> *"Competence of the staff means motivation. The staff uses all of the skills they have in the inhabitants' favor. Competence is needed, but if it is not correctly managed, it is not working."*

> *"We have virtually no on-the-job training, but we get new ideas from our current refresher courses."*

About the structure capital we focused on the working atmosphere and management culture. The working atmosphere is at a good level. One interviewee saw that there is something to develop in the working atmosphere (see below). The interviewee mentioned that the management culture is closely related to the political culture. It is, however, not compared to the corporate management culture. The other interviewee saw that management is matter management, and personnel management needs more attention.

> *"In the working atmosphere there is something to develop. Personnel management is not of course easy, but the working atmosphere determines how services operate."*

Interviews also shed light on relational capital. Partners in cooperation are very important also for this municipality. Interviewees considered the image of the municipality good and even getting better. They develop their image by their existing good brands.

The total number of staff in *Taipalsaari* was 204 in the end of year 2006. The educational level and competencies of the personnel were not compiled in the statistics and there was no training strategy. There was no separate information on the investment into the training of the personnel. Development discussions and atmosphere measurement were used. The payroll system and rewarding were directly informed. Relational capital was also included in the report on some level, and regional cooperation was mentioned. Reputation and customer satisfaction were measured and reported. Public order, safety, and management of finances were on a good level. Reputation and image included a positive mentioning of the built environment and cleanliness of the environment.

Interviews showed that competencies are important for the municipality; the staff is producing services. This municipality develops its staff by training and development discussions. Tacit knowledge and its taking into account was mentioned in the interviews. They have, for example, orientation manner for new staff in the municipality. One interviewee mentioned that there is always something to develop in the usability of tacit knowledge.

About the structure capital we focused on the working atmosphere and management culture. The working atmosphere is at a fairly good level. The management culture is open and goal oriented. One interviewee mentioned that management is an interplay and the management of people is in general difficult.

> *"In the working atmosphere, it is changing, and there are pain points, when we have changes."*

> *"The management culture is fairly open and goal oriented."*

The interviews also revealed more information about relational capital. Partners in cooperation are very important also for this municipality. They have cooperation in services with the border municipalities. The interviewees considered the image of the municipality good, but they do not have

any specific measures to enhance their image. Instead, they develop their image by good basic level services. Table 3 below, summarizes all the results.

Table 3: Summary of the IC in the case municipalities.

Municipality	**Human capital**	**Structural capital**	**Relational capital**	**IC report**	***Suggestion* to value determination**
Joutseno	Educational level and competencies of the personnel were not compiled in the statistics	Development discussions and atmosphere measurement were used	Reputation and customer satisfaction were measured; cooperation was experienced important	Personnel report	Value measurement/ Measurement (Scorecard)
Lappeenranta	Educational level and competencies of the personnel were not compiled in the statistics; resources for training EUR1 million/year 2006	Development discussions and atmosphere measur were used	Reputation and customer satisfaction were measured; cooperation was experienced important	Personnel narrative	Value measurement/ Measurement (Scorecard)
Lemi	Educational level of the personnel was compiled in the statistics	Development discussions and atmosphere measurement were not mentioned in the report	Reputation and customer satisfaction were measured; cooperation was experienced important	Personnel narrative	Value measurement/ Measurement (Scorecard)
Taipalsaari	Educational level and competencies of the personnel were not compiled in the statistics	Development discussions and atmosphere measurement were used, Payroll system was open informed	Reputation and customer satisfaction were measured; cooperation was experienced important	Personnel narrative	Value measurement/ Measurement (Scorecard)

Traditional human resource accounting (HRA) (see for example Andriessen 2004) is a reporting model that is in use in all our case municipalities. There could be seen a three-fold classification to model IC, but reports are based on human resource accounting. As a result we could say that there is not yet real measurement of value or understanding it. We did, however, find some right components – although not enough – but it is a good start.

Challenges in developing IC in every case municipality concern the numbers of retiring personnel, increase in municipal cooperation, and advancing different processes and systems. The financial situation was also an important pain point for small municipalities which have to produce services by municipal taxes. This is the base why IC is applicable and useful also for municipalities.

In the case municipalities the practices to foresee the exit of competencies (because of retiring) was varying. The importance of this was noticed in strategic tasks. In Joutseno at least the social and health service sector was prepared for retiring by hiring standbys. In Lappeenranta they have been aware of the practicalities to foresee the exit of competencies. They have also completed accounts of the personnel structure and the need for recruitments. In Lemi interviewees mentioned that it is a clear development area to foresee the exit of competencies. In Taipalsaari in the salary payment services they have practices; this competence was not behind one person.

5. Discussion

In this paper we examined the applicability and usefulness of the IC approach for identifying and assessing the current success factors and developmental needs in municipalities. All of the four

municipalities examined were already reporting on some aspects of their intellectual capital through personnel reports or personnel narratives. However, these reporting formats provided quite inadequate information on the municipalities' IC. In our view, even the dimension of human capital was rather limitedly described in these reports. Our main finding is that municipalities regarded IC as very positive, but we did not get evidence that there are prevailing concrete benefits yet.

The interviews conducted helped to form a fuller picture of the municipalities' IC. The questions in the interviews were based on human capital, and structural and relational capital. Based on our analysis of four Finnish municipalities, we can conclude that the three-fold classification of IC into human, structural and relational capital worked quite well for analyzing intangible assets and identifying the main development points. The most important intangible assets in the municipalities are the staff skills, working atmosphere cooperation, and the image of the municipality.

Our suggestion for the case municipalities would be to prepare a more specific IC report. They could plan a report model that serves their own interests. It is also good to include in an IC report a plan for action with regard to the requirements of the current situation. We also suggest that the IC report would assist the strategy work of the municipality. It is also valuable in mapping competencies and it evaluates learning goals, and in that way municipalities could measure their renewal capital.

All the municipalities perceived challenges in developing IC on some level. The most important challenge is to get IC as a tool to develop management. It is also important to understand that measuring IC is not the main point itself, but more important is the development, which municipalities could get through the process.

It is helpful for the municipalities that they really see the value and not only measure and report things. It is important to link IC to the quality of services. In that way it is also easier to get the entire traditionally bureaucratic organization to participate in this kind of development and change. Since municipalities understand the link between the value of services and IC, they could improve their internal management.

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Identifying a Suitable Approach for Measuring and Managing Public Service Productivity

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Abstract: Every public organization faces the challenge of improving productivity (ratio between output and input). In this effort, productivity measures are essential managerial tools. However, the issue of measuring service productivity has proven to be challenging. A key reason for the challenges seems to be related to the intangibility of services. It has been discussed a rather lot in the literature but there seems to be lack of understanding on how to capture this feature in practice. The objective of this paper is to find out how to measure the relevant elements of public service productivity in order to provide useful information for managerial purposes. The study is carried out by using qualitative research approach. Two tasks are carried out in order to push the topic further. First, the current knowledge is examined by reviewing literature on productivity and performance measurement. Second, an empirical examination is carried out in the context of four case services of the City of Helsinki, Finland. Several approaches of measuring productivity can be found in the literature. These approaches were evaluated in the context of the case services. In the case examination, several requirements for productivity measurement were identified. There is clearly a need for getting more detailed information on productivity affecting factors: measures should be designed for operative level units. Component-by-component approach was regarded as a suitable way for examining the complex measurement object of service productivity at the bottom level of an organization. In regards to the more technical measurement methods, the representatives of case services felt that matrix approach was the most suitable for their purposes. It was rationalized by the fact that matrix approach is easy to understand and it provides a powerful tool for operative management of productivity.

Keywords: Intangibles, performance measurement, productivity management, public services

1. Introduction

There have been public sector reforms in many countries. One outcome of these reforms is that public organisations are now required to demonstrate that there have been improvements in performance (Wisniewski & Stewart, 2004). The role of performance measurement has been emphasized. Key measurement information relates to *productivity* which has been traditionally defined simply as the ratio between output (e.g. the quantity of services produced) and input (e.g. the number of employees). In contrast to manufacturing operations, the application of productivity concept in service organizations seems to be a complicated task. Especially the development of valid productivity measures is a tough challenge. Current measures have been criticized since they seem to provide biased information that is not very useful in managerial purposes. An essential reason behind this relates to the intangible nature of services (Sherwood, 1994). According to Filipo (1988), examples of intangible factors of services are service image, contact personnel image, atmosphere in service provision and the level of customer satisfaction. Even though the intangibility of services has been discussed for decades, there seems to be a lack of understanding on how capture to this feature in order to design valid productivity measures.

Many of the existing studies on public service productivity (and service productivity in general) examine the issue at the macro (e.g. industry or firm) level (Brax, 2007; Boyle, 2006). The objective of this paper is to find out how to measure the relevant elements of public service productivity in order to provide useful information for managerial purposes. In this context, usefulness means that operative managers can use the measurement information in identifying bottlenecks and other targets of development in striving for productivity improvements. The objective of the paper is approached with qualitative case research which is an appropriate research approach when examining a complex research problem in which deep understanding on certain case-related phenomena is needed (cf. Eisenhardt, 1989). Two tasks are carried out in order to push the topic further. First, the current knowledge of the issue is examined by reviewing literature on service productivity and performance measurement. Second, an empirical examination of the issue is carried out in the context of four case services of the City of Helsinki, Finland.

2. Literature review

2.1 Defining public service productivity

Despite the simple definition of productivity (output/input), it is a rather ambiguous concept that can be easily mixed with other concepts. Productivity closely relates to concepts, such as *operational performance*, which refers to the efficiency and effectiveness of business processes (Kaydos, 1999), *efficiency*, which is related to the utilisation of resources and *effectiveness,* which refers to the ability to reach a desired objective or the degree to which desired results are achieved and *performance*, since the productivity of an organization can be seen as a component of its performance (Tangen, 2005).

The literature on service productivity applies a wider approach in productivity examination, which indeed seems to be closer to the meaning of performance concept. Several service productivity models can be found in the literature (e.g. Grönroos & Ojasalo, 2004). The service literature stresses factors, such as the quality of service (Sahay, 2005), utilization of service capacity (Grönroos & Ojasalo, 2004) and the role of customers in service provision (Martin et al. 2001). In the context of public services, productivity can be related to cost-efficiency and quality of services (Hodginson, 1999). According to Faucett & Kleiner (1994), public service productivity can be improved by producing more outputs of better quality with the same costs or by producing the same number of outputs of same quality with fewer costs. As mentioned earlier, the intangible nature of services causes challenges in productivity measurement. Jääskeläinen (2008) identified the following intangible productivity affecting factors in public services: employee competence, employee satisfaction, working atmosphere (inputs) and subjective output quality. Many aspects of service quality are linked to intangible elements of services. Service quality is a multidimensional concept which includes both tangible and intangible elements. Grönroos (2001) identifies three dimensions in the quality of services: technical quality, functional quality and perceived service quality. According to Wakefield and Blodgett (1999), the intangible factors related to service quality are reliability, responsiveness, assurance and empathy.

2.2 Exploring different measurement approaches

McLaughlin and Coffey (1990) pointed out the lack of productivity measures for services. According to Grönroos and Ojasalo (2004), the situation has not improved in 15 years. One of the key challenges in the productivity measurement of services relates to the defining of the basic unit for measuring the quantity of the services performed (Sherwood, 1994). After outputs are properly defined it is usually rather easy to link them to inputs (e.g. costs or working hours) used. Developing productivity measurement approaches is not a new topic. In fact, many different approaches have been presented some of which are presented next.

2.2.1 Productivity level vs. productivity change

In principle, there are two ways of measuring productivity: measuring the level or the change of productivity (Uusi-Rauva, 1997). These can also be referred to as static and dynamic productivity measures (Sink, 1983). Static measures give information on the current productivity level. They can be useful in benchmarking the productivity level of different organizational units at a certain time. Dynamic measures are commonly used in measuring productivity of nations and industries. They compare the current result of the measure to a former result of the same measure. The results of dynamic measures are typically better comparable between units providing different outputs. However, if the level of productivity is low in the starting point it is easier to gain productivity improvements.

2.2.2 Monetary measurement

In the context of service productivity, quite a many authors seem to suggest monetary measures in order to properly capture all the elements in service outputs. Grönroos and Ojasalo (2004) propose that financial measures that calculate the value of the outputs are the only valid measures of service productivity. Klassen et al. (1998) rationalize sales price as an output by stating that in this way the subjective evaluation of service value can be avoided. While the monetary measurement approach seems potentially suitable in service providing companies it is of no use for public organisations which do not have markets and prices in a similar sense as companies do.

2.2.3 Component vs. aggregated approach

Mammone (1980) identifies two approaches for productivity measurement at the firm level: component measurement and aggregate measurement. Component measures capture the productivity of a single activity or unit. Aggregate measures are intended to examine the productivity of a large organizational entity or the whole organization. McLaughlin & Coffey (1990) suggest that the measurement of service productivity could be first focused on disaggregated components (e.g. product or process) of a complex mix of services. In this conception, inputs and outputs for each component are examined separately and compared separately. An opposite approach (e.g. firm level) is to use a model that deals simultaneously with multiple inputs and outputs. They also argue that much of the emphasis on service productivity research needs to focus on disaggregate measures. In the context of public services, Boyle (2006) refers to a similar kind of approach as micro level or "bottom up" measurement of productivity and suggests that more emphasis should be put on developing these kinds of productivity measures. Jääskeläinen and Lönnqvist (2008) reviewed IC literature to find out if any suitable measurement approaches could be found for the purposes of public service productivity measurement. They concluded that component-by-component measurement approach (Luthy, 1998) seems to be suitable for the purposes. Component-by-component methods identify individual components of IC (e.g. image or employees' competencies) and measure them. According to Jääskeläinen and Lönnqvist, it is possible to first identify the intangible components of services and then design measures that capture these factors. Finally, an aggregated index of these component measures can be calculated.

2.2.4 Output index approach

In addition to those quite generic approaches presented above, there are also more specific formulas for measuring public service productivity and outputs in particular. Rosen (1993) has proposed a measurement approach for better quantifying complex service outputs. Two aspects of output are distinguished: output quantity and output quality. These two aspects together form the actual output which is measured simply as follows: output quantity * output quality. Output quantity is measured by the number of output units (e.g. number of investigations) produced. Output quality is calculated by summing up the results of weighted quality indicators. Each quality-related measure is weighted by allocating 100 % to all of the measures. Quality measures with different measurement scales are commensurated by dividing measurement result with the set target level. Hodginson (1999) has presented a productivity measurement method for public services the aim of which is to take in the account the efficiency factors as well as outcomes and quality of services. The basic idea of the method is similar to the approach presented above, the quantitative outputs are multiplied with a quality-related index.

2.2.5 Matrix approach

Productivity matrix is an approach in which a set of direct and indirect productivity measures are used to compose a single measurement result. Every measure has its own weight (0-100 %) in the calculations. There should not be more than 7 measures per one matrix since matrices with more measures are in danger of becoming too complex (Laaksonen et al. 1992). In a quite traditional application of the matrix, the results of different measures are scaled in order to produce a score from 0 to 10 for each measure. In this way, the matrix produces a total score from 0 to 1000. Different names, such as objectives matrix (OMAX), productivity matrix, multi-criteria performance measurement technique (MCP/PMT), importance-performance matrix and interpretations of matrix approach have been used in the past. An early application of the matrix approach was carried out by Riggs (1986). Measurement framework has been applied in manufacturing industries, services and public organizations (Dervitsiovits, 1995). According to Rantanen and Holtari (1999), matrix approach of performance measurement is one of the most popularly used alongside with balanced performance measurement frameworks such as the Balanced Score card. Matrix approach distances itself from the traditional productivity examination. It includes many different productivity affecting factors which do not necessarily measure the relationship between output and input. Therefore, the term performance matrix would also be well justified.

2.2.6 Scorecards

Performance measurement systems, such as the Balanced Scorecard, were developed in the 1990s for strategic management purposes of companies (Kaplan & Norton, 1992). They include different perspectives which all have their own set of measures. As an example, Boyne (2002) presents the

following perspectives of public service performance: outputs (quantities and qualities), efficiency (costs per unit of output), service outcomes (e.g. formal effectiveness and impact), responsiveness (e.g. staff satisfaction, customer satisfaction) and democratic outcomes (e.g. probity and participation). Although these systems surely differ from the traditional productivity measurement, they too may be powerful in identifying means to improve productivity. There are many studies on successful implementation of performance measurement systems in public organisations. However, there are also reports that public organisations are having problems in applying them (see e.g. Rantanen et al., 2007). Public organizations typically have many different stakeholders. According to Wisniewski & Stewart (2004), there is a risk that taking the needs of various stakeholders into account can result in a measurement system that is too complex and therefore time-consuming to use. There can be substantial problems in choosing a coherent and compact pack of measurement objects.

A problem in using a comprehensive performance measurement system in productivity management purposes is that factors in the core of productivity may remain hidden due to the complexity of the systems. There is a potential danger that no real emphasis is placed to monitor productivity or to develop the currently used productivity measures.

2.3 Summary of the literature

Several approaches of measuring productivity can be found in the literature some of which (monetary measures) can clearly not be applied in the case of public services. On the other hand, many others, such as output index and matrix approaches, as well as, scorecards could be suitable. It would seem that different approaches could be combined in the context of public organizations. Earlier understanding of the issue suggests that it is necessary to begin investigation from the operative level. In this way, it is also possible to apply the so-called component-by-component measurement approach. This approach could be then connected to the index or matrix measurement, for instance. The issue related to the intangible nature of services has been discussed a rather lot in the literature but there seems to be a lack of understanding on what it means and on how to capture this feature in practice. Since there still is a lack of knowledge on what works and what not, an empirical examination of the issue was carried out. Different measurement practices were presented and evaluated in the context of case services of the City of Helsinki, Finland.

3. Case study

3.1 Data and research methods

The author has been involved in an action research project from the beginning of 2007. During the recent two years the project has included development work of productivity measurement in the City of Helsinki, Finland. The City of Helsinki is a large municipal organization with around 40,000 employees. The annual expenditure of the organisation is around 3,000 million Euros. Social welfare and health care account for more than a half of the total expenditure. Most of the income is derived from tax revenues. (City of Helsinki, 2002) The experiences reported in this study are related to childcare (around 200 day care centres), child welfare (8 substitute homes), elderly (4 service centres and 13 blocks of serviced flats) and disability (7 day activity units) services. All of these services are provided by Social Services Department. As a whole the development project has included many research activities such as interviews, workshops and meetings. The gathered data consist of on-site observations, written memos and interview data.

The aim of the action research project is to develop more valid productivity measures than the existing ones. Like in many other public organizations, valid measurement of productivity has proven to be a great challenge in the organization. Productivity measurement has been carried out for years with a system that provides information on the productivity trend of a rather large organizational entity (e.g. Social Services Department) based on output/input index (outputs / costs). According to previous experiences, the key reasons for challenges in the measurement of productivity are related to, first, variations in output quality, second, variations in the service demand and, third, the time lag between immediate outputs and final outcomes. Action research is the most challenging and far-reaching method used in case studies (Gummesson, 2000). Action research is a method in which researcher participate in an organisation's activities – in this case the design process of productivity measures – and examine a situation while it is occurring (Coughlan & Coghlan, 2002). Action research requires interaction between researcher and actors in the organization studied (Gummesson, 2000). Design-based research is a specific type of action research which aims to develop knowledge that can be

used in solving field problems (Andriessen, 2004; Van Aken, 2007). Effectiveness and validity of the solutions are not only evaluated by the researchers but also by the users in the field of application (Stam, 2007). Designs may refer to entities such as actions, structures, processes or systems whereas design methods can be design processes, design roles and more specific methods for solving certain design issues (Van Aken, 2007).

This study clearly has the nature of design-based research since it aims to identify and develop a solution to the problem from the practical field. In this study, workshops have been utilised as a practical development method in the design work. Six different working teams with their own workshop schedule have carried out the design work. In addition to the author, 3-5 persons from the Social Services Department have attended the workshops. The author has acted as a facilitator of the design process by presenting different measurement approaches from the literature, asking questions and directing discussion as well as the design work. The experiences of the workshops have been carefully documented for research purposes. By the time writing this paper, the design work in childcare and elderly care has been finalized and the measures have been taken into use. In the other services, the different productivity affecting factors have been identified but the actual development work related to measurement is still under way.

3.2 Experiences from the action research project

After interviewing around 20 managers (mainly departmental heads) of the City of Helsinki, several requirements related to productivity measurement were identified. For example, productivity measures should provide detailed information in order to identify concrete targets of development. On the other hand, productivity measures should help in monitoring of productivity trend in a larger organizational entity, such as the Social Services Department. In addition, productivity measures should provide tools for benchmarking different units. The representatives of the case services (operative level managers) emphasized the following requirements for the productivity measurement system:

- usefulness as a productivity and performance management tool at the operative level,
- information on all the key factors that affect productivity,
- controllability of the factors measured, measuring only those factors that can be affected by managerial means,
- possibility to compare units providing similar services,
- possibility to utilize the measurement information provided by currently used measures,
- simplicity of the measurement system (easy to understand).

At first, designing of a measurement tool for satisfying all the different requirements seemed to be a rather complicated task. The next step was that the author presented several approaches (that were identified during the literature review) for measuring productivity. They were evaluated in an open discussion by the working team members. The key comments related to each proposed approach are summarized next.

- a) *Developing the currently used output/input indicator in order to better capture both tangible and intangible output elements*. The representatives of the case organization felt that this approach is rather complicated and does not give enough information on productivity-related factors for managerial purposes. Hence, index approaches with complicated mathematical formulas were dismissed.
- b) *Developing a couple of new simple productivity measures that could be used as part of the balanced performance measurement system* that was commonly used in different units. In this approach, measures related to intangible elements of service inputs and outputs could be monitored alongside with their own measures. The working team felt that this approach is not new enough. There were many measures already in use. It was regarded that high number of measures provides an overwhelming mass of data which is difficult to monitor. Different measures are easily left detached.
- c) *Productivity matrix* which was eventually chosen for the purposes due to many reasons. One key reason was that the representatives of the case units were really enthusiastic with the approach. They felt that something really new could be accomplished for managerial purposes. Matrix provides one index calculated from several productivity-related indicators. In addition, it is easy to understand what the factors are that have influenced the index. Matrix does not include

any complexity: measurement method is transparent to every employee. The approach also shows what a good result is. Therefore, it can be used in the management by objectives. Individual objectives for each measure and for the total index can be defined in the case of each unit. Therefore, it is easier to identify means on how to improve productivity. It was also felt that the matrix approach was a good way to give more meaning to the indicators that were already in use but not intensively monitored and analyzed.

In the beginning of the design process, each working team identified what the different productivity affecting factors are in the context of their organizational unit. The result was a map that is roughly similar to the strategy map (cf. Kaplan & Norton, 2004). Initially, two aspects of productivity were separated: service quality and cost efficiency (cf. Hodginson, 1999). The following figure illustrates an example of the result. Typically the maps did not encompass as many factors. When looking at the factors more closely there are factors clearly tangible, such as output quantity, output magnitude, the condition of customers and, on the other hand, resources and resource utilization. Examples of intangible factors are customer satisfaction, happiness of customers (output factors), as well as, working atmosphere and employee competence (input factors).

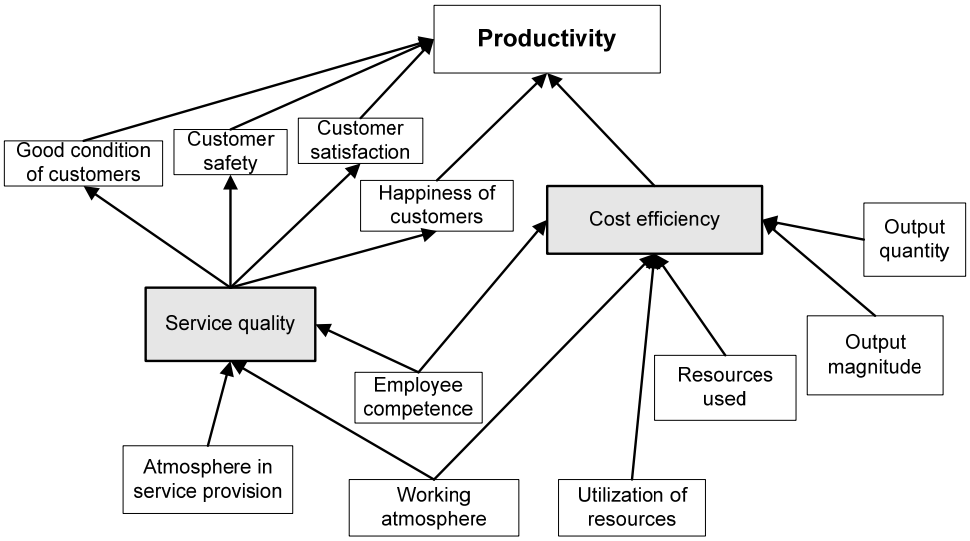

Figure 1: Map of different productivity affecting factors

The next step in applying the matrix approach was to identify measures for different productivity affecting factors. Many of the tangible factors were already measured. For instance, output quantity was measured with the number of care days provided. Resources and resource utilization were linked to their own measures, such as the utilization of premises or the average number of customers per employees. Not surprisingly the intangible factors were regarded considerably more difficult to measure. However, several measures were linked to them, deficiencies of which were acknowledged. For example, it was assumed that the rate of short sickness absences indicate the working atmosphere of an organizational unit. Employee competence could be measured with measures related to educational activities. These kinds of measures can be referred to as indirect measures. However, direct measures for certain intangible factors were in use. For example, customer satisfaction of childcare is measured with a questionnaire addressed to the parents of children. The following step in constructing a productivity matrix was to prioritize the measures. 100 % was allocated to all of the measures. This was done by evaluating the significance of each factor from the point of view of productivity management. In order to finalize the matrix, there was a need to collect measurement data related to each measure. Since the matrix uses a scale from 0 to 10 to describe to score for different measurement results, it was necessary to understand what the current level for each measure is. The average result got the score of 4. Scores 0 and 10 were defined in such a way that there are only single units that have such results in the beginning of using the matrix. The following figure presents a matrix that was designed in the case of elderly care. In the example, the result of the first measure has been 15.50 €. This means that it does not yet fulfil the requirements of the score 6. Score 5 is multiplied with the weight of 45 % which means that weighted score for the measure is 225. When the same is done for each measure we get the final score of 580.

	Unit cost of calculated care day, €	Percentage of customers with deteorating condition	Average number of customers per number of employees	Degree of utilization of premises, %	Rate of short sickness absences, %
Measurement result	**15,50**	**4**	**0,55**	**100**	**3,6**
10	12	0	0,28	100	3
9	12,5	1	0,29	99,9	3,2
8	13	2	0,3	99,7	3,4
7	14	4	0,31	99,5	3,7
6	15	6	0,34	99	4
5	16	8	0,37	97	4,5
4	17	10	0,4	95	5
3	19	13	0,5	92,5	6
2	21	16	0,6	90	7
1	23	20	0,7	85	8
0	25	25	0,8	80	10
Score	5	7	2	10	7
Weight	45	15	15	15	10
Weighted score	225	105	30	150	70
Total score	580				

Figure 2: Illustration of the matrix

In order to compare the total score of a productivity matrix, same scales, weights and measures have to be used. Therefore, the total score of the matrix is comparable only when the same matrix is used. In the case of City of Helsinki, it is intended that the results of different matrices are commensurated by examining the change in total score not the score as such. However, in the case of similar units using similar matrices the score provides a good basis for benchmarking and has also been regarded as a potential tool in supporting the payment by results.

4. Conclusions and discussion

This study identified the intangible and tangible productivity factors in the case services of the City of Helsinki. In addition, it explored how these factors are measured in practice. According to the results, there are several measures related to tangible productivity factors but only few direct measures of intangible factors: indirect measures with limited validity are used. The main issue of the paper was related to the choosing of suitable approach for measuring and managing productivity in public organizations. Several requirements for productivity measurement were identified. For example, it is necessary to gain information on the level of productivity of similar service providing units, in order to properly compare their productivity. There is clearly a need for getting more detailed information on productivity affecting factors: measures should be designed for operative level units. Component-by-component approach was regarded as a suitable way for examining the complex measurement object of service productivity at the bottom level of an organization. This approach also makes it possible to constantly develop the measurement system: components of productivity can be regularly evaluated and better measures for them can be designed. It is also a good analytical approach for understanding the issue, not all components have to be measured. Based on several arguments, the representatives of case services felt that matrix approach was the most suitable for their purposes. A key reason for not choosing the output index approach, for instance, was the requirement of simplicity. In addition, matrix approach provides a powerful tool for operative management of productivity. However, this approach is not without limitations. The score of the matrix is comparable only in units that use the same matrix. Even though the change in the score is more comparable, there should still be some guidelines and rules on designing the matrix in different services.

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How to Conduct the Audit of Intellectual Capital in Polish Tourism Business?

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Abstract: Intellectual capital (IC) - defined by the values such as knowledge, skills, experience, organisational, social and cultural relations etc. – is one of the most important assets of tourism business and can be perceived as the factor having the greatest influence on the company's value. Due to the leading role of intangible assets in tourism sector, it is important to specify the IC structure and diagnose IC assets for tourism industry. The results of the diagnosis should be taken into consideration in IC management and in the decision-making process within the organisation. The diagnosis of the IC condition is an issue which has not been the subject of any detailed research in Polish environment. The lack of specific tools as well as the real need for resolving the title problem has been the inspiration for a deeper investigation. The goal of the undertaken research is to create an algorithm of IC audit for tourism companies and necessary, utilitarian tools. The main objective shall be achieved by performing the research tasks presented in the paper, among which the most important are:

1. Review of the theory and different IC valuating and measuring methods (literature of the subject).

2. Executing the initial research among experts, executives and employees of tourism market, using an Individual in-Depth Interview (IDI) and participant observation methods.

3. Preparation of an IC audit's algorithm.

4. Programming a software of IC audit implementation.

5. Application of the IC audit prototype to an experimental group with the aim of eliminating any methodological and technical faults.

6. Implementation of the IC audit in chosen Polish tourism companies.

7. Presentation of the results (reporting).

The initial research has clearly indicated, that the knowledge resulting from an IC audit is useful and necessary for executives. Reporting of IC audit lets managers identify and highlight the missing or neglected elements of IC structure and recommends certain activities in management procedures, designed to enhance business performance. This paper presents the results of the research done so far, but the main goal is to implement the IC audit tool in Polish tourism companies and prove its efficiency.

Keywords: Intellectual capital, intangible assets, IC audit, management, tourism, Poland

1. Theoretical background

1.1 IC theories and valuation methods

Many companies have been recently facing the problem of an inexplicable difference between their book and market value. More and more often powerful companies were falling into a competitive black hole and they were replaced by companies entering the market. As a result, many researchers focused their interest on understanding this competitive advantage (Roos and Roos, 1997). They found out that account results were not any more reliable as an indicator of the company's value. The most valuable assets became human knowledge and intellectual resources (Karlgaard, 1993). It was already noticed in the early 90s. Many managers tried to manage intangible assets using their common sense and intuition but these assets were defined much later as intellectual capital.

Intellectual capital (IC) is defined as "hidden assets of the company, omitted in its balance sheets" (Wachowiak, 2005). It includes "knowledge, experiences, expertise and associated soft assets, rather than their physical and financial capital"(Klein, 1998).

Until it was measured first time, IC had been known as an invisible hand of the market. To institutionalize intellectual capital entrepreneurs and scientists propose many different IC models (Bontis, Keow and Richardson,2000; Brooking, 1996; Edvinsson and Malone,1997; Moon and Kym,

2006; Saint – Onge, 1996; Stewart, 1997). One of best known IC models is 'Navigator', created by Leif Edvinsson (Edvinsson and Malone,1997). Edvinsson described IC in terms of five dimensions (financial, development, customers, processes and human) which include 112 indices measuring intellectual capital. Then he evaluated IC of the company Skandia and published the results – it was a breakthrough in the intangible assets management.

Another important model is the Broker Technology (Brooking, 1996,1997), presenting audit as a diagnostic tool of intellectual capital. Broker Technology is a combination of market assets, intellectual property assets, human-centred assets and infrastructure assets. Each dimension is examined through a number of specific audit questionnaires (178 questions). The answers allow to identify and evaluate IC components. The final result is monetary value of the intellectual capital of a company. This model is appreciated for presenting a complex IC diagnosis companies of any type (Kasiewicz, Rogowski and Kicińska, 2006).

There are many other approaches to the theory of intellectual capital – to its significance, structure and management. There is a number of different methods of IC measuring and evaluating, different dimensions, indices and indicators (Andriessen, 2004; Brennan and Connell, 2000; Kaplan and Norton, 1996; Lim and Dalimoore, 2004; Lev, 2001; Low and Kalafut, 2002; Sullivan, 2000; Sveiby, 1997). However, all authorities in the field of management agree that intellectual capital increasingly influences the overall functioning of organizations (Stewart, 2001). Due to that, in order to create their image and strengthen position and credibility, companies must measure it and report their IC condition to the market.

1.2 IC role in tourism business

In many kinds of industries managers perceive the importance of intangible assets (for e.g. consultancy, insurance or IT companies), which are considered as the basic for company's development and success. Nevertheless the role of intellectual capital in tourism industry as well as the need for IC management have not been sufficiently recognized and valued yet.

All products on tourism market have one common feature – they are intangible, which means that their production and consumption are simultaneous. That is why they must arise from the creativity and knowledge of the people, who create them. Professionalism and individual know–how of every employee are essential to provide customers with the highest quality products and to satisfy their expectations. These competences are required either from office staff or from those who directly provide services to the customers in destination places. The quality of the dreams bought by customers and served by employees depends on their intellectual potential as specialists in tourism. It depends on drivers and tour leaders during trips, on the travel agent while the customer is choosing his or her travel destination, on every employee of tour operating company while creating the complimentary tourism product etc. How much would be worth the best plane without a professional pilot or a very modern reservation system without people who are able to handle it properly? However, to create a high quality tourism product, all employees and contractors (considered as elements of the comany's virtual structure) must closely cooperate. The cooperation can be successful only with an effective human resources management. Furthermore, the effectiveness of IC management should be considered as an opportunity to gain competitive advantage on tourist market.

An audit is one of useful methods facilitating IC management process (review; Sutherland and Canwell, 2004). An audit allows to determine the current condition of company's intangible assets. It lets identify opportunities and problems of IC management and allows to define values and the culture of an organization. From an audit perspective it is possible to examine the nature and localisation of intellectual resources (whether they are used, neglected or missing), the ways of using and transfering knowledge within the company and the needs of its employees. However, only properly performed audit is able to identify intellectual supplies within the organisation and deliver useful information to improve the process of IC management.

2. Case study

Although intellectual capital is important in all kinds of organizations (private, public and third sector), this paper focuses on privately owned tourism companies in terms of IC importance to their commercial goal.

Polish tourism market is developing dynamically, which is reflected in growing market share, an increasing number of employees in services and a growing quantity of tourist products consumers. Poland's indisputable tourism potential is what makes the presented research concept well justified.

2.1 Research objectives

The main purpose of the research is to create an algorithm to conduct the audit of intellectual capital in tourism companies as well as necessary and utilitarian research tools. Audit's results enable to control changes in the structure of intellectual resources in tourism companies. Testing the designed IC auditing tool within a company is perceived as an integral activity.

2.2 Research tasks

It is assumed that a regular review of IC state in tourism companies will allow to locate, control and solve internal problems connected with intellectual resources. The audit method enables to formulate and implement IC management strategy or - if one exists - to improve its efficiency and so maximize the company's market value.

Regarding the main goal of the research, there are many methodological and substantive problems to be solved:

- Defining the assumptions of conducting IC audit in tourism companies.
- Determining the IC structure adequate to human resources of tourism companies.
- To identify problems, threats and opportunities associated with intellectual assets of tourism companies.
- Designing technical tools for performing the audit.
- Choosing the methods to assess the nature of changes in IC structure within a company.
- Defining the guidelines and directives for human resources and IC management.

2.3 Implementation

The research process is divided into two parts – the initial and the main study. Each part includes three specific stages (figure 1). The initial research is completed and its results are presented in the article. The main research shall be conducted from February 2009.

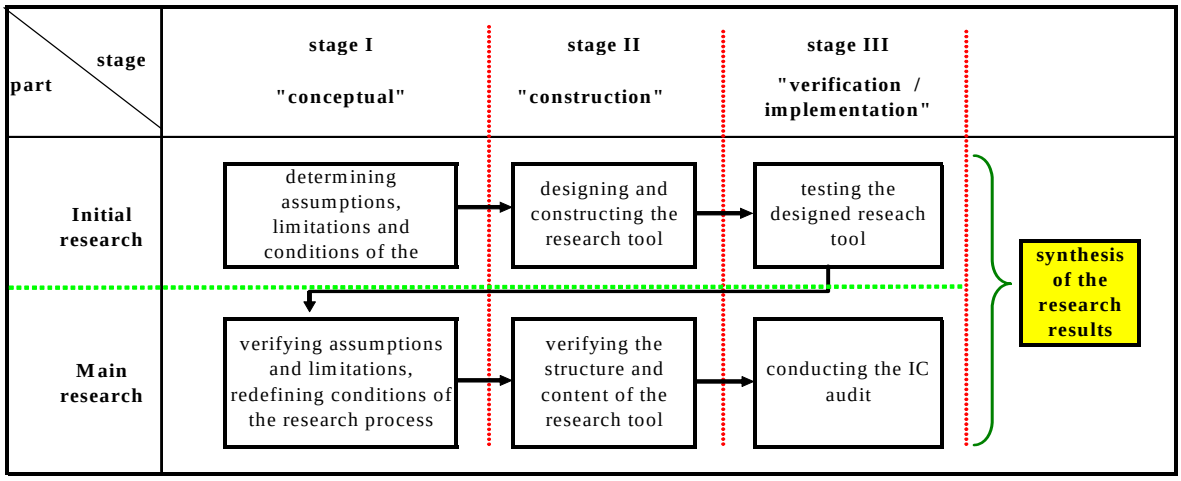

Figure 1: The research structure.

2.4 Initial research - conceptual stage

Initial research was focussed on designing IC audit tool and determining assumptions and conditions of its implementation in a tourism company.

First step was to analyze different methods of IC measurement implemented in various Polish and foreign organizations. It was carried out on the background of the desk research and it allowed to determine the possibility to adapt knowlegde about IC to the needs of tourism industry. The different sets of IC components, structures, models and indicators proposed in literature were reviewed.
The conclusions of literature review were completed and verified by carrying out further studies: benchmarking of the similar research tools of IC diagnosis and measurement, participating observation and the individual in-depth interview (IDI).

Participating observation method was used to register work performance of the employees of different tourism companies cooperating to provide services to tourists – hotel staff (20 hotels), tour leaders (50 persons), guides (20 persons), foreign contractors (6), agents (brokers sale – 15 offices), etc. All of them together create a virtual structure of tourism companies and have strong influence on the condition of company's intellectual capital. Due to the needs of the observation, intellectual assets were divided into two groups:

- - Assets posessed and used by employees of tourism companies to perform their duties.
- - Assets expected from them by colleagues, superiors, employers and customers.

Observation took place on the territory of Morocco, France, Portugal and Poland (from September, 2006 to November, 2007).

Individual in-depth interviews (IDI) were carried out with those who are not easily available (because of their position or workplace). This method was used twice during the different stages of the initial research. First time, it was conducted with executive (1) and operation managers (3) of a Polish travel agency and tour leaders (12) working for a few different Polish travel agencies (in July and August 2007). Each of them was deliberately chosen on the basis of to their detailed knowledge about functioning of tourism company from the inside (managers) and from the outside (tour leaders).

These studies allowed to recognize the specification of tourism companies (especially tour operating agencies), to determine their virtual organizational structure, to locate their intellectual resources and finally to define criteria of IC in tourism business.

2.5 Initial research - Construction stage

To create the tool of IC auditing in tourism companies, first it was necessary to specify how to conduct the audit. The second step was to design a software and finally to prepare the guidelines for using the tool.

The research tool is a software, adequate for the needs of the IC auditing. It was designed by a programmer, who followed the instructions clearly defined by the author. The next task after preparing the software was to insert into the programme a previously determined list of IC evaluating criteria (in a form of questions). The questions can be put in or out, set and changed depending on the research needs.

The software is installed in the Internet database and can be entered via the author's web site. On the web site respondents may read about the subject and objectives of the research as well as the instruction to the content and form of the audit (also available while completing the audit). Then they access the audit but only by using a previously received user name and a password. It helps to protect the results of the research from distortion and to identify and divide the results if there are several different companies being investigated at the same time. This way of conducting the research gives far-reaching benefits - each respondent can undertake the audit at any time and anywhere, in suitable conditions.

From the technical point of view, the software is divided into three levels:

- Auditing questionnaire – used by respondents to log in and fill in an audit sheet.
- Control panel - used only by the auditor to insert or delete the auditing questions, to put them in an appropriate order, to define all the variables of the audit (depending on one's needs). The panel contains database, where all the research results are collected and automatically analysed. It contains also a search engine, where the auditor can see statistics for particular questions or questionnaire or even choose particular personal data as searching criteria.

- Software algorithm - prepared and administered by the programmer.

The software is available on a CD and can be installed in each tourism company, which has its own server with a PHP interface and a database. In that case, for better protection of the results the access to the audit is possible only via the company's computers.

The essential content of the audit is composed of 241 descriptive criteria evaluating IC. One can distinguish the following segments: personal data form and 13 auditing questionnaires. The latter include twelve sets of inquires which are thematically related to various IC components and one used as a part of quality research aimed to verify the research tool itself. Once the tool has been verified the 13th set of questions is deleted.

Personal data form contains questions on: age, gender, education, place of residence, seniority in the company, seniority on the position, experience in tourism industry and form of contract (13 questions).

The auditing questionnaires (10-20 questions each) are as follows:

- Intellectual assets of the employees.
- Ability to get the job well done
- Performance management and controlling
- Company's brand and the ,,branded employee".
- Overall job/cooperation satisfaction.
- Customer orientation.
- Company's cooperation with external contractors.
- Working conditions.
- Teamwork and team-building.
- Management strategy and company's values.
- Employee and his/her immediate supervisor (mentoring).
- Intellectual property.

At the end of each auditing questionnaire there is an open question used as an element of quality verification of the tool during the initial research. By this question respondents have the opportunity to judge if the questions are clear, rational and well-aimed concerning the objective of the questionnare. At this stage all respondents respond to all questions. In the main research questions will be divided into: universal (for all) and specialized - assigned to particular groups of respondents taking into account departments they work in and their position in the company.

The presented software of IC auditing in tourism companies is an utilitarian research tool, simple to implement and to use within the organisation. The auditing results are immediately analysed and graphically ilustrated, which is useful, for example, during executive meetings when company's IC state can be easily presented. In the same time it is universal – it can be easily changed and adapted to the needs of any tourism company. The audit can be conducted by a person who is competent and authorised by the company to manage the software.

2.6 Initial research – Auditing tool verification

The prototype of the research tool was tested from two different points of view: technical and essential. The aim of technical testing was to check if the software functions correctly. The verification of the audit's content was concentrated on the quality of auditing questions and the accuracy of the previously chosen IC criteria and whether they were adequate to tourism specificity. As the final test, it was planned to implement the software in a choosen tourism company. The aim of this stage was to obtain the maximum amount of information and opinions on the tool.

The technical testing was carried out in April and May 2008 on an experimental group of working students (30 persons) to verify the functioning of the software by using CAWI technique (Computer Aided Web Interview). It provided information about various types of errors in auditing questionnaires and technical defects in the form of audit and graphical ilustration of the results. It also allowed to

verify the method of search engine operating. All errors detected during testing have been succesfully removed, for example:

- It was difficult to analyze the comments given by respondents in open questions because they were collected in the database in a form which couldn't be copied or printed.
- The data imported to Excel for further analysis was presented in unacceptable form (unclear, in random order etc.).
- The graphical presentation of the results for selected searching criteria didn't say what criteria has been chosen. Consequently, if there were many questions analysed at the same time, it was necessary to go back to the search engine in order to remind previously chosen criteria.
- It wasn't possible to copy the graphical presentation of the results to Excel for further analysis in a form read by this program.

Further testing was related to the content of IC auditing tool and conducted by means of interviews (IDI) with the executive manager of Polish travel agency Triada (1), the operation manager of Bristol Hotel in Warsaw (1) and with professors (8) who are experts in the field of HR (January to March 2008). The aim of IDI was to verify if the set of IC criteria is well chosen, if the questions are properly formulated or if the order of questions is suitable to the audit objective.

The information obtained from the interviews as well as from the answers (previously given to the open questions by a group of students) allowed to correct the content of IC auditing tool. Only these suggestions which were essential for the objective of the research and could significantly improve the quality of the tool were selected and used. It is important that the respondents were specialists from various kinds of tourism companies or even different industries and they had different work positions. That is why they could look at the research from many different points of view and assess it objectively. Their comments helped the author to see the concept of IC auditing from a fresh perspective.

Some of interesting suggestions resulting from the survey have been presented in the article. For example, in the 4th questionnaire "Company's brand and the 'branded employee'" the respondents suggested a question about the employee's readiness to make sacrifices for the company. Another suggested question was if management is able to convince the employees that they are "branded" and to explain what it means to be a "branded employee". The employees should be also asked if they identify with the mission of the company, if they have possibilities to be promoted and if there exists a formal way of promotion within the company. The 13th questionnaire included 10 questions and was used for the initial research to verify the designed IC audit tool. Respondents were asked to assess the quantity and quality of guidance available just before entering the audit. They were asked if the "Help" section contained information they needed while completing the audit and if – in their opinion – the chosen IC criteria were consistent with the research objectives. They could also evaluate the form, content and the number of questions of the audit. Furthermore, respondents expressed their opinion on the idea of carrying out the audit - if proposed IC audit will be a useful source of information about the functioning of the company. If yes, how often it should be repeated. The last question welcomed any additional comments about the survey.

This last part of the audit provided the most valuable information concerning verification of the proposed tool. It showed that the amount of guidance is appropriate for 67% of respondents, 23% think that it is a bit too much, and 7% that it is far too much (figure 2).

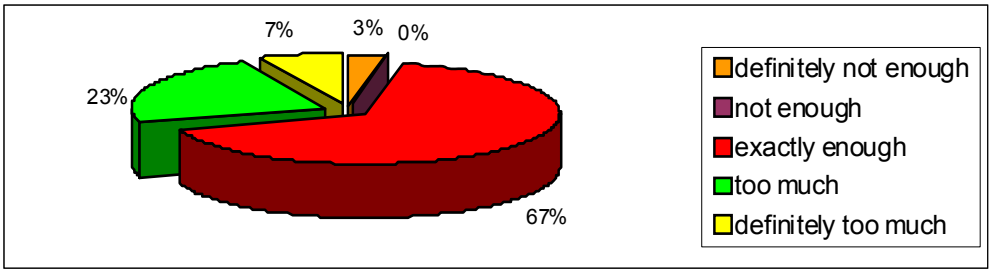

Figure 2: "Choose the most appropriate description of the amount of the researcr guidance available on the web site"

The amount of information should be reduced to a strict minimum, especially since 90% of respondents did not use at all that information while filling in the audit sheet (question 3). The form of research was appropriate (97% - question 4) and the questionnaires were comprehensible (100% - question 5). The relevance of questions was assessed at an average of 4.5 (question 7).

The proposed tool of IC auditing was evaluated as a useful source of information about the state and functioning of the company (question 8) which should be carried out regularly (77% - question 9). Respondents concluded that proposed audit can stimulate changes within the company. As the audit provides knowledge about needs and expectations the employees are afraid to talk about openly, it may facilitate relations between managers and employees.

2.7 Initial research – Implementation

Bearing in mind the testing results, all the necessary amendments in the algorithm of IC audit conducting as well as in the research tool were introduced. So far, the most important change has been made in the content of the audit: the list of IC auditing criteria, within the 12 audit sheets, has been reduced down to 180 questions. The audit sheets have not been presented in this paper because the quantity of the auditing questions is still to be verified and then finally specified; all by the end of the research process.

The last part of the initial research was to partly implement the IC audit tool in chosen Polish travel agencies. Unexpectedly, it turned out that it was not possible to carry out the implementation in a way that had been intended - neither in the last stage of the initial research, nor in the main research (May 2008). The managers asked to conduct the audit within their companies refused claiming that:

- The present situation of the companies, being forced to adapt to the rapidly changing tourism market, is not favourable to carry out this type of research.
- Some of the audit questions are related to “sensitive” issues and confidential information, which should not be known to anybody outside of the company.
- Many questions concern commercial information, which are absolutely confidential.
- Answers to many questions are obvious to managers.
- If the results of the research of one company became known to the others, it would endanger its competitive position on the tourism market.
- Publication of the research results could have negative influence on the corporate image.
- Employees – by completing the audit - could expect some changes in particular areas of company’s functioning, which wouldn’t be possible for the time being. Therefore, conducting the research would cause a clash of interests inside the company.
- There aren’t many travel agencies on Polish tourism market, so in case of the research results publication it would be easy to identify the surveyed companies (even if the identification data were concealed).

Any guarantees of the research results protection did not change the attitude of the managers of the travel agencies asked to implement the proposed IC audit (4 strongest tour operating companies on Polish tourism market). At the same time, these managers emphasized the importance of conducting this kind of research and they were interested in possessing proposed IC auditing tool for their own purposes and internal use.

The exposed problem, which is strongly related to IC valuation in tourism companies, has not been identified before. It showed that tourism companies are afraid to conduct the research because it could reveal weaknesses in the management process, which are known but ignored by the executives of these companies. This problem shall be included in the list of the research tasks to solve (due to its importance in the context of the research objectives).

2.8 Initial research - Verification of the research methodology project

In that situation it was necessary to find other way, which could allow to achieve the main goal of the research, at the same ensuring time the credibility of the research process. To search the solution, the author decided to carry out different surveys of qualitative character such as interviews and consultations with experts in the field of management, managers and scientists (June 2008).

On the basis of the advise and suggestions obtained, it was decided to conduct an experiment. The research tool will be verified by its implementation in a virtual travel agency. The virtual company will be made up of real - former and current - employees of different tourism companies. The participation in the survey will be voluntary. Each person, involved in this experiment, will be reviewed in terms of its competence to perform well (within the created structure of virtual company). The chosen participants will be clearly informed about the tasks they are expected to perform throughout the experiment. The experiment is to commence in February 2009.

3. Conclusions

3.1 Initial research findings

Initial research consisted of few stages and required different conducting methods. Bearing in mind the goal of the initial research, the results obtained within this research were satisfactory. Even though some of the findings were unexpected, they were interesting from scientific point of view and valuable for the whole research prosess. Among the most important findings of the research done so far should be mentioned:

- The prepared and verified set of auditing questionnaires.
- A problem with the implementation of IC audit in a real tourism companies - decision about undertaking the experiment.

3.2 Further research results expectation

The ultimate outcome of the research shall be an algorithm of conducting an IC audit within a tourism company. It shall include:

- A set of definitions applying to the IC audit.
- Objectives of performing the IC audit in tourism companies.
- Conditions necessary to conduct the audit.
- The recommended frequency of carrying out the audit.
- Timetable and stages of the audit.
- Procedures of the IC auditing tool implementation and performance.
- Methods of collecting and analyzing the results of the audit.
- Rules of choosing the auditor.
- Procedures of authorization to access the audit's results.
- Procedures and a form of reporting the audit's results.
- Evaluation of IC auditing influence on corporate mission and objectives.
- Evaluation of IC audit effectiveness.

The author expects that regular implementation of the IC audit in tourism companies will result in a report presenting semantic profile of the intellectual capital condition (in a graphic form). This profile is constituted by a compilation of all answers to the auditing questionnaires from different periods of time within one company (following the algorithm of conducting the audit).

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Measuring the Effects of an IC Development Service: Case Pietari Business Campus

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Abstract: Intellectual capital (IC) development includes a wide set of activities focusing on the improvement of an organisation's intangible resources. However, it is often unclear what kind of impacts different IC initiatives have. The current literature lacks appropriate methods for identifying and measuring them. If it is not possible to assess the impact of various development activities it is difficult to justify IC investments or choose between alternative service providers. This paper, based on a case study, examines how to assess the effects of an IC development initiative. The empirical research setting is the Pietari Business Campus, which provides various IC development services for its twelve member companies operating in the Saint-Petersburg area in Russia. In this paper, the literature is first examined to understand how the impacts of development activities can be assessed in different contexts. The characteristics of these approaches are then utilised to formulate the assessment methodology used in the case study. The empirical assessment consists of both objective indicator data on activities and outputs as well as subjective interview data on outcomes. The case study showed that the activities and outputs can quite accurately be measured but the outcomes are difficult to capture. The main challenge results from external changes taking place and making it difficult to observe the outcomes of development activities. Due to the challenging nature of the assessment task and the relatively low managerial priority of the issue it is suggested that subjective assessment methods may provide sufficient information in many cases.

Keywords: Effect, impact, intellectual capital, intellectual capital development, measurement, service

1. Introduction

Intellectual capital (IC) management consists of various activities related to, e.g., identifying, developing, measuring and reporting on the intangible assets of an organisation. IC development – a key aspect of IC management – focuses on the improvement of IC-related resources and activities in practice (Lönnqvist et al. 2008). IC-related resources include, for example, skills, brands and working atmosphere. IC development activities consist of various practices such as development discussions, customer satisfaction surveys and employee training. According to the literature (e.g. Lönnqvist et al. 2008, Salojärvi 2005), many of these activities are already carried out in companies without even necessarily considering them as "IC development activities".

In practice, various programmes and services (e.g. training, education and brand improvement) are available to support managers with IC development initiatives. However, it is not clear what kind of impacts different IC initiatives have, if they have any. The current literature lacks appropriate methods for identifying and measuring these effects. If it is not possible to assess the impact of various development activities it is difficult to justify the IC investments or choose between alternative service providers.

This paper examines how to assess the effects of an IC development initiative. The paper is based on a case study. The empirical research setting is Pietari Business Campus (PBC). PBC is an innovate platform for providing IC development services for its twelve member companies operating in the Saint-Petersburg area in Russia. This paper examines the effects that the PBC's IC development activities have on its member companies. Through the case analysis an improved understanding of the challenges related to assessing the impacts of IC development activities is obtained.

2. Literature review: Assessing the effects of development activities

It is assumed that by investing in IC development work (e.g. developing recruiting practices) positive effects on a company's activities and finally improvements on financial results (e.g. productivity and profitability) can be achieved. However, the literature shows that it is not clear what kind of impacts different IC development initiatives have (Kujansivu & Lönnqvist 2007, Ross 2002, Väisänen et al. 2007). Furthermore, the literature lacks appropriate methods for identifying and measuring these effects.

In the literature there are several models for measuring and managing organisation's IC as such. Examples of these are the Calculated Intangible Value (Stewart 1997), the Value Added Intellectual Coefficient (Pulic 2000), Knowledge Assets Value Spiral (Carlucci & Schiuma 2006), the Danish Guidelines (DMTI 2003) and the Meritum Guidelines (Meritum 2001). These models provide a frame for the IC development work. They support evaluating the status of IC in the organisation at a certain time. However, they are not designed for assessing the impacts of individual IC development initiatives (cf. investment calculations in the case of physical assets), i.e. they are intended for the valuation and / or development of IC as a whole – not for understanding the effectiveness of a single IC development activity.

From managerial perspective it is difficult to justify IC investments if it is not possible to assess the impact of the development activities. Moreover, all development activities in a company should be prioritised and the selected development activities should be executed with the best possible input per output ratio (Taskinen & Smeds 1999). A choice between alternative service providers is also difficult to make. On the other hand, service providers (e.g. consultancies, public organisations) need information about what kind of added value their services provide for customers' business activities. Measuring the impacts of IC development is considered difficult or time-consuming and, therefore, measurement is often neglected in practice. Thus, there is a clear need for a practical managerial procedure to support the measurement of IC development effects.

The literature on "impact measurement" is scattered so that studies usually address only the assessment of impacts of a specific activity. For example, 'the assessment of effects' has been discussed in the contexts of competence development initiatives (Suikki et al. 2006), R&D projects (Herath & Park 1999) and change management interventions (Scharitzer & Korunka 2000). It is assumed that by seeking assessment approaches from several streams of literature (such as education, R&D and so on) there is a good chance to learn about the "best practices" in each field. Next, some examples of measurement models presented in the literature are provided.

According to Scharitzer and Korunka (2000), the effects of *change management interventions* (e.g. a comprehensive restructuring process; the development of new customer-orientation) should be measured at three points in time: at least one month before the organisational change, shortly after the change and one year after the change. The evaluation includes (in each step) two parts taking different perspectives on the phenomenon: customers' and employees' views. To measure both customers' and employees' expectations and experiences structured questionnaires are used. Also Taskinen and Smeds (1999) introduced a framework for measuring the effects of *change management*. Two types of measures are used: The first type assesses change project management itself and the second measures the outcomes of the change project (improvements gained in manufacturing operations). The outcome measures are further divided into human resources, process and technology dimensions. A questionnaire, which includes both quantitative and qualitative measures, is used to assess the change.

Various evaluation models for the impacts of *IT investments* have been proposed. Love and Irani (2004) used questionnaire which included three different benefit classes: strategic, tactical and operational. Respondents were asked to indicate the extent to which the factors were undertaken or had been experienced. Sun and Oza (2008) developed a method for measuring the benefits of implementing (and utilising) a specific IT system. The main idea is that both tangible and intangible benefits need to be evaluated. For tangible benefits, a spreadsheet calculation tool was developed. Instead, intangible benefits are measured using a proposed framework, which includes six key measurement areas. The assessment can be carried out easiest by interviewing managers. Giaglis et al. (1999) present a categorisation (2x2 matrix) for the benefits gained from information systems. They distinguish, first, quantifiable and non-quantifiable benefits, and second, those benefits that are realised solely as a result of the intervention, and those that depend to a greater or lesser extent, on other organisational factors as well. The Finnish Funding Agency of Technology and Innovation (Tekes 2008) evaluates the effects of *R&D projects* carried out in companies at the end of projects using two types of questions: quantitative and qualitative.

The impacts of *implementing different types of management systems* applied are discussed in several studies. For example, according to Beattie and Sohal (1999) the benefits of implementing ISO 9000 (carrying out a total quality management project) need to be measured form two perspectives: strategic business benefits and operational business benefits. Instead, Ukko et al. (2007) focused on

the evaluation of performance measurement impacts (application of the Balanced Scorecard). They used interviews to assess outcomes from two perspectives – management and leadership.

Voisey et al. (2006) focused on the measurement of the impact of a *business incubation project* (i.e. developing and supporting entrepreneurial activity) on its participants. The effects are measured from four perspectives: hard client specific measures, hard incubator specific measures, soft client specific measures and incubator specific measures.

To summarize, although the focus of the different methods is on different types of initiatives there are some common elements emphasised. First, many models suggest that the effects achieved should be measured from different perspectives, with an attention to both intangible (soft) and tangible (hard) factors and also to benefits obtained at different levels (strategic and operational). Second, it seems necessary to take into account the views of different stakeholders, such as employees, service provider and customers. Third, the assessment typically includes many data gathering methods, for example interviews and numerical indicators. Fourth, the measurement of the effects of a development initiative seems to be to a great extend based on the subjective assessment of individuals.

Measuring the effect of IC development initiatives (e.g. competence development project) carried out within organisations is challenging due to a number of reasons (cf. Antikainen et al. 2008). First, when assessing the outcomes we should be able to identify the factors making an impact. In addition to a specific development initiative, also other changes may take place. For example, significant changes in the business environment (such as the sudden economic decline at the end of 2008) or organisational changes (e.g., the replacement of a CEO) may have a big impact on an organisation's business performance. Thus, it can be difficult to determine which part of the benefit is caused by the specific development initiative and which results due to other factors. Second, it may take some time before the impact of an intervention is realised. Thus, the outcomes may not have been realised at the time of assessment. Furthermore, it is difficult to link the investment (the development activity) and the impact if there is a long time lag (especially when taking into account all the impacts of other changes taking place).

3. Case study

3.1 Description of the research setting

The empirical examination is based on case research. According to Eisenhardt (1989) case study is a research approach that focuses on understanding the dynamics within single settings. Case studies are used in order to study in-depth a certain phenomenon in selected cases. Case study was chosen because it emphasises the rich, real-world context in which the phenomenon occurs (Eisenhardt & Graebner 2007) and enriches not only theory, but also the researchers themselves (Voss et al. 2002). In addition, case studies may use various data sources including interviews, survey data and observations (e.g. Gummesson 2000, Yin 1994).

The case organisation examined in this study, the PBC, is a network founded (in June 2007) and owned by twelve Finnish companies operating in the Saint-Petersburg area (overall about 350 Finnish companies operate in the area). PBC provides IC development services for its member companies focusing on such areas as competence development and improving employer image. Examples of the development services are recruiting events, bench learning events, co-operation with educational institutions and training events.

There were many reasons for establishing the network. For example, at the time of starting the network the markets in the area were considered very potential but challenging for Finnish companies due to the characteristics of the business environment. Another reason for starting the network was the belief that sharing experiences and competence development efforts would be useful for companies planning to enter the area.

The need for assessing the impacts of the development activities originated from the PBC. The main motive was to show to TEKES, an external funder of the PBC, the effectiveness of its activities. In addition, it was considered that the assessment information can be valuable for the development of PBC's activities.

3.2 Assessment procedure

The assessment procedure was developed by both studying the existing assessment models in the literature and evaluating the potential for obtaining measurement data. The assessment methodology to be applied for PBC was first sketched by the authors. After some discussions with the PBC managers the final version of the model was formed as presented in Figure 1.

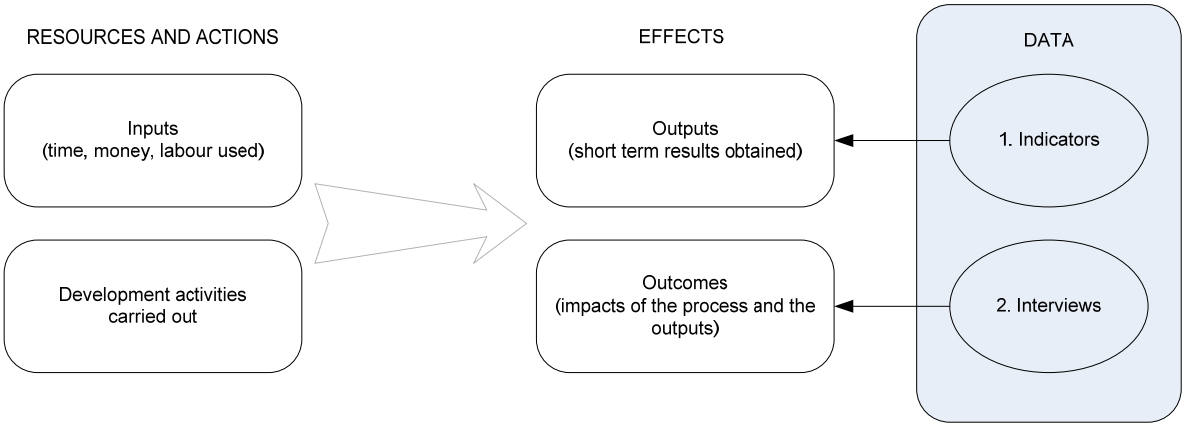

Figure 1: Assessment procedure for the effects of IC development initiatives

Figure 1 shows simplistically the key factors of an IC development activity from the point of view of impact assessment. First, there are certain inputs used in the development project, e.g. companies' money and time. Second, there is the specific development activity taking place (i.e. what is actually being done). Examples of these are educational and recruiting events. Consequently, the input usage and the activities lead to effects. Obviously, different kinds of activities have different impacts (or they impact different factors). The outputs, such as a new acquired skill, and the outcomes, such as improved process performance, can be distinguished as the two main types of effects.

The assessment includes two phases: output measurement using a set of indicators and a subjective evaluation of the outcomes. The main idea of the procedure is that the two different data sources provide supplementary information which can be combined in an analysis to provide an understanding of the effects of different activities. The indicators provide an understanding of the concrete activities taking place and of their immediate results. These factors can be considered as necessary drivers for the outcomes. They do not provide information about the outcomes as such because they are usually observable only later on. However, interviews can capture the subjective understanding of the managers who often have a fairly good understanding of their companies. Subjective measurement has its drawbacks but it also provides benefits. The information about the outcomes (even if it is at least partially only about expected outcomes) can be obtained quite soon and it is fairly easy and cheap to collect. In addition, it is well known that objective impact measurement is very difficult to perform and thus its results may not be any more accurate.

In the following sections, the assessment based on the indicator results is first described and then the results of interviews are presented.

3.3 Measuring activities and outputs

In order to identify relevant indicators for capturing information about PBC's activities and the outputs created four measurement perspectives were first defined according to the PBC's vision and strategic goals. The perspectives are Recruiting processes, Visibility and contacts, Learning and developing operation models and Financial perspective. Then, indicators were chosen to represent each of these perspectives. The indicators and their results are presented in Table 1.

The choice of indicators was a result of discussions between researchers and the PBC's personnel. For example, in the Financial perspective *Cost per company* is considered an important issue because cost savings (due to sharing development efforts between network's partner companies) is one of the key motives for the network's existence. Measuring the amount of activities (e.g. Number of recruiting events and Number of attendance in training events) is a driver of the impacts: if the PBC is not able to organise events no resulting recruitments can occur or if companies do not participate in

the events they cannot be impacted either. Finally, improved visibility can be considered an impact of PBC's activities as such since one of its goals is to increase the recognition of the Finnish companies as potential employers. Another factor affecting the choice of indicators was the availability of data. Because the assessment of impacts represents only a small activity compared to the key tasks of PBC there was only a limited resource for data collection and indicator development. Thus, the indicators are fairly "light" and simplistic. In practice, the measurement results were collected manually (by a person from PBC) and documented using Excel.

Table 1: Indicators and summary of the measurement results

Perspective	Indicator	Result
Financial	Costs per company* of recruiting events (€)	6,703
	Costs per company* of recruiting events without PBC (€)	34,747
	Costs per company* of educational events (€)	0
Recruiting Process	Number of recruiting events	3
	Number of participated companies in recruiting events**	15
	Number of received applications per company* in recruiting events	659
	Number of recruitments per company* in recruiting events	2
	Number of received applications per company* through co-operation with educational institutions in Russia	5
	Number of recruitments per company* through co-operation with educational institutions in Russia	2
Visibility and contacts	Number of contacts with educational institutions in Russia	16
	Number of media appearances	7
Learning and developing operation models	Number of attendance per company* in personnel training events	45
	Number of attendance per company* in "learning from others" events	9

* Company level data can not be presented here due to confidentiality. The results refer to the total results of all participated companies
** In total in all recruiting events

The results in the financial perspective demonstrate the PBC's impact from cost savings perspective. The recruiting events would have been significantly more expensive for an individual company without the network sharing the cost. The other measures describe the volume of the activities organized by the PBC. In simple terms, many of these activities would not have been organized without the PBC's efforts, and thus they can be listed as concrete outputs of its activities.

3.4 Assessing the outcomes based on interviews

For the purposes of this study we used interview data collected by PBC during October and November 2008. The interviews were primarily designed as a basis for strategy discussions and, therefore consisted of a wide array of questions. However, the interview outline also contained some questions related to the impacts of PBC's activities. For example, questions such as "*When you think about PBC´s operations, in which activities you feel that the network has succeeded?"* and *"In which activities the network has failed or you would have expected it to succeed better?"* were considered useful. Thus, it was considered cost efficient to utilise the existing interview material and not to burden the managers with an extra interview.

Eleven of the twelve companies participated in the interviews. Respondents were chosen by the contact person of the company; in some cases also the person who had been in active co-operation with PBC earlier was interviewed. In total 13 interviews were carried out. Examples of the status of the respondents are Quality Director, Managing Director, Project Manager and Human Resource Manager. Most interviews were carried out face-to-face (four people were interviewed by telephone). In the following section, the interview responses related to the effects of IC development initiatives provided by the PBC are presented. The presentation follows the perspectives listed in Table 1.

Financial: No effects related to the financial issues were mentioned. This is probably due to the fact that at the time of the interviews PBC had been working for a rather short period. Financial outcomes are most likely observable only later on.

Visibility and contacts: Many of the managers interviewed mentioned that one of the most significant benefits of the PBC's activities is new contacts created among the members of the network. In addition, some of the managers mentioned having succeeded in improving the awareness of their company among the network. New contacts and improved awareness, in turn, have resulted in, e.g., obtaining new customers and partners. On the other hand, awareness among students is considered an important outcome because it may improve the company's image as an employer among students.

> *"I have been able to improve the awareness of our company among the other members of PBC and contacted by potential customers."*

> *"The network has succeeded in providing the company with new business contacts…"*

Besides the above mentioned benefits, many members of the network consider that the collective attitude and common ambitions of the members is one of the positive impacts of PBC's operation.

> *"In addition, solidarity (the sense of belonging to the same group) developed within the network is valuable to me."*

Recruiting process: The effects of the recruiting events organised were contradictory. One of the companies has been able to recruit new Russian employees into the business units operating in Finland. In addition, it was considered a positive outcome that the co-operation with labour authorities has increased. However, some managers pointed out that the recruiting events were not successful in terms of having new employees.

> *"Recruiting initiatives through PBC did not succeed. The material we searched for was not reached through the recruiting events."*

Learning and developing operation models: Outcomes related to learning and developing operations were pointed out in many interviews. The PBC network has provided managers with new experiences from other managers involved. Especially, experiences shared about business in Russian markets were considered valuable. In addition, according to a respondent, Russian language skills have been improved. The network was considered "a resource of learning, knowledge and practices".

> *"Companies starting here, but mainly operating in Finland, have certainly benefited the most from the network. They have gained assistance at entering the market and also knowledge through experiences and contacts."*

Overall, in the managers' opinion PBC's activities have succeeded in the creation of co-operation and networks among the companies. Furthermore, as discussed above many companies have achieved more concrete benefits. However, there was also opposite opinions. Not all managers saw that PBC had added some value to their company.

4. Analysis of the case study results

4.1 What can we say about the PBC's effects?

The indicators' results showed that the PBC has carried out activities with the partner companies, i.e. we can specify the amount and type of development output created. It can be observed that the activities have been produced in a cost-effective manner using the network structure. However, the indicators do not provide insights about the actual outcomes. The interviews proved a bit more revealing regarding the PBC's impacts. For example, they provided detailed information about the specific benefits and the limitations of the activities. However, it seems that the interviews took place too early in order to be able to fully observe the impacts. Thus, at this point we can conclude that the PBC has produced activities with some positive impacts, but the major outcomes are probably only observable later on.

One big issue affecting the assessment of PBC's impacts is the sharp decline of the economic situation during the latter part of 2008. Thus, the PBC's development activities play only a small role in the big turmoil taking place amongst the companies. The demand for the products of many companies has dropped significantly and many companies are forced to lay off hundreds of employees. This also affects the role of the PBC, and the goals of the network must perhaps be renewed in the future. Anyway, it is understandable that these changes make it even more difficult to assess the impacts. One might even question whether there is any sense in trying to make the assessment in this kind of environment.

4.2 What were the main challenges in assessing the effects?

The change in the economic conditions was already discussed as the major challenge from the technical impact assessment point of view. In addition, it seems that quite a long time must pass in order to capture the impacts. However, the more time goes by the more likely it is that some kind of "disturbing" change affects the organisation and makes it difficult to see the impacts.

If we look past this big issue there are other important factors also. For example, it is fairly easy to measure the inputs and concrete activities associated with IC development in an objective manner. However, the outcomes are often intangible by nature and they cannot easily be described objectively. Thus, subjective assessment can be the only practical approach for capturing information about the outcomes – especially when considering the resources available for carrying out such assessments.

Another challenge in assessing the impacts related to the motivation of the PBC's partner companies to support the assessment process. It was the authors' perception that the managers are busy with more important business decisions and thus they are not truly interested in finding out the impacts. In addition, the IC development cost maybe considered as "sunk cost", i.e. the money has already been used, so there are more important things for managers to focus their attention on. It seems that a strong managerial commitment would be a good asset in this kind of measurement process as it is in many other contexts also.

5. Conclusions

There is a clear practical need – especially on the service provider's side – to be better able to assess the impacts of investments made to develop companies' intangible resources. There is also a lack of tools for making such assessments. In this paper, the literature was first examined to understand how the impacts of development activities can be assessed in different contexts. The characteristics of these approaches were utilised to formulate an assessment methodology to be applied in the case study. The assessment consisted of both objective indicator data on activities and outputs as well as subjective interview data on outcomes.

The case study showed that the activities and outputs can quite accurately be measured but the outcomes are difficult to capture. The main challenge results from the external changes making it difficult to observe the outcomes which occur during a long time period. Due to the challenging nature of the assessment task and the relatively low managerial priority of the issue (compared to more important tasks) it is suggested that subjective assessment methods may provide sufficient information in many cases.

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Solving the Value Conundrum of Knowledge and of Intellectual Capital in General

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Abstract: "To measure is to know", yet it is paradoxical that where it concerns knowledge and creativity - arguably the key drivers in today's 'new economy' - there is no consensus on how to measure, let alone value, these presumably valuable resources and activities. The realisation that a major part of a company's market value could not be explained by its financial or physical capital lay at the root of the intellectual capital movement since the early 1990's: Everyone "knows" that the combined intellectual assets (and liabilities) of an enterprise are increasingly critical in determining the health and therefore the value of the enterprise, if only because fewer and fewer enterprises rely on physical assets to do their business. Yet after almost two decades Intellectual Capital (IC) remains an elusive Shangri-La when it comes to providing generally accepted tools and techniques for identifying, measuring, reporting, and managing its value. This ultimately limits its usefulness for executive or managerial decision making. Using the case of knowledge markets, this paper exposes several shortcomings of the traditional transaction-based approaches that are typically used to determine the value of knowledge assets. It addresses specifically the limitations of ownership and appropriability, the significance of information asymmetry, and the need for authentication, all of which put downward pressure on the marketable value of knowledge. This goes to explain why knowledge markets cannot and should not merely mirror the dynamics of physical or financial markets. Key is to realise that the value of knowledge cannot be determined at the time of the exchange, and neither can its price! The act of sharing knowledge creates options on a continuum of future revenues. The value and price of knowledge should therefore be derived from whatever revenues it generates, as and when these are generated, rather than up front based on assumptions about future uses. Author proposes that knowledge markets be based on the 'bee-keeper model', an Open Source business model, separating the process of sharing knowledge from its commercial application, upon which its added value can ultimately be determined. By tracking shared knowledge all the way to where it leads to the generation of added value one can determine a claim on part of the related revenues to those who contributed to making them possible - by sharing their knowledge. These claims on part of future revenues can then also be traded as knowledge options.

Keywords: Intellectual Capital; knowledge markets; value; options

1. Value at the roots of the intellectual capital movement

At the root of the Intellectual Capital (IC) movement was the realisation that a company's financial and physical assets and liabilities could no longer be used as a yardstick for its market value as determined by its stock price. Lev (2001) illustrated this by showing that the ratio of average market value to book value of Standard & Poor's top 500 companies had gradually increased from 1:1 to almost 7:1 between 1980 and 2000[1]. This unexpected and growing gap between market and book values prompted the search for whatever was the missing component in the analysis. Soon the realisation came that the performance and hence value of a business was not so much dependent the size of its physical or financial assets, but rather on the ideas and innovations, the unique ways of making or doing things, the relationships one built with customers, etc., i.e. all the components and activities in an organisation that ultimately became known as intellectual capital (IC). Augier and Teece (2005) highlight that classical economists throughout the 20th century have long suspected that IC (and in particular knowledge and innovation) was the primary driver of economic growth yet failed to provide the analyses or analytical tools, and ultimately the economic models that could help executives and investors in quantifying the related business value.

Many different methods and tools have meanwhile been proposed to somehow determine an organisation's intellectual capital. Andriessen's (2004) assessment of 25 IC valuation and measurement methods highlights the various strengths but also shortcomings in each method, in particular with regard to the objectives of improving external reporting, respectively internal management. He concludes that a few may be candidates to becoming a universally applied method for measuring or valuing IC, though none appear to clearly or fully fit the bill. Marr (2005) in turn

[1] While such ratio indeed "compares apples to oranges" (Andriessen 2004) – market value being determined as the net present value of future expected cash flows, and book value being the sum of historical costs less depreciation – it still provides a ratio of outputs over inputs, i.e. some measure of (expected) productivity that can underpin investment decisions and resource allocations.

pleads for further cross-functional and interdisciplinary learning as terminology and definitions of IC still depend on which perspective (eg. finance, accounting, legal, economic, …) is taken.

Is it not paradoxical that where it concerns IC components like knowledge and innovation - arguably the key drivers in today's 'new economy' - there is a general lack of consensus on how to measure, let alone value, these presumably most valuable resources and activities?

Practitioners and academics in the intellectual capital community may not need convincing of the promise that the concept of intellectual capital holds for understanding what drives the new economy. However, because of precisely this lack of consensus on the definition, measurement, management and reporting of IC, they risk remaining but a vanguard of innovators unable to bring its application into the mainstream of management. "A solution in search of a cause", as Andriessen (2004) put it, and it seems that the search continues.

But perhaps we're looking in the wrong place? Are we even asking the right questions? Leliaert (2004) suggests that our questions – and solutions – remain framed in a management mindset that was fit for the industrial economy but is no longer for the new (knowledge) economy. The objective in this paper is specifically to challenge the conventional approaches – Andriessen (2004) even calls it an obsession - in first trying to measure and determine the financial value of IC as a necessary step towards managing IC.

Using knowledge markets as a case study as from the next chapter, author will explain why insisting on ex-ante (financial) valuation of knowledge paradoxically causes knowledge markets to fail; and how the removal of such precondition can instead lead to a working knowledge market model. Author concludes that, where it concerns IC in general, measurement and (financial) valuation should likewise be postponed and instead applied retroactively, which admittedly will require both further longitudinal research and practice to validate.

2. Markets for knowledge

Several authors have stated that there are no active, organised markets for intangibles[2,3] including for knowledge (Lev 2001, Andriessen 2004, Augier et al. 2005). Starting from two common themes in their argumentation, namely the weak appropriability of intangibles in general, and the strong dependence of their value on context, the current chapter will explain the root causes behind the failure of in particular knowledge markets, and thus determine what would need to be fixed to make knowledge markets.

2.1 Imperfect appropriability

Appropriability in the context of knowledge means the ability of knowledge creators to capture the economic benefits of their ideas, while excluding benefits to others (Lev 2001, Augier et al. 2005).

In the case of tangibles, such as a car or furniture or raw materials[4], property rights are usually well-defined and enable owners to effectively exclude non-owners from enjoying the related benefits (Lev 2001). The physical boundaries of tangibles allow one to uniquely and unequivocally determine who is owner at any one time and therefore to whom the related economic benefits will accrue at any such time. When tangibles are traded, the transfer of ownership automatically and simultaneously transfers the entitlement over all related benefits (as well as risks), which is what the buyer is after in the first place[5]. Appropriability of tangibles is therefore secured by ownership. And the economic value of ownership equates the aggregate value of economic benefits.

[2] Lev (2001) specifies that organised, active markets should have numerous participants and transparent prices.

[3] Burgman et al. (2004) explain and demonstrate that not all IC is necessarily intangible in nature, as there also exist many tangible expressions of IC (such as customer contracts, and patents); similarly, physical and monetary capital have both tangible and intangible expressions. In the present discussion, however, intangibles will mainly refer to Intellectual Capital.

[4] The same in fact applies to all tangible expressions of IC including knowledge, such as books, CDs or DVDs.

[5] A rental or lease can be considered a time-bound transfer of ownership, though legally there is of course no actual transfer of ownership; the value of related benefits is then split between the tenant and the owner.

Not so for intangibles, which aren't bounded by time or space. Owning certain knowledge does not necessarily imply exclusive use over all the benefits it affords, and spillovers mean that even where intellectual property rights (IPR)[6] such as patents are in force, these cannot avoid that competitors reverse engineer one's products, learn (i.e. gain insight and knowledge) from this, and may eventually 'invent around' the patent (Lev 2001, Augier et al. 2005): studies show that in spite of strengthening patent protection U.S. manufacturing firms are increasingly relying on secrecy and short time-to-market to secure a fast return on their investments in knowledge, instead of banking on appropriability through costly patent protection and enforcement.

The purpose of appropriability, to ensure the creators and owners of knowledge get the benefits of their ideas, seems reasonable and fair. But unlike for tangibles, the construct 'ownership' or 'property' is at the very least an imperfect means for ensuring appropriability of knowledge, due to unavoidable spillovers.

2.2 The role of ownership

Lev (2001) states that "markets cannot function without clearly defined property rights of parties to a trade". And therein he finds a problem where it concerns intangibles, namely the "considerable difficulties (and cost) of specifying outcomes as well as in allocating in advance investors' rights and responsibilities" notwithstanding the provisions of IPR. Indeed, when knowledge is sold, the seller in actual fact still intrinsically retains use over it, and thus will also keep the related benefits albeit supposedly limited by what IPR permit. For instance, if Robert Kaplan and David Norton were to sell all rights over their Balanced Scorecard (BSC) model and its derivative works like books and consulting engagements to, say, McKinsey & Company, they would still retain the related insights and experience, as well as notoriety as the conceptual inventors of BSC, short of changing their names. It seems a stretch to think that one could properly describe in any sales agreement whether and what Kaplan and Norton would need to pay to McKinsey for any future business they get on the back of their reputation and experience related to BSC, or how respective fees would be determined when McKinsey would subcontract them for a BSC project. The absence of active markets for knowledge, Lev continues, is in part due to the failure to write "complete contracts" that uniquely define the boundaries of what is sold and bought.

There is some debate about whether attaching the notion of property to knowledge, and IC in general, truly makes sense (Leliaert 2004, Lessig 2004, Stallman 2004). Knowledge after all derives its value from usage[7], and therefore the more it is used the more valuable it becomes. Augier and Teece (2005) explain that "consumption (of knowledge) by one individual does not reduce the amount left for another". In other words: the value of knowledge is not a zero-sum game and exclusivity of use is no longer required to fully enjoy the benefits of knowledge to oneself. For instance, everyone can fully benefit from the use of a word processing or spreadsheet application irrespective of others using the same; in fact to the contrary: the more people use the same application, the more valuable its use becomes to the individual since his documents and spreadsheets can then be shared more efficiently with others.

Restricting usage, which is indeed what assigning ownership and IPR do, is therefore restricting its potential full value to society. Lessig (2004) is particularly scathing about, and concerned with, the increasing restrictions typically imposed by IPR via for instance Digital Rights Management (DRM) technologies on what used to be 'fair use' of copyrighted materials: you can buy a book (which is a tangible expression of knowledge) and read it as many times as you want, lend or sell it to others, write in it, or modify it to your heart's content; none of this is regulated, nor subject to copyright law or to publisher's permission. An electronic version of the same book however is governed by a significantly different set of rules: the publisher can control and restrict the number of times you read even parts of the e-book, whether you may print or copy/paste any sections, whether you may sell or forward it to others, and in some instances how you may use its content in your own work. Lessig does not see copyright law as the enemy, but rather "regulation that does no good". He concludes

[6] Intellectual Property (IP) represents the legally protected and codified knowledge of its owners, and is one component of an organisation's IC (Sullivan 2005). They include patents, trademarks, industrial designs, geographic indications of source, and copyrights.

[7] What is knowledge for one, is but mere data or information for another. "You cannot define and manage (knowledge) unless you know what you are trying to do with (it)" (Stewart 1997).

that “the opportunity to create and transform becomes weakened in a world in which creation requires permission and creativity must check with a lawyer.”

It seems that the unavoidable difficulties in defining boundaries when applying the construct of property to knowledge expand the scope of regulation which becomes increasingly costly to manage, both to sellers and to buyers of knowledge, and may ultimately not add but rather restrict value.

2.3 Information asymmetry

Even the value of knowledge itself is difficult to determine. Andriessen (2004) states that if asset value reflects the degree of that asset’s usefulness or desirability, then how the asset is valued very much depends on one’s values, which are by definition subjective. This argument applies to both tangibles and intangibles: A given piece of land will have different value to a farmer, a residential property developer and a sports club. The value of a four-door saloon car will be different to a taxi driver, a sales rep, and a family of five. In these cases, however, the price at which the asset will be traded will be guided by what similar assets have been traded at between other buyers and sellers. Active markets are therefore considered to be essential for providing reliable reference points for the fair value of the assets being traded, and furthermore provide liquidity, in that purchased goods could be sold back or onward, which helps to optimise resource allocation and reduce one’s risk to be stuck with un- or underutilised assets (Lev 2001).

When it comes to trading knowledge there are two additional issues that affect price and payment: Firstly, buying knowledge in most cases is like buying a pig in a poke since you cannot inspect up front the quality of the knowledge you buy, and you therefore may have to trust the seller (that indeed he gives value for money). References are particularly important for building one’s reputation as a provider, to convey assurances about the quality of the knowledge traded and avoid a “market of lemons” from developing (Yamagishi et al. 2002): When buyers have insufficient information about the quality of what is sold, they will compensate for this uncertainty by offering less than fair value. Information asymmetry thus forces higher-quality sellers out of the market and overall quality down. The end result is that the average market price will continue to be driven downwards.

Secondly, knowledge and expertise, irrespective of their quality, may be too contextual, i.e. too narrowly linked to a specific context and not relevant anymore for a similar problem but in another context (Stewart 1997, Hansen et al. 2002): A school for the blind has no use for a course on photography, whatever your reputation as a photographer, but might value a course on ceramics. In some cases, poor quality may not even be an issue, as noted by former SEC commissioner Steve Wallman who is reported as saying that, in relation to share prices, “some of the most useful information is not the most reliable; and some of the most reliable information is not the most useful” (Skyrme 1999).

2.4 Authentication, risk, and transaction costs

Information asymmetry can be resolved by making price and payment contingent on authentication, i.e. applicability to the buyer’s own context. Desouza & Awazu (2003) point out that goods and services can easily be authenticated prior to the purchase, by testing the goods or observing how the service is performed with other customers; yet knowledge can really only be authenticated after the buyer has assimilated and applied it to his own context - at which point the exchange can no longer be annulled. With knowledge the proof of the pudding is truly in the eating! And once eaten, the pudding cannot be returned.

Contingent payment thus shifts the transaction risk onto the seller since the buyer, having already gained the knowledge, could withhold payment on the basis of it not fully or immediately meeting his/her requirements. Once the knowledge is shared, it is difficult to police whether or not the buyer uses the knowledge in spite of refusing to pay for it. Trust goes both ways and reputation therefore equally applies to the buyer.

However while contingent payment lowers transaction risk on the buyer’s side, he still cannot avoid that some time may be wasted on assimilating knowledge that ends up being useless, at least for the time being. For instance when reading this paper, even if you find most of it extremely relevant and inspiring, you may deem certain parts to be superfluous (including what you already knew) - but won’t know that until you actually read them. Likewise, the provider also has to invest time and therefore

cost in transferring her knowledge to the buyer, for instance in writing a paper or making a presentation.

These non-negligible transaction costs, together with the irreversibility of an exchange, lower the efficiency of knowledge exchanges and thus de facto reduce liquidity in the market for knowledge.

2.5 Zero price equilibrium

Transaction risk and information asymmetry aren't the only factors affecting the dynamic of knowledge markets. In general terms, the cost of developing and externalising knowledge (so that it may be traded) is large, up-front and sunk, yet the marginal cost of selling an additional copy of the same knowledge objects is all but zero (Lev 2001). In other words, the cost of producing one piece of knowledge is about the same as that of producing endless copies of that same piece of knowledge. Like the horn of plentiful one can keep selling the same knowledge over and over, at near-zero marginal cost, and without it ever running out, due precisely to its intangible nature.

But by the same token, whoever buys and assimilates your knowledge may be able to sell it onwards time and time again (IPR and demand permitting[8]), also at near-zero cost. The buyer in fact has an incentive to sell at a lower price so as to undercut you and quickly recuperate the original purchase cost, while at the same time retaining the knowledge. And since the next buyer will have the same incentive, and so on, price will quickly drop (Augier et al. 2005)! And therein lies the paradox: the more that knowledge markets become active and efficient, the more that prices will approach the marginal cost of production, which is all but zero!

2.6 Empirical observations

In spite of some authors' assertions that there are no active markets for knowledge (cf. §2), Bryan Davis of the Kaietur Institute for Knowledge Management actually lists in excess of 470 online knowledge banks, stores, malls, exchanges, markets, networks and auction sites (http://www.kikm.org/portal/page2.htm). He defines these as "formal or informal community contexts, platforms, or environments (…) used to promote knowledge commerce, trade and exchange, demand and supply, between knowledge buyers and sellers" (Davis 2007). Author's review of 215 such knowledge markets, auctions and exchanges showed that 64 (30%) were no longer available, and out of the remaining 151 sites:

- 60 (40%) were information portals and/or expert directories, usually with a search facility to locate specific content, products or experts: knowledge is either available online or it can be obtained by contacting the relevant experts; access to the site is free or fee-based.
- 47 (31%) were storefronts for specific content or vendors (solutions providers or consultants): online or offline knowledge can be purchased via the site or by contacting the vendors.
- 44 (29%) were collaboration platforms or online auctions: these typically connect knowledge seekers with knowledge providers.

In the context of the current discussion about how to value knowledge, and whether it can be traded, it is interesting to note that in most cases knowledge is indeed available for free! Only 6 out of the 60 information portals/expert directories charge a flat membership fee to access the available knowledge; and out of the 44 collaboration portals, 3 are IP auctions where price is determined by bidding, and 8 charge a typically time-related fee for expert advice. So even when a price is charged for knowledge it is hardly determined in relation to its value in use (except arguably for the auctions).

Conversely, in the context of what follows, it is worth noting that 3 sites - all of them collaboration platforms as it happens - use a reputation system to rate their experts, one of which converts reputation points into currency value (see http://www.ammas.com).

[8] As discussed earlier, IPR mimic the concepts of property and passing of title and restrict the ability of non-owners to lawfully reproduce and sell knowledge. Although IPR cannot avoid spillovers, they may slow down the downward spiral of pricing (Augier et al. 2005).

3. A market model for the New Economy

Applying to knowledge the same market mechanism as used for physical and financial products implies - and relies on - the introduction of the construct ownership to enforce appropriability of benefits and avoid a downward spiral of pricing. Even so, as discussed in the previous chapter:

- The boundaries of ownership remain difficult to define, and with it the ability to write 'complete contracts'.
- IPR are often difficult and costly to enforce.
- Spillovers are unavoidable and make appropriability imperfect.
- The value of knowledge very much depends on context, which can only be determined after authentication, i.e. application in the context of the buyer; without authentication, information asymmetry drives the price down.
- Authentication implies that knowledge is transferred, at which point the exchange can no longer be annulled.

The current chapter proposes a different market mechanism for knowledge that avoids these various traps. It is based on the approach taken originally by the Free Software Foundation and the Open Source Initiative (OSI)[9], both of which promote the free[10] sharing of software, and later followed by the Open Knowledge Foundation (OKF), which promotes the free sharing of knowledge in general.

3.1 Lessons from Open Source and Open Knowledge

Instead of putting restrictions on use, the OKF (and OSI) approach promotes and protects open knowledge, meaning knowledge that "anyone is free to use, re-use and redistribute without legal, social or technological restriction", i.e. almost literally the opposite of what IPR aim to do.

Protection comes in the form of licences that explicitly exclude restrictions on use, modifications, sale or redistribution[11]. Often they stipulate that all modifications and additions automatically become part of the body of knowledge subject to the same licence, and that credit be given to the original source of knowledge. Variants may include restrictions on modifications or additions, as well as on commercial use. But everyone can use the knowledge 'as is', without passing of title or exchange of money (although the latter may be allowed). In doing so, the aggregate body of knowledge can grow unhampered by discussions on who owns what, or on what is the perceived value of individual contributions.

Open Source and Open Knowledge licences are in effect a grant of freedom instead of a restriction on rights. They add "a layer of reasonable copyright on top of the extremes that now reign" (Lessig 2004). Yet this does not prohibit that businesses are built based on such principles: many business models have evolved around for instance open source software, ranging from the development of specific functionality, to 'service-only' providers offering documentation, translations, training, testing and quality assurance, bug fixes, etc. (Tapscott et al. 2006). Pentaho's Bee-keeper Model in Figure 1 is particularly instructive in explaining one such professional open source software business model and how it differs from the proprietary software business model (Cottrell 2008).

3.2 Standing on the shoulders of giants

A similar approach can be adopted for knowledge markets, avoiding the several traps that make traditional markets for knowledge fail: rather than experts and innovators (the 'bees') directly trading their knowledge ('honey & wax'), the knowledge market is first to provide a platform (the 'hive') that supports and stimulates the free sharing of knowledge, including ideas and questions. Only in a second step is the knowledge packaged, taken to market, and sold against payment, often as part of a bundle of products and services.

In the period 2001-2003 an international network of independent consultants used this approach for developing and marketing a common body of IC, including knowledge around innovation and change

[9] The similarities and differences between Free Software and Open Source are discussed on http://www.gnu.org/philosophy/free-software-for-freedom.html

[10] 'Free' in this context must be interpreted as 'freedom to act', not as 'for free' or 'at zero cost' (Dixon$_{(a)}$ 2007).

[11] For an overview and description of the various licences, see http://www.opensource.org/licenses.

management. Their knowledge platform tracked and rewarded individual members' contributions to the group's intellectual capital through a reputation system that ensured credit was given to contributors according to the appreciation shown by all other community members (including business partners and customers). The focus shifts to crediting the contributions of others in the development and formulation of one's own knowledge, instead of on claiming ownership over one's latest insight and controlling how that may be used. It is humbly admitting that "so too we are (but) dwarfs astride the shoulders of giants. We master their wisdom and move beyond it. Due their wisdom we grow wise and are able to say all that we say, but not because we are greater than they" (attributed to Isaiah di Trani; Leiman 1993).

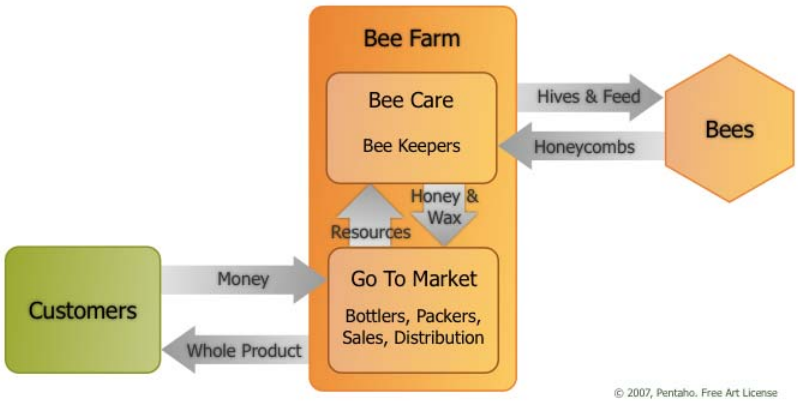

Figure 1: Pentaho's Bee-keeper Model (Dixon$_{(b)}$ 2007) (Free Art Licence, cf. http://artlibre.org/licence/lal/en/)

"The Bee Keeper creates an environment that is attractive for bees: accommodation and a natural, food-rich habitat. The bees do what they do naturally and make honeycombs. The Bee Keeper sells the honey and bees-wax to his customers and uses the money to grow his bee farm." (Dixon$_{(b)}$ 2007)

Giving credit to knowledge contributions corresponds to a value assessment, using Andriessen's terminology (2004): each member of the community will have his or her own subjective value scale to assess the relevance and (likely) usefulness of the shared knowledge, without having to relate this to any observable criteria – which would make it objectively measurable – or making a financial valuation – which is impossible at that time. The usefulness of shared knowledge is initially limited to the extent to which it is assimilated by the rest of the community and thus adds to the aggregate body of knowledge regarding a specific topic or practice. Tracking each member's reputation (i.e. the sum of credits received) corresponds to that member's relative impact and contribution to that topic or practice.

The absence of a direct link with remuneration or market value is not a hindrance, it is even a necessity: research shows that many knowledge contributors are intrinsically motivated and an extrinsic reward system could actually have a negative impact on their motivation to contribute (e.g. Amar 2002, Gammelgaard 2007). Still, some kind of reward will eventually be required to keep motivating employees and partners to share their knowledge, especially if your company aims to commercially benefit from it (DeSouza 2003)

3.3 Value of knowledge based on actual use

The traditional way to determine value (of physical and financial assets) is by calculating the present value of future net cash inflows it generates, a technique called discounted cash flow (DCF). These future net cash flows are typically estimated through comparison with the net income generated by other and similar assets, used for the same purpose. Since physical and financial assets are rival goods - meaning they cannot be used for more than one purpose at the same time - such estimation is a fair measure of value. But intellectual capital assets, including knowledge, are non-rival 'goods' since they can be used for many purposes at the same time. As Davis (2007) puts it: "For all intents and purposes there are no limits to the use of knowledge: the knowledge-based economy is an economy with the potential for limitless abundance". This implies that the related DCF is a potentially

endless summation of all known and unknown applications, with value in each case dependent on specific context, making it impossible to calculate (Sudarsanam et al. 2005, Sullivan 2005). Imagine having to estimate the value of a piece of land that will be used, several times over, for woodland AND for feeding cattle AND for office buildings AND as an industrial site AND for residential development!

Until knowledge generates actual cash inflows, all its future applications remain merely potential uses. Leliaert et al. (2003) therefore distinguish between 'present' and 'future' IC value: the former is based on an extrapolation of actual revenues generated from its current and hence proven applications, whereas the latter is based on expected revenues from planned but future and as such unproven applications.

This distinction between current and future applications of knowledge can serve to validate specific knowledge contributions – call it the difference between theory and practice – as well as the related credits earned by its contributors[12]. This is a critical distinction since it illustrates how knowledge that today is deemed of no practical use and therefore worthless, can still hold some latent or potential value that may only become relevant at a later date, or in a different context. And even knowledge that is already used in present day may find many more applications that so far remain hidden from one's view or imagination.

As and when knowledge leads to the realisation of actual revenues, part thereof can serve to pay for the use of that knowledge, just like other parts cover the costs of resource time and materials. The price of knowledge is then no longer estimated up front as a fixed amount, to be allocated to all future but as yet unknown revenues; instead price can be established as a percentage of all future revenues it helps generate.

The role of the commercial side of knowledge markets becomes clear: it is there to help find commercial uses for the knowledge shared within the community it supports, and to negotiate the percentage of the related revenues that should be paid as royalties in return for the commercial use of knowledge. Appropriability is no longer about excluding non-owners from benefiting – which is practically impossible anyway - but rather about ensuring that the creators of knowledge can earn a fair return for their efforts and investment from whatever many applications that knowledge has. And the exchange of knowledge itself is no longer a spot transaction - thus avoiding the related difficulties of having to define boundaries of ownership, authenticate its usefulness, and determine fair value at a given point in time - but rather the start of an on-going relationship, the value of which is contingent on actual use and accrues over time.

The knowledge contributors can eventually earn their share of royalties proportional to the related credits they have accumulated. It is worthwhile noting that these credits are then in effect options on a stream of future royalty revenues, which can be marketed and sold in their own right. While the number of credits assigned to a body of knowledge may not be fixed or limited, each credit is uniquely allocated to an individual. Within the aforementioned group of consultants, for instance, the credits representing rights to a sales commission or to the fees for developing training materials could be sold from one consultant to another.

4. Conclusions

Out of the many initiatives for measuring or valuing IC, none have thus far surfaced as a definitive method to drive the management of IC. Author argues that the focus within the IC community has been too much on measurement and valuation as a necessity for managing IC, based on conventional wisdom that one has to measure in order to know. The failure to date of knowledge markets demonstrates that conventional business models and approaches may no longer be appropriate for managing IC: where it concerns physical or financial capital it is relatively straightforward to establish ownership, determine fair value, and pass title in exchange for payment. Not so when applied to intellectual capital such as knowledge.

[12] The knowledge platform of the aforementioned group of consultants ran on Knexa's Tribute engine (formerly called Interknexa, cf. http://www.knexa.com), using which knowledge contributions were initially credited with 'silver' points and converted to 'gold' points as soon as the related knowledge was linked to actual revenues.

An alternative approach is proposed, borne out of experiments with knowledge markets among an international group of consultants, which can be applied to IC in general. As explained and illustrated by Pentaho's bee-keeper model, knowledge markets should comprise two parts: a platform to support and stimulate the free sharing of knowledge, unhampered by claims of ownership or notions of financial value, but governed by a reputation system; and a separate but linked interface to the market that tracks the uses of knowledge and collects related royalties as and when revenues are generated.

The value of knowledge is and can not be determined as a fixed amount, but accrues over time as and when the knowledge is used and leads to actual revenues.

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Corporate Social Responsibility and Social Capital

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Abstract: The recent corporate scandals remind us that, even if we adopt a narrow concept of managerial responsibility, there may still be serious difficulties associated with the effective institutionalization of this obligation. The actors of a firm have a common interest in ensuring its success. However, this common interest does not necessarily generate an harmony of individual interest. Collective action dilemmas arise among co-worker, supervisor and employee, managers and shareholders. Circumstances in which agents pursue their own interests at expense of principals is a clear manifestations of opportunism. Situations of opportunism, lack of trust and cooperation are real problems in firm/stakeholder relations. Broadening managerial responsibility may exacerbate the agency problems that arise between managers and shareholders.

Opportunism, lack of trust and cooperation are all obstacles to efficiency. When there are external effects, the interests of corporations and of society are not aligned: maximizing profits does not lead to the social good. Non-alignment can be often costly and damaging to the corporation. It is possible to reduce social conflicts and improve efficiency in two ways: increasing the quality of information and fostering trust, via formal institutions or via interpersonal relationships. Formal institutions are more expensive than interpersonal relationships and quite often they need to be integrated by informal institutions to be effective. Economists and moral philosophers since Adam Smith have observed that market economies operate far better where shared values of honesty and integrity prevail than where they do not. As North (1981, p.47) claimed: “strong moral and ethical codes of a society are the cement of social stability which makes an economic system viable”. It can be helpful therefore to analyse the literature on social capital that focuses principally on interpersonal relationships.

In the past the challenge for corporations was to support process and design improvements and to increase their profits, the challenge of the future is to improve relationships in order to reduce and manage the most important risks. The paper tries to analyse what role social capital could play in the process of the diffusion of corporate social responsibility.

Keyword: Institutions; agency problem; social capital; corporate social responsibility

1. Introduction

The Enron and WorldCom affairs that unveiled deep inadequacies of the American corporate governance system, the Parmalat scandal that questioned the virtues of Italian family capitalism, the Asian crisis in 1997 that threw light on the perverse connections between companies, governments, banks etc., have raised awareness that ill-managed corporations harm both shareholders and stakeholders.

Never before companies have been under such critical scrutiny of the way in which they conduct business. There has been a significant increase in the expectations of a wide range of stakeholders - consumers, employees, investors, communities, governments and environment - in regard to their companies' commitment to socially responsible business practices. Senior corporate decision makers continuously find themselves faced with conflicting demands on their attention, time, and resources. As a result, Corporate Social Responsibility (CSR) is becoming a progressively more important component of good business practice.

CSR has no single commonly accepted definition. The concept is a fuzzy one with unclear boundaries (Lantos, 2001). It generally refers to business practices based on ethical values, with respect for people, communities, and the environment.

The company has special obligations to ensure that the shareholders receive a “fair” return on their investment; but it also has special obligation to other stakeholder, which go above and beyond those required by law.

For supporters of stakeholder theory of the firm, shareholders are but one of a number of important stakeholder groups. Shareholders have a stake in, and are affected by, the firm’s success or failure. This idea of “shareholders as just another stakeholder group” is not one that underlies corporate law in most market economies. In corporate law, shareholders are given pre-eminent status as the owners of the firm. The board of directors is supposed to ensure that the firm respects its legal and

contractual obligations to other stakeholder group; it can also instruct managers to consider the ultimate purpose of the firm to be the maximization of profits and shareholder value (Heath and Norman, 2004).

Corporate law casts ethical and social concerns as irrelevant, or as stumbling blocks to the corporation's fundamental mandate. That's the effect the law has inside the corporation. Outside the corporation the effect is more devastating. When toxic chemicals are spilled or communities devastated through plants shutdown, corporations view these as unimportant side effects outside their area of concern; they privatize the gain and externalize the cost.

Situations of opportunism, lack of trust and cooperation are real problems in firm/stakeholder relations. They are all obstacles to efficiency. When there are external effects, the interests of corporations and of society are not aligned: maximizing profits does not lead to the social good. In the ideal world of economic theory, with no market failures, maximizing profits leads the economy to a Pareto efficient outcome, which is assumed to be good for society. In contrast, in the world we live in there are differences between the private and social costs of making and using products and services (Heal, 2007). Non-alignment can be often costly and damaging to the corporation; in fact, conflicts can lead to actions against a company by non-governmental organizations, to law suits, to regulatory intervention, and to loss of brand image and corporate reputation.

It is possible to reduces the sources of conflicts between corporations and society and improving efficiency in two ways: increasing the quality of information and fostering trust. This can be made via formal institutions or via interpersonal relationships.

The institutional solutions are not always adequate. Even if legislators can pass any number of rules, formal institutions are more expensive than interpersonal relationship and often they need to be integrated by informal institutions to be effective. There is strong need for voluntary action. It can be therefore helpful to analyse the literature on SC that focuses principally on interpersonal relationships.

The literature acknowledges that some managers may exercise moral discretion in the course of carrying out their work. Wood (1991) argues that managerial discretion is one of the key principles of CSR and refers to managers as "moral actors" within the organization. Hemingway (2005) argues that championing of CSR depends upon a sense of personal responsibility or collectivistic sense of duty to society that is valued by the individual, as opposed to an individualistic orientation. CSR implementation could be facilitated by the existence of Social Capital (SC).

This paper is concerned with the role that SC could play in the process of the diffusion of CSR. It is organized as follows. Section 2 presents a concise analysis of the institutional solutions for CG. In Section 3 we analyse the agency costs and in Section 4 we discuss interest and values. Section 5 is devoted to a synthesis of the literature on CSR. In Section 6 we take a critical look at the highly controversial concept(s) of SC. Section 7 is devoted to the analysis of the influence of SC on CSR. Section 8 concludes.

2. Corporate governance institutions

Institutions are the rule of the game: constraints that create order and reduce uncertainty, transaction costs and opportunism which hinder exchange (North, 1990). The rules are formal rules coupled with legal enforcement, and informal constraint coupled with private enforcement.

Formal rules can be categorized by political rules, economic rules and contracts. Economic institutions allocate goods and services and influence the evolution of values and tastes.

Secure private property rights represent the main element of the incentive system of a market economy. The Coase theorem shows that the initial allocation of property rights does not matter from an efficiency perspective as long as they are clearly defined in the first place, and can be freely and costlessly contracted on and exchanged. Poorly defined property rights, the lack of contract enforcement, i.e. weak institutions, are all obstacles to efficiency.

A clearly delineated system of property rights, institutions that mitigate risk and manage social conflicts, these are social arrangements that economists usually take for granted but which are conspicuous by their absence or by their inadequacy in some circumstances.

Institutions are shared solutions to recurring problems that arise in social interaction. In corporate governance (CG), this refers to the principal-agent conflicts. Instituions shape the incentive structure towards productive or redistributive activities.

The most widely accepted position on the legal purpose of the corporation – known as shareholder primacy, was articulated by Milton Friedman in 1970: the only "social responsibility of business is to maximize profits".

A more subtle version of the shareholder primacy argument is the "nexus of contracts" approach (Jensen and Meckling, 1976), which views the corporation as a nexus of legal contracts between the suppliers of various factors of production, who agree to cooperate in order to generate monetary returns. These agreements specify that in exchange for their contributions, the owners of most factors of production will receive set payments with little risk. Shareholders – the suppliers of capital – accept the residual financial risk of doing business, and in return receive the residual profits. Since shareholders have no contractual guarantee of a fixed payment from the firm's activities, any profits that are diverted towards other activities, such as pursuit of "the social good", come directly out of their pockets.

A second view of the role of the corporation is found in the team production model (Blair and Stout, 1999), which views the corporation as the solution to the moral hazard problem that arises when the owners of production factors must make firm-specific investments but fear they will not be rewarded ex-post. To solve this problem, the board of directors functions as a neutral "mediating hierarch" that allocates residual profits to all the factors of production (team members) according to their relative contributions. Under the team-production model, sacrificing profits in the social interest is legal, as long as the profits are allocated to a deserving factor of production (Reinhardt, Stavins, Vietor, 2008, p. 3).

CG is about the control of the resources in firms. The institutions of CG are those repeated mechanisms that tie managers to stakeholders: markets, boards of directors, gate-keeping, incentive compensation, capital structure (Roe, 2004). They serve two objectives: enhance the performance and ensure the conformance of corporations.

Well functioning CG institutions facilitate and stimulate the performance of corporations. They put the right manager in the right place and give that manager the right set of incentives and constrains.

Management of firms is disciplined by the competitive pressure of markets. The board hires and fires the CEO, makes key business decisions, and reviews the work of the firm's senior managers. Laws affect the composition of the board.

Minority shareholders need information about their companies. The institutions here are the securities law mandates of periodic disclosure. The gatekeepers are those not deeply embedded inside the firm who verify or sometimes warrant the information about the firm. They are the lawyers, accountants, securities analysts and outside directors.

However the institutions of CG are not just organizational and technical. They are, or they are affected by political institutions and by social factors. Legislators can pass any number of rules. These will be of no avail until we realise that the market realities themselves change continuously. There is strong need for voluntary action. This comes from personal commitment to ethics, fairness, transparency, rule of law.

3. Agency costs

The diffused ownership is layered over a basic principal-agent problem: the shareholders' agenda can be at odds with managers' agendas. In that setting, aligning their interests becomes the typical problem of CG.

Agency theory (AT) builds upon the theory of property rights. The incentive problem arising from a separation of management and ownership should be solved through implicit or explicit contracts, in which individual rights are well specified so costs and rewards are clearly allocated among participants in the firm. How managers behave depends on the contracts they have with the owners. Owners will discipline management through monitoring or bonding contracts, which create incentives for management to maximize the values of the firm in the interest of shareholders.

In the AT there is no conceptual distinction between the "inside" and the "outside" of the firm: it is all about contracts that organize input, production and selling.

In Transaction Costs Economics (TCE) the firm is conceptualized as a governance structure, which is different from the market and which allows for a clear distinction between markets and hierarchies. The authority aspect is taken by TCE to be the distinguishing nature of the firm resulting in the hierarchy that economizes on transaction costs in comparison to market contracts.

The two theories work out of the characteristics of bounded rationality and opportunism. Incomplete contracting is central.

The agency cost, shareholder-manager alignment problem comes in two varieties. One variety is of diversion, while the other is of competence, "stealing and shirking". Managers could divert value from the firm into their own hands: they could have the firm transfer funds to their own bank accounts, or have the firm sell goods at low prices to entities controlled by them, or pay themselves (excessively) high salaries (Roe, 2004).

Stealing and shirking - both costs to shareholders – are affected differently by institutions of CG. Each specific CG institution does not uniformly reduce both. Some affect one, some affect the other.

Markets - the firm's product market, the capital market and the managerial labour market - are filters of the interest of specific individuals and groups; individuals and groups attempt to organize markets in such a way that their private interest is best served (Groenewegen, 2004).

If firm cannot sell its product, it disappears. This sometimes leads commentators to belittle the importance of other CG institutions, because one of the markets punishes deviant firms and reward well-performing firms.

But, as Roe (2004) explains, a *markets-are-everything* idea would face substantial defects. First, as we know, each market is imperfect. Second, markets may be good for some governance tasks, weak for others. They may be good at limiting some types of "shirking" but be less good at limiting "stealing", especially if the stealing is a small part of the firm's total value. Law and other (non market) institutions are probably more important here than market itself; sometimes they are better and cheaper at governing firms than any market constraints.

4. Interests and values

Economists tend to view human agents as welfare maximizers making choices according to their stable preferences. Preferences (or tastes), interests, values, and norms are often taken as primitives. Preferences are subjective and personal. They lack cognitive content, and hence are not rationally defensible.

Interests have a pragmatic aspect missing from tastes, and they may be defensible. Interests are related to needs and may diverge from preferences; they define what is conducive to human flourishing. Interest may implicate an ought command, but such a command is only binding in terms of the personal consequences if the command is violated. Interests may also have a social context, such as when one speaks of a group interests or the public interest. An oughtness quality may similarly be implicated, but here this quality is associated with shared values (Avio, 2004).

Values have been described as "…things of the mind that are to do with the vision people have of the good life for themselves and their fellows…" (Rescher, 1969, p.5). Wright (1971) linked the concept of value with moral ideology, which he said was concerned with beliefs about what is wrong and the values that define the positive goals in life. This, then, introduce values as "standards of conduct"

formed as a result of reward, punishment, or deprivation which may be modified as a result of the experience. Their function is motivating the individual to achieve satisfactions and avoid dissatisfactions.

Individuals will exhibit value-related behaviour in order to avoid negative internal feelings. Personal values are not to be confused with desires. Desires may be overruled by behaviour. Personal values are more deeply rooted and provide the reason for the first-order desire, i.e., the act, or, the reason for the second-order volition. They have been acknowledged as components in the process of human perception due to their connection with social norms and emotions (Hemingway, 2005).

Values are rationally defensible; the defence of values is in terms of a shared way of life. Indeed, the very concept of community implies that some values are held in common. For non trivial values to have an influence on one's life, one must be a member of a community with shared goals and collective aspirations. Values have an associated evaluative quality expressing what is good for a particular culture or an individual.

Norms are rules or principles of action that always have a binary (yes/no) oughtness quality attached. In this they differ from values, which "inform decisions as to what conduct is most desirable" (Habermas, 1995, p.114).

Corporate morality might be seen as an analogy of individual morality. Corporation behaviour will reflect the moral sentiments of its top management. Corporate morality like individual morality is detectable through reputation and it is reflected in the policies and decisions of the firm and in the nature of its direct dealings with corporate stakeholders.

Economists and moral philosophers since Adam Smith have observed that market economies operate far better where shared values of honesty and integrity prevail than where they do not. As North (1981, p.47) claimed: "strong moral and ethical codes of a society are the cement of social stability which makes an economic system viable".

5. CSR and stakeholder theory

More than 30 years ago, Votaw (1972, p.25) wrote: " CSR means something, but not always the same thing to everybody. To some it conveys the idea of legal responsibility or liability; to others, it means socially responsible behaviour in the ethical sense; to still others, the meaning transmitted is that of "responsible for" in a causal mode; some take it to mean socially conscious; a few see a sort of fiduciary duty imposing higher standards of behaviour on businessman than on citizen at large". CSR is still a fuzzy concept.

Corporations are social actors, and their economic actions are often embedded in concrete social relations (Granovetter, 1985). They have more extensive duties to key stakeholder groups than is required by law. In a more classical conception of managerial obligation, shareholders are - as we have seen - the pre-eminent stakeholders.

The definition of CSR as an extended responsibility towards firm's stakeholders is rooted in neo-institutional theory (Williamson, 1985; Grossman and Hart, 1986).

The relations between the firm and its stakeholders are characterized by settings in which information or knowledge about the action of the firm is incomplete or asymmetric. Because of incomplete information, the stakeholders can not verify if the firm has actually behaved as a honest cooperative agent by trying to avoid any opportunistic behaviour. Compliance with CSR voluntary but explicit norms can solve the incomplete information problem and can allow the firm to develop its reputation.

There are various ways to approach the concept of CSR. A way is to deny or limit the room for the social responsibility of firms. Friedman (1970) idea that the only social responsibility of a firm is to make profits without breaking the law, is founded on two arguments. The first one concerns the principle of the maximization of the shareholder's value. A manager must run a firm pursuing the interests of the group of the people that he represents because they have given him the control of the firm. The second one comes from the firm belief that the maximization of the shareholder's value implies an optimal use of resources and, consequently, the maximization of total wealth.

If one looks at the contractarian approach to CSR (Sacconi, 2006), relational aspects may have a key role in promoting the coordination processes between firm and stakeholders. The contractarian approach to CSR stems from the idea that a firm is an institution that arises in order to solve the incompleteness of contracts and bounded rationality. In a context characterized by incompleteness of contracts and bounded rationality, economic institutions allocate through property rights and hierarchical organizations decision rights to certain parties in any sub-set of the economy. The need for general and abstract ethics principle rises from the risk this discretion may be abused.

Social responsibility is a *balancing act*: business must balance *economic* performance, *ethical* performance, and *social* performance, and the balance must be achieved among various stakeholders. This suggests a dual bottom line with economic and *noneconomic* criteria. In fact, many companies have multiple objectives. The public demands that businesses make social issues a part of their strategies. Community and environmental pressures encompass ensuring that the business' operations do not threaten the safety of the local community. At the same time, there is the competing pressure for improved financial performance from institutional investors, pension fund managers, who have a fiduciary duty to their investors to earn a maximum return on investment. This leads to the push and pull of forces arguing for strict profit maximization versus those pushing for better social performance (Lantos, 2001, p.9).

Social demands vary in time and space and even within the same group of stakeholders. Therefore, there will always be some ambiguity in the concept of CSR: it has to be specified in each company, taking into account its changing environment.

Being socially responsible means going beyond compliance and investing more into human capital, the environment and the relations with stakeholders. Going beyond basic legal obligations in the social area, for example, training, working conditions, management-employee relations, can have a direct impact on productivity.

CSR is also about the integration of companies in their local setting. Companies contribute to their communities by providing jobs, wages and benefits, and tax revenues. On the other hand, companies depend on the health, stability, and prosperity of the communities in which they operate (European Commission, 2001).

Acting in a socially responsible manner is not in the short term personal interest of the ownership but the compliance with CSR norms generates middle-long term economic benefits by increasing the reputational capital of the firm. Corporations will choose to do what is economically in their best interests; therefore, firms will follow social responsibility norms.

6. Social capital

If people are strangers to one another, they are indifferent to each-other's well-being. This means that they have independent utility functions. They are indifferent whether their own actions help or harm others. This is the standard assumption made in most economic analysis. In the real world, economic agents do not act in social vacuum; rather they are surrounded by a web of social networks which gives them information on others' action. People care whether others are better off or not (Uphoff, 2000).

The term SC refers to networks, relationships, norms, trust, features that facilitate coordination and cooperation for mutual benefit. The components of SC are therefore many and, in many instances, intangible as they consist of different types of relationships and engagements. In this sense, it is a multi-dimensional concept. SC is unlike other assets that economists call capital because investment in its development does not seems amenable to quantified measurement. The capital label should be taken somewhat metaphorically.

SC has become an umbrella concept spanning from individual level analysis to community level analysis. Between the many definitions of SC that have been introduced in the literature in order to analyse the role of interpersonal relations in the economic activity, we can distinguish at least two main characterizations of this concept. On one hand, there are definitions that mostly look at the networks that constitute the structure of relations of a single agent or of a community as a whole

(Coleman, 1988; Burt 1992). On the other hand, SC is defined by looking mostly at cultural factors, such as attitude and norms (Knack and Keefer, 1997; Putnam, 1993).

Uphoff (2000, p.218), for example, distinguishes and analyses two categories of SC: structural SC and cognitive SC. The first one refers to social networks connecting agents. The latter refers to the dispositional characters of agents that affect their propensity to behave in different ways. According to his definition "the structural category is associated with various forms of social organization, particularly roles, rules and procedures as well as a variety of networks that contribute to cooperation, and specifically to mutually beneficial collective action, which is the stream of benefits that results from SC. The cognitive category derives from mental processes and resulting ideas, reinforced by culture, specifically norms, values, attitudes, and beliefs that contribute cooperative behaviour and mutually beneficial collective action". Uphoff stresses that networks "are crucially sustained by expectations (that is, by norms) of reciprocity" and that this reveals the existence of an cognitive dimension of networks.

Most conceptual attempts can be grouped into "bonding" and "bridging" SC. The bonding views emphasize the SC inherent in the social structure, the shared cognition and norms and values of a particular group or collectivity. The term bonding holds a negative connotation and generally refers to small circles of homogeneous people that do not cooperate with other outside the boundaries of the group.

The bridging views stress the horizontal ties shaping heterogeneous groups of people with different backgrounds. The term bridging refers to the ability of such networks to create "bridges" connecting sectors of society that, otherwise would have never come into contact. The common claim is that such relationships have positive effects on the diffusion of information and trust.

It is generally argued that the existence of networks among the agents and a dense flow of information lower the transaction costs of creating collective action. The transaction cost paradigm remains the traditional way of thinking about the mechanism by which SC affects economic performance.

Even if the concept is criticised for giving rise to "vague ideas" (Solow, 2000) and questions are raised concerning its conceptualisation and measurement, from different definitions we find in literature, it is possible to distinguish three main underlying ideas: (1) SC generate positive externalities for members of a group; (2) these externalities are achieved through shared trust, norms and values and their consequent effects on expectations and behaviour; (3) shared trust, norms and values arise from informal forms of organization based on social networks and associations.

An important aspect of SC is the role played by social norms in determining socially conscious behaviour. Individuals not only internalize moral norms, such as that of paying their dues, helping others at some costs for themselves; they also practice such norms as those prescribing that they punish people who have hurt them intentionally and even metanorms as shunning people who break agreements. Individuals feel shame or guilt in violating the norm and this prevent them from doing so. In cases in which market relationships and non-market relationships coexists, a grim norm could be expected prevail, as it involves permanent sanctions – which is a device for preventing people from engaging in opportunistic behaviour when short-term opportunities appear (Dasgupta, 2000)

7. The relationship between CSR and SC

CSR and SC has been used as umbrella concepts. The first one resumes the principle that companies must not only be concerned about profits. The second one resumes the idea that social relationships can facilitate collective action and access to resources.

SC can favour CSR practices diffusion because it deals with the engagement in the community in which a firm is expected of to operate in order to succeed; it offers an understanding of the channels and internalisation/externalisation process by which knowledge flows too effectively or not at all; it highlights how firms can increase the effectiveness and efficiency of their external networks with other firms and reduce transactions costs; and how firms can find alternative means of employment, motivation and retention for their employees.

SC is about more than getting employees to relate to one another: this is without doubt an aspect of SC at the micro-level, but it is not the whole picture and myopia in this regard can lead to the neglect of the SC which facilities firms' interactions with their community.

Companies are involved with the communities in which they operate. Whilst in one sense they may represent an impermeable entity installed in a foreign land, from a different perspective they are exposed and involved in the communities in which they are located. They alter the social configuration of the communities in which they operate, regardless of whether or not they desire this.

The qualities related to 'SC as a resource' can be seen mainly in the structural component of the concept. One example of SC as a resource is membership within a network, such as a multi-stakeholder forum. Such affiliations can be seen as a resource for obtaining information about stakeholders' views concerning CSR or the debate in a manageable, personal and perhaps trustful circle. But, this should be distinguished from the different ways how to use such resources. This depends on the capability, e.g., to develop alliances through trustworthy behaviour or to build up a good reputation (Hiβ, 2004).

It can be seen as a capability to develop, to use, to activate or to obtain resources such as networks, contacts, trust or reputation, which can be characterized as a process.

The central premise of SC is that social network (of which board is an example) has value. SC creates value for the people linked by the social ties created by these networks and can have flow-on effects beyond the immediate connection as well. Applying this thinking in the corporate context, a board can be viewed as exemplifying such a social network.

The increase in reputation promote cooperation among stakeholders and their willingness to interact with a firm which does not implement opportunistic behaviour. The adoption of CSR standards signals that the firm behaves cooperatively with stakeholders. The diffusion of information that SC enables, allows the firm to develop a reputation faster.

8. Conclusions

The corporate scandals have triggered a broad discussion on the role of business in society, that is to say, on its legitimacy, obligations, and responsibilities. As a result businesses are increasingly held accountable for what they do by multiple stakeholders and society at large.

Good CG is associated with increased transparency and lucid financial disclosures. Poor CG and misleading financial statements are one side of the corporate coin – the other side being poor CSR. Informal controls such as social and self-controls have a dominant influence in instilling socially responsive decision making among the managers.

Ethical behaviour, stakeholder engagement and accountability increase trust and enhance and protect corporate reputation. An open dialogue with shareholders makes it easier for firms to identify risks by highlighting issues before they reach a crisis point. Close stakeholder and community relations can also help companies secure a license to operate.

Profits lose their capacity to measure performance when in their computation the externalities have not been taken into account. Developments in the measurement of intangible assets (e.g., corporate reputation) and the inclusion of social and environmental performance in risk management try to capture these externalities.

CSR refers to the corporations' consideration of issues beyond the narrow economic, and legal requirements to accomplish social benefits along with the traditional economic gains which the corporations seek.

SC plays a key role in inducing the firm to adopt and observe CSR practices.

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The Knowledge Management Role in Mitigating Operational Risk

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Abstract: The idea that information and knowledge have become critical for value creation processes of companies and nations is now widely recognized. However, we must broaden this perspective and consider not only the potential benefits offered by intangible assets, but also the risks created by the mismanagement of the same assets. Otherwise, it will be increasingly difficult to manage the growing number of risks that can affect the results of a company. This theoretical paper discusses specifically the linkage between Operational Risk and Knowledge Management, aiming to improve the understanding of this subtle connection. After establishing this linkage, it is discussed which perspective should be adopted by Operational Risk Managers regarding information and knowledge. In short, these professionals should evaluate both: firstly, how information and knowledge create the possibility of operational risk events and, secondly, how they could be used to avoid these undesirable events. From this point, it is possible to define the focuses that Information Management and Knowledge Management practices could adopt to contribute to the mitigation of Operational Risk. This integrated perspective has the potential to benefit both Knowledge Management and Operational Risk Management practitioners. A Risk Manager will profit from a broader and more accurate understanding of many operational risk events. Even more important, this manager will also be able to deal with some causes of these risk events. This will launch a foundation for a better risk mitigation strategy, though, of course, risks cannot be fully eliminated. At the same time, a Knowledge Manager will profit from a clear and direct business driver linking Knowledge Management and risk mitigation, something that could potentially boost the return on investment of Knowledge Management initiatives. The paper also presents some real operational risk cases, considered from the Knowledge Management – Operational Risk Management integrated point of view presented in this paper.

Keywords: Knowledge management, risk management, operational risk, information, knowledge, risk event, risk mitigation

1. Introduction

It has been almost three decades that Alvin Toffler described the transition from one industrial society to a post-industrial society, which is based on knowledge. Since then, information and knowledge (represented as intangible assets) are recognized as crucial for the performance of companies and countries. Moreover, both represent an increasing part of the economic wealth created by companies and countries.

In this new environment, it is necessary to acknowledge not only the value that can be created through intangible assets, but also the risks represented by them. It is also necessary to develop tools and techniques to manage the exposure to these risks. Carvalho (2005) warns in his article that neglecting the management of intangible assets has the potential to destroy the value of tangible assets, in a process sometimes difficult to interrupt. He states that many operational risks to which a company is exposed are related to the mismanagement of intangible assets that could be administered by Knowledge Management practices.

This paper shows that many operational risks to which an organization is exposed are, in fact, the result of poor management of some intangible assets. Furthermore, this exposure could be reduced through adequate Knowledge Management practices. The paper initially defines Knowledge Management (KM) and Operational Risk (OR) and then establishes the linkage between these two themes. From this linkage, the paper discusses what should be done regarding Information and Knowledge Management (although an extensive discussion is beyond the scope of this work). Finally, it presents the benefits of this perspective, especially for the work of a Risk Manager of an organization. The paper is completed by the presentation of some cases that illustrate the importance and urgency of the perspective proposed.

2. Information and knowledge – where does KM fit?

It is possible to define knowledge simply as what we know. However, this simple definition implies all mental processes necessary to understand and learn from information captured by one of our senses, because only this way we can identify a significant meaning from these pieces of information. This process can involve interaction with other people, practical experimenting and identification of

connections with previously known concepts. Furthermore, comprehension is related to the "life history" of each one, since everyone carries mental models and behavioural patterns that influence the whole process. It is also important to link knowledge with an action (or the possibility of an action) because it must enable someone to take positions and decide the best course of action.

A person can express the knowledge that she has only through a message – written, oral – and these messages are "only" information, not the knowledge per se. By the way, considering that knowledge depends fundamentally on the life history of each one, it is reasonable to expect that it will not be the same for any two individuals, no matter the quality of the communication process. The last important distinction is between information and data. As it is possible to infer, information is related to a relevant context, whilst data is related to any register that can be manipulated.

Knowledge Management is an interdisciplinary field of study which origin can be traced back to the end of the 80's and the beginning of the 90's. Since then it has attracted the attention of researches, professionals and organizations, who are developing ways to leverage the use of these intangible assets of companies and countries.

Nevertheless, the huge expectation towards KM has many times been frustrated by different approaches regarding the KM itself, by the lack of distinction between information and knowledge and by the excessive focus on metrics and tools to deliver KM "solutions", when, in fact, it cannot be actually "managed" as many assets. Too often the focus relies on capturing and disseminating "tacit knowledge" (which is incorrectly defined, since it is actually a piece of knowledge out of the conscious sphere of the knower) and it is possible to identify "waves" of proposed KM "solutions" with no solid foundation. Fortunately, there are proposals with new and sound approaches, and this will probably make viable for KM to deliver important and consistent results.

3. Operational risk – how to interpret it?

Risk can be defined as the effect of uncertain events over the goals of an organization. In the context of this paper, it is possible to adopt a stricter definition: the chance of a loss due to the uncertainty regarding the result of an event. It is easy to notice that risk is part of any business-related activity, since it is impossible to forecast with absolute certainty the outcome of this activity. It is also important to stress that the occurrence of a risk event may severely impact the achievement of a goal, even make it impossible to achieve. For these reasons the management of different risk types is receiving increasing attention from academia, companies and governments. The last is contributing heavily to the development of this field, especially because it is passing more severe and sophisticated laws to regulate the activities of different types of companies (the North-American Sarbanes-Oxley, the international recommendations from the Basel Committee and the Brazilian requirements for financial institutions are important examples of this trend).

The Bank for International Settlements (BIS) establishes in the Basel II Framework the capital requirements for financial institutions, according to three risk types: market, credit and operational. Market and credit risks are being focused for some time, and the requirement to allocate capital to deal with the operational risk increased the importance and necessity to manage this type of risk. It is also interesting to notice that, creating a linkage between risks and capital allocation, the BIS recognizes that these risks cannot be neither completely avoided nor transferred by financial institutions. However, they can be managed, and financial institutions must be ready to allocate more capital if they decide to accept more risks. A similar thinking could be applied to any other industry.

According to the British Bankers Association, operational risk is related to the chance of losses directly or indirectly associated with failures or inadequacies in processes, people and systems, or yet as the result of as external event. These failures or inadequacies occur in the regular operation of a company, and they have many causes. The impact of a risk event may be big enough to threaten the continuity of a company. The following is a useful categorization of operational risk events (the examples are only illustrative and do not cover all possible events):

- Internal fraud – steal of assets, tax evasion, corruption, accounting fraud
- External fraud – steal of confidential information, hacker attack, falsification of documents
- Employment practices and Security - segregation, harassment, illegal practices

- Clients, Products and Business Practices – market manipulation, anti-competitive practices, breach of contract
- Damages to physical assets – natural disaster, terrorism, vandalism
- Business disruption and System failure – operation disruption, software and hardware failure
- Processes execution and management – data entry error, accounting error, flawed legal reports, assets lost by negligence

Frauds and anti-competitive practices in general attract much attention, but, in fact, employees of an organization can also impose severe losses due to errors that can be the result of incompetence, bad decisions or the lack of compliance to rules in the attempt to achieve a goal or better serve a client.

Obviously, operational risk is part of any business activity and cannot be fully mitigated. However, it is interesting to stress that the legislation related to financial institutions increased the awareness and importance of this topic. It is also important to stress that there is no single model universally accepted as the preferred standard to manage OR, and the solution to this issue depends on the nature of each organization.

4. Understanding the linkage between KM and OR

In order to understand the linkage between KM and OR it is necessary to evaluate some aspects related to OR from the point of view of information and knowledge. More specifically, how information and knowledge contribute to the occurrence of these risk events or how they could be used to avoid OR events.

Figure 1 shows the main OR vectors influenced by more proactive information and knowledge management perspectives, as well as some of the main focus that these practices should adopt. Thinking from a business perspective, it is natural that one factor could lead to more than one outcome. Therefore, it is not relevant to tie each factor to specific outcomes. For instance, *Flaws in decision making* may occur due to *Bad data quality*, to *Loss of previous experiences* or to the *Dependence on one key person* who is not available, or even to a combination of these and other factors.

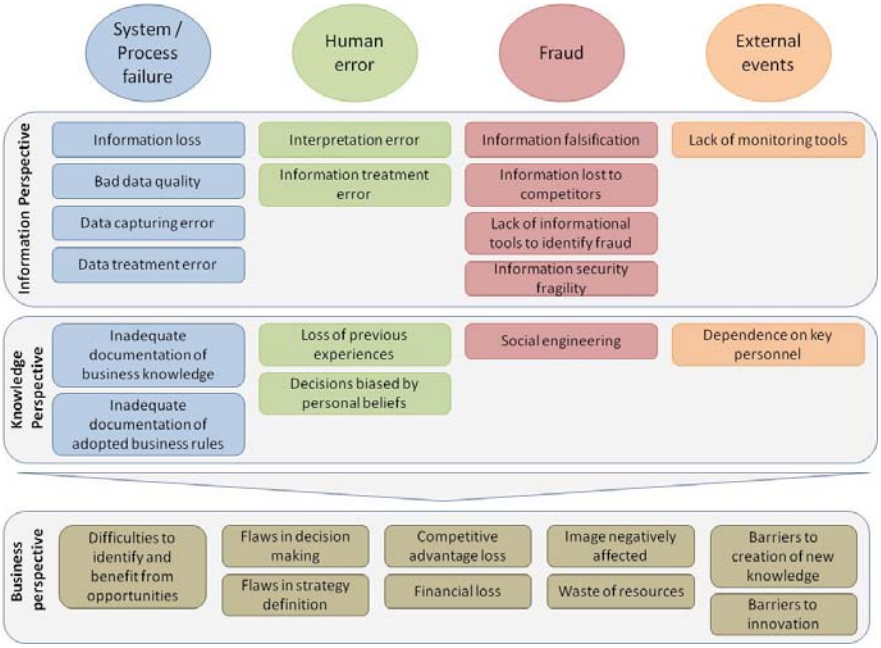

Figure 1: OR vectors, related information and knowledge factors and business impact

Exploring Figure 1 allows us to achieve a better understanding of the profound connection between some of the most important OR vectors and the absence of adequate practices regarding the management of intangible assets such as information and knowledge.

Thus, it is clear that OR management can profit significantly from good KM practices. The probability of occurrence of some risk events could be reduced, since the root causes of these events would be

eliminated or weakened. This would determine a direct value generation driver to the business, something that may be crucial to the decision of implementing these KM practices.

One point must be stressed: at the end of many situations depicted here one action or decision will have to be made. This only reinforces the linkage between OR and KM, since the last must adopt the role of supporting this decision or action. One example will make this point clearer: a real-time and absolutely trustable risk report will be useless if the management team does not act in accordance to the necessity of the situation. And this can happen because the most adequate actions are not known or because the design of this report makes its understanding harder. In both cases KM can play an important role, guaranteeing that the knowledge will be absorbed by those who need it or designing an information system that makes easier to understand the context, to evaluate events and to make decisions.

5. Information management role

From the point of view of this paper, information should be seen as an asset of an organization. However, it is a "special" kind of asset that has no intrinsic value but is part of operational processes, being essential for the value creation process. It is interesting to make an analogy with the valuation of a company (assessment of the fair value of the company), since the value of a company is calculated not only considering the market or accounting value of its assets, but mainly forecasting its cash flow capacity (of course, taking into account factors relevant to the business of this company). This way, informational assets must have an adequate quality and be safe from events that can make them useless. Most of this work is already part of business continuity and information security programs. These programs also deal with the risk of losing information – no matter whether it was intentional or not – important to keep the competitive advantage of a company. It is worth to stress that in this situation losing the information per se is not important, since it does not represent any economic value lost (conversely, a stolen physical asset does represent loss of economic value), but the competitive advantage that a competitor could gain using an information to which it should not have access.

At the same time, it is also important to guarantee that these pieces of information will be adequately interpreted and used, and it is reasonable to expect higher investments in business intelligence and data mining systems during the next years. Another important action is identifying those pieces of information that are important but are not available for some reason. In this case, a mechanism to capture, treat and disseminate this information is necessary. We could use Johari's Window as a model to understand this better: which pieces of information are available for the company and its competitors, which are available only for the company, which are available only for its competitors and which are not available by any company. This simple matrix can help a company to identify which pieces of information it really needs to keep confidential (because it generates competitive advantage and is known only by the company) and which the company should make an effort to obtain, either because its competitors have the information or because the information has the potential to put the company in the cutting edge. Therefore, a work initially focused on managing OR may has as a by-product identifying leverage points for the business, through an information necessity that is discovered.

In short, all points discussed lead to the same direction: guarantee that information important for decision is correct, available and timely. Risk management must be based on the best available information, including the acknowledgment of limitations that this information may have.

6. Knowledge management role

KM role in managing OR can be grouped into three categories: loss of organizational knowledge, barriers to the creation of new knowledge and loss of relative competitive advantage.

Talking about loss of organizational knowledge, processes and IT systems poorly documented, especially about the rationality of business rules, are serious drains on organizational knowledge. Big companies frequently need to identify the reason that has led to past definitions, simply because there is no documentation of processes or systems neither updated nor complete. IT system development projects ignore documentation trying to achieve an expected shortening in the project length. However, this decision will charge its price in the future, as waste of resources in order to recover lost information and knowledge, as the risk of keeping out-of-date business rules in systems and processes or as the risk of an unanticipated impact when a new process or system is delivered.

Barriers to the creation of new knowledge appear from the absence of important information for this to occur, something related to the previous discussion. It is also important to notice that the knowledge creation process can be harder if the company does not make any effort to foster it, such as adopting access rules too restrictive or adopting aggressive policies to protect its intellectual property. This point is extremely important, since the continuous creation of new knowledge is able to make the company moves forward, differentiating itself from competitors through the development of new products, services and markets. The line that separates and adequate control of information to manage OR and excessive practices that will hinder a crucial process for the future of a company is very thin.

Lastly, loss of relative competitive advantage can be the result of confidential information stolen by another company, one that has the ability to profit from it. However, it can also be the result of an employee leaving the company, especially if this employee is the only person who has a knowledge important for the company. This situation is even more dramatic when the employee is hired by a competitor of his/her former employer, because the company will lose a key person and, at the same time, see this person applying all his/her knowledge to benefit a competitor. This is the case even when the employee neither carries with himself/herself any information of his/her former employer nor acts dishonestly. Noticing that different professional groups use specific language is also interesting, because, if a company wants to manage well its OR, all employees must understand OR nature, importance, processes and goals. This can be another decisive contribution of KM: make the adoption of this culture easier, guarantee organizational learning in OR and create favourable conditions to the evolution of OR management inside an organization.

7. Benefits that this approach will generate

Despite not being extensive, this work demonstrates clearly many sources of OR that will be adequately managed only through the adoption of a Knowledge and Information Management perspective. Obviously, organizations are dealing with OR, but in the absence of this KM perspective the efforts may not have the necessary reach or even be ineffective to mitigate OR. Information security programs are a good example: defining clear access profiles will reduce the possibility of frauds, but hardly will deal with data quality or with the creation of informational tools to identify other types of fraud. Similarly, business continuity plans will certainly deal with loss of data, but without a broader perspective they can even increase the risk of information being stolen, since it will be available in more than one place (physical or virtual). For those responsible for OR management the suggested approach has a clear benefit: it provides a generic framework that any organization can adopt. More important than this is the possibility to identify multiple causes for a certain kind of risk event and act in order to reduce the probability of each cause. For instance, fraud risk can be mitigated integrating good information security policies, processes that guarantee data availability and integrity, warning tools that identify signs of fraud (such as behavior patterns divergent from an usual pattern) and programs that aim to improve awareness against social engineering.

The benefit of this approach is relevant not only because it will mitigate OR reducing the likelihood of its occurrence, but also because it will make a company integrate many efforts that are often concurrently developed with no coordination, leading to a waste of time and resources. Another relevant aspect is the consistency that managing OR will have, since decisions regarding each risk (accepting, mitigating, transferring) will be made consistently. For this, it is necessary not only clear decision criteria, it is also necessary to follow the result of previous decisions and learn from these, feeding a continuous organizational learning process. The benefits are equally important for those in charge of KM: supporting OR mitigation will contribute directly to a business driver, not to mention the possibility of using this effort to leverage other results. It is very likely that an effort to document properly business rules will find out opportunities to revise and streamline them, something that would increase operational efficiency. Something similar could happen to a program that registered adequately the main lessons learned in projects – it would not only reduce the risk of human fault (repeat a wrong decision) but would also make the development of new projects faster and less risky.

In short: the suggested approach has the potential to generate important results for those in charge of Risk Management and Knowledge Management and also for the whole company.

8. Some cases

The study of real cases is worth to validate the approach proposed. We will discuss the cases of a high executive who has been hired by a competitor of his former employer, of banks that have lost personal information of their customers, of an energy company that has had some computers stolen and of a financial institution that has supposedly delivered false information to its investors.

In March 15th, 1993, the Spanish executive José Ignacio López de Arriortúa left his position as a senior executive at General Motors (GM) in favour of a similar position at Volkswagen (VW). GM accused him of misappropriating trade secrets. After four years of confrontation, in January 1997 GM and VW agreed to sign an agreement in which VW committed itself to pay US$ 100 million to GM and buy at least US$ 1 billion in components from the North-American company along a seven-year period (this was not an additional expense, since VW usually bought about US$ 300 million per year from GM). Despite the agreement, VW did not acknowledge any illegal act, but recognized the possibility of illegal activity performed by its executives. López had resigned from his position at VW two months before this agreement. The Spanish court refused to extradite López, considering that the charges were not serious enough to justify this. Considering the focus of this paper, besides the alleged industrial espionage, the negative effects of this confrontation for both companies and the loss of knowledge and experience that GM suffered anyway, it is interesting to notice that López had reportedly asked for access to a huge number of classified documents four months before leaving GM. According to the approach suggested here, a monitoring system could have identified an unusual access pattern to classified material, a warning that could draw attention to the possibility of an OR event. GM would hardly avoid the change of López and other executives, but maybe could have adopted pro-actively some actions to avoid or minimize any negative effect of this change.

In February and again in April 2008 data storage tapes with the backup of personal data of customers of the Bank of New York Mellon Corp. (BNY Mellon) were lost. In the first incident, the tapes had information of about 4 million customers, whilst in the second the tapes had information of 47 institutional customers and of an unspecified number of individual customers. In both cases the tapes were lost while transported by BNY Mellon contractors. Although the bank stated that there was no evidence that the lost data had been neither used nor accessed, it decided to offer free of charge for the period of two years a monitoring service and insurance worth US$ 25,000 for those customers affected by identity theft. As serious as this event can seem, maybe it is not so rare. In March 2008 HSBC also lost a data disc with personal data of 370,000 insurance customers, in an incident very similar to that of BNY Mellon. Despite the fact that the data was protected just by a password, not by any cryptography method, HSBC stated that the risk faced by its customers was limited because there was no information regarding addresses or accounts in the disc. What is the impact of this data loss? It can be certainly much higher than the amount spent to indemnify customers, inform the general public, explain itself to regulators and reduce the negative effect of these events over the bank's credibility. For companies that depend intrinsically on trust to do business – as is the case of a financial institution – this kind of event may doom the organization to closure. The reaction to this sort of event seems to become stronger and one can expect that companies that treat carelessly personal information of its customers will be increasingly scrutinize by public and government.

In January 2008 Petrobras, the leading Brazilian energy company, informed the Police that two laptops with classified information about oil and gas fields recently discovered and of great economic value had been stolen. A Federal Police investigation has found out that four port guards were responsible for the theft and has eliminated the industrial espionage hypothesis, since they "had no idea" of how important the information in those laptops was. Even refusing the hypothesis of espionage, what would be the cost of a company in a similar situation if the laptops were not recovered? Employees of a Petrobras' contractor were using those computers, and in the absence of backup tools and policies, they could well be the only source of that critical information (this aspect was not covered by the press). In this situation and supposing that the laptops were not recovered, all that work should be done again, doubling the cost and maybe increasing the risk of losing a market opportunity due to the time necessary to rework what had been done before.

The last case is related to Bear Stearns Asset Management. In June 2008, the Securities and Exchange Commission (SEC, the organization in charge of monitoring the North-American financial market) fined two former investment portfolio managers, who were then directors, for supposedly delivering false information to investors of two funds managed by the company. The information had minimized increasing problems faced by the funds in the beginning of 2007 due to investments in the

subprime market (which is related to mortgages of high credit risk profile). The false information had allegedly misled with the goal of avoiding the customers to withdraw resources or even of making them increase their investment. Ultimately both funds collapsed, generating a loss of about US$ 1.8 billion to its investors. It is interesting to notice that in this case the false information did not affected the company responsible for this, but its customers, whose decision making process was supposedly compromised by the false information. No matter what is the truth behind this case, it makes clear that the impact of this kind of event can be disastrous to the reputation of a company.

All these cases have in common a poorly managed intangible asset and the occurrence of a serious or potentially serious operational risk event. All of them reinforce the approach suggested by this paper to integrate Knowledge Management and Operational Risk Management perspectives.

9. Conclusion

This paper has demonstrated the coherence, validity and necessity to integrate Knowledge Management and Operational Risk Management perspectives, in order to benefit those professional involved in both areas and also those companies that decide to adopt this approach. Naturally, it is only the first step towards the development of an integration model that could be adequately adopted by any company. It is reasonable to expect that this effort will generate a revision in practices usually adopted by both disciplines, in order to guarantee perfect synergy and the achievement of significant results. Companies must also be committed to start this effort, something that is likely to be pushed by the necessity of improving OR management practices imposed by governments and regulators.

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Environmental Capital: A Classification of Environmental Intangibles from Intellectual Capital

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Abstract: Social pressures force firms to assume and face the environmental challenge through the development of new knowledge which can allow them to act following a sustainable development approach in the business environment. This new knowledge, related to environmental resources, practices and processes that firms put in motion is what we call *Environmental Capital* (EC). EC is often unknown both by the firm itself and by its *stakeholders*, because traditional environmental information dissemination methods fail to offer a faithful image of the firm. Thus, the need arises to look for alternative instruments that can complement them. A good alternative is represented by intellectual capital models, which offer a classification and, at times, the measurement of the intangible assets owned by the firm. The aim of this paper is to integrate EC into the overall intellectual capital approach. For this purpose, the *Intellectus Model* is taken as a reference in order to provide a framework from which it could be adaptable to the environmental context. EC would be the result of combining human EC, structural EC, and relational EC.The methodolodogy used is the multiple case study applied to eight Spanish firms belonging to different sectors. The results indicated that, from the point of view of human EC, the firms analysed publish their environmental policy to show the extent to which they are committed to the environment, organise environmental training, information and awareness sessions and often attend seminars, sessions and workshops in order to obtain new knowledge related to this field. For structural EC, all the firms continuously introduce innovations and improvements in their environmental technology portfolio, basically formed by preventive practices; the creation of an environmental department, the appointment of a management representative and the existence of an environmental manager are the options taken by the firms examined. The analysis of relational EC reveals that primary and secondary sectors tend to involve suppliers in the environmental management process, whereas in the service sector, the customer is the most directly involved agent.

Keywords: Environmental capital, human environmental capital, structural environmental capital, relational environmental capital, case study

1. Introduction

Both academics and practitioners currently agree that the information delivered by traditional financial accounts no longer suffices to respond to the demand for more comprehensive reports arising from both internal and external stakeholders (Del Bello 2006). In fact, the European Commission's Green Paper (2001) highlights the need for a greater effort on the part of firms in the social and environmental fields, which implies the development of three essential pillars: economic, social and environmental. The last one is the focus of interest in this paper.

Social pressures have forced firms to understand that they must assume and face the environmental challenge through the development of new knowledge which can allow them to act following a sustainable development approach and which, in turn, can give them the opportunity to improve their ability to compete in the business environment (Schaltegger and Synnestvedt 2002; Wagner 2005). This new knowledge, related to environmental resources, practices and processes that firms put in motion is what we call EC. EC is very often unknown both by the firm itself and by its *stakeholders* (Freeman 1984), because the traditional environmental information dissemination methods fail to offer a faithful image of the business organisation. Therefore, the need arises to look for alternative instruments that can complement those methods. A good alternative is represented by intellectual capital models, which offer a classification and, at times, the measurement of the intangible assets owned by the firm.

This paper focuses on the integration of EC into the general intellectual capital approach. Its contribution implies the adoption of the *Intellectus Model* (CIC 2003) as a reference, seeking to simplify its structure and present a reference framework from which it can be made adaptable to the

environmental context, not only within social capital, but also considering the global intellectual capital as a whole.

2. Environmental capital from the *Intellectus Model*

Intellectual capital is defined by Stewart (1997) as intellectual material (knowledge, information, intellectual property, experience) which can be exploited in order to generate wealth. Intellectual Capital is linked to the identification and measurement of the existing intangible assets created within the firm. Several intellectual capital models have been developed to solve the information deficiencies found in traditional methods. Among them we can find the *Intellectus Model* (CIC 2003).

According to this model, intellectual capital is divided into these essential blocks: *human capital*, which refers to the contribution made by employees to the value of the company through their competencies, attitudes and mental agility (Dragonetti and Roos 1997; CIC 2003). *Structural capital*, which includes systematised knowledge, made explicit or internalised by the organisation (CIC 2003), and consists of organisational and technological capital. *Organisational capital* is formed by the set of intangibles which structure and develop the organisation's activity (culture, structure, organisational learning and processes) effectively and efficiently. *Technological capital* is represented by the group of intangibles directly linked to the development of the activities and functions of the firm's operation technical system. Finally, *relational capital* has to do with the organisation's links to the agents in its immediate environment and covers a wide range of intangibles contained in two types of capitals: business capital and social capital. *Business capital* refers to the value assigned by the organisation to its relationships with the principal agents linked to its basic business process. Regarding *social capital*, though authors such as McElroy (2002) define it as "the value of relationships between people in firms and between firms and other firms", according to the *Intellectus Model* (CIC 2003), it is the value assigned by the organisation to its relationships with the public administrations, with the mass media and corporate image, the protection of the environment, the corporate reputation and social relationships. Social capital incorporates the relationships that the organisation may have with the protection of the environment in such aspects as the preservation of the natural environment and the promotion of ecological initiatives.

The development and spread of EC firstly allows the firm to identify the extent to which it has accepted the environmental responsibility for the impact caused by its products and productive processes, thus avoiding surprises; and secondly, to facilitate environmental action by means of the amount of learning achieved through, for instance, cooperation and the creation of green alliances with various environmental groups (suppliers, customers, Administration, opinion groups, NGOs, etc) (Hart 1995; González-Benito and González-Benito 2005). EC integration into the organisation's global intellectual capital converts into it the result of combining human EC, structural EC (organisational EC and technological EC) and relational EC (business EC and social EC). The first one is operational (mainly based on knowledge and skills) and emotional (based on motivation, leadership and loyalty). The environmental talent and skills of individuals can be measured from formal or specialised training, from personal development and experience, and finally from collaboration and knowledge exchange levels. The second one can be organisational, as it has to assume the need to adapt the culture and the formal organisation through the definition of new occupations, and/or technological, allowing the introduction of new ecological products, cleaner productive processes or less polluting machinery. Finally, relational EC links firms to stakeholders and to the market in which it operates (green or ecological brands, ecological labels and certifications).

The following sections show the empirical evidence provided by eight Spanish firms regarding the identification and integration of the environmental intangibles that a firm owns in accordance with the *Intellectus Model* structure.

3. Methodology

Miles and Huberman (1994) suggest that researchers should use qualitative research designs when there is a clear need for deep understanding, local contextualization, and presentation of the points of view of the population under study. The appropriate research methodology for a study which attempts to extend the existing literature is the comparative case study (Eisenhardt 1989; Yin 1994; Stake 1995). This technique is used in order to identify the different variables from which EC should be analysed.

Sample- To achieve the aim of the study a selection is offered of cases belonging to the different categories proposed by Hutchinson (1996, p. 15) is offered, which provide a classification of these sectors according to the pollution levels caused by each one of them. The assumption is that different sectors generate various levels of environmental impact, from which can be inferred that firms' responses to environment will vary too. In fact, a number of studies which relate the firm's environmental attitude to the type of activity it develops reveal a stronger environmental commitment by the firms which find themselves in those sectors with the most serious pollution-related problems (Cairncross, 1992). The least polluting firms, instead, suffer less pressure, since the main environment protection measures have basically been focused on industrial activities with a direct, visible impact on the natural environment (Bowen, 2000). Eight cases were selected in order to achieve a diverse sample that can provide many possibilities for comparison, which in turn enables a richer theory development (Strauss and Corbin, 1990). The sectorial distribution was: Primary sector: Coato (food and agriculture); Secondary sector: Enplater (ENP) (plastics), Aznar Textil (AZT) (fabrics) and Construcciones Deco (CD) (building); and Tertiary sector: FutureSpace (FS) (new technologies), Transportes Davi (TD) (transport), Corona del Mar (CM) (tourism) and Cartera Ambiental (CA) (industrial waste management). All these firms had environmental management systems in place (EMAS Regulation and ISO 14001 Norm) and had integrated environmental programmes before the rest of the firms operating in their sectors. They were recognised environmental leaders and recipients of both national and international environmental excellence awards.

Data collection- Given the qualitative nature of most of the data sought, triangulation was one of the important means of increasing construct validity and substantiating findings (Denzin 1978). Three aspects were combined: A) personal structured interviews and surveys among environmental managers between January and May 2004; B) direct observation (visits to the facilities and contacts with employees). C) access to internal documents (in-house information bulletins, environmental declarations, annual reports for the 1997-2003 period), and external ones (press, web pages, commercial registries, SABI database). This triangulation technique provides stronger validation of the results if they converge (Yin 1994). The issue of internal validity was handled by conducting multiple iterations and follow-ups during the analyses. The problem of reliability was addressed drawing up detailed case study protocols and following the required documentation and transcription standards. External validity was increased through the study of multiple firms and the analysis of comparative findings. To test data interpretation credibility, the analysis was subject to member checks. Emerging insights were checked on an ongoing basis with the informants, asking for their feedback, sometimes in a second interview when some aspect was not clear.

Data analysis.- The extended case method (Burewoy 1991) was used as a guide to data analysis. This methodology approach uses empirical data gathered through case studies to reconceptualise and extend theory. This method consists of two 'running exchanges': between literature review and data analysis, and between data analysis and data collection, represented as: literature review $\leftrightarrow$ data analysis $\leftrightarrow$ data collection. The different phases followed are: (1) exploring relevant concepts and theories found in the literature; (2) developing the Coato case study (made in 2003); (3) holding face-to-face interviews with environmental managers; (4) analysing interviewees' feedback on the first draft of case descriptions in order to check their validity; (5) preparing a comparative analysis of the different cases; and (6) developing a matrix that will provide us with a visual identification of the similarities and differences between the firms analysed.

4. Results

Concerning *human EC*, the effort made by managers to integrate environmental issues into the organisation must be highlighted. There are different ways to involve the firm's staff (Table 1).

According to Table 1, firms publish their environmental policy, which includes the firm's commitment to the environment in three senses: pollution prevention, legislative compliance and ongoing improvement. It is also worth highlighting the organisation of environmental training, information and awareness sessions, above all during the early environmental management development stages. ENPLATER, Aznar Textil and FutureSpace have gone one step beyond because they have managed to achieve a higher degree of employee involvement through the celebration of annual meetings dedicated to environmental quality. During these meetings, managers and employees adopt joint decisions on both the future environmental approach to be followed by the firm during the next few years and the potential environmental objectives and analyse the findings obtained in previous years.

This type of meetings is also productive because employee involvement and participation favours the emergence of personal contributions and compensations.

Environmental talent and skills of employees can be measured from formal or specialised training, personal development and experience, along with collaboration and knowledge exchange. That is why attending seminars, sessions and workshops and preparing textbooks on good practices which provide the main rules of behaviour in front of potential emergency situations related to waste, dumping or emissions are usual activities within this context.

Table 1: Human environmental capital

COATO	ENP	AZT	CD	FS	TD	CM	CA
ET&IS PW&S Participation in the World's Day of the Environment in Totana	ET&IS Web pages Environmental declaration	ET&IS Annual environmental quality assembly Environmental report (private) Participation in fairs and sponsorships	ET&IS Quality, environment and prevention good practice manual EDW PW&S	ET&IS Welcome dossier with sections dedicated to quality and the environment Annual meeting to present the results of the firm's environmental action, future annual objectives and how to achieve them	ET&IS Good practice manual EDW	ET&IS Welcome Manual (quality and environment policy) EDW PW&S	ET&IS PW&S

ET&IS: Environmental Training and Information Sessions for employees, EDW: Environmental Declaration on the Web and PW&S: Participation in Workshops and Seminars related to environment

As for *structural EC*, it can be organisational, as it has to consider the need to adapt formal organisation and culture through the definition of new occupations, and/or technological, the introduction of new ecological products, cleaner productive processes or less polluting machinery. Table 2 shows the largest investments made by these firms in the fields of technological and organisational development. According to Table 2, all firms carry out continuous innovations and improvements of the environmental technology portfolio which, except for the case of Construcciones DECO, is mainly formed by preventive practices. The environmental technology portfolio is the result of combining pollution control and pollution prevention technologies.

Control technologies allow firms to focus their actions in the short term. Their objective is to undertake environmental impact corrective actions through end-of-pipe measures which do not imply the development of new skills for new environmental processes. These technologies do not generate value and may imply quite a high cost apart from being unproductive for the firm, as it does not correct the environmental impact. Prevention technologies make it possible to reduce or eliminate the environmental impact from the source. For that purpose, firms have had to modify and redesign their productive processes and install new technologies, thus contributing to the development of internal routines and the know-how. The greater complexity involved in this type of technology has forced firms to cover new needs linked to employee learning, training and involvement at all organisational levels, to the definition of new environmental responsibilities and to the functional coverage required to solve specific technical and environmental management problems (Judge and Douglas 1998). However, thanks to this technology, firms have managed to reduce certain costs from the achievement of higher eco-efficiency, which has made it easier for firms to find external funding and has equally favoured the establishment of market image as a differentiating factor.

The organisational structure has turned out to be another vital factor when it comes to facing the environmental challenges of firms. Three differentiated structural options can be identified: the creation of an environmental department (ENPLATER), the appointment of a top management representative (COATO, Aznar Textil, Construcciones DECO and Corona del Mar); functional managers are responsible for their environmental practices and there is an environmental executive who coordinates and supervises all actions (Transportes Daví, FutureSpace and Cartera Ambiental). Regardless of the option chosen by the firms, they all refer to the need for a person to assume the ultimate responsibility in strategic, planning, control and even operational aspects. Their mission is to act as catalysts of wills in order to foster a higher degree of greater attention to environmental preservation.

Table 2: Structural environmental capital

COATO	
Control logic (CL)	Prevention logic (PL)
Investment on emission/pollution control systems Introducing fuel machine collection facilities	Recycling programmes Used residues closed-circuit within the firm. Changes in material and product specifications Fertilisers with a lower environmental impact Packaging reduction

ENPLATER	
CL	PL
Measurements at emission points Selective waste collection Treatment Plant Toxic/dangerous waste disposal	DISPENSING ink preparation and recovery equipment (INPLANT) equipment which makes it possible to prepare the different ink colours needed to print from a reduced number of basic colours. Recycling programmes Procedures for immediate response before emergencies Essential changes in process and product design to reduce/eliminate environmental accidents, spillages and leakages, as well as dangerous waste

AZNAR TEXTIL	
CL	PL
Study on loom speeds, on machinery changes and energy-saving through new acquisitions Noise measurement at the premises and on the road Correct waste segregation	Development of a computer programme which helps to minimise yarn movements and to exploit the rest of batches Implementation of a water change system in the gas wash site Introduction of materials with a lower environmental impact Packaging reduction Recycling programme Closed circuit of waste used with other organisations

CONSTRUCCIONES DECO		
	CL	PL
Building materials	Development of control technologies	Introduction of materials with a lower environmental impact
Energy consumption	Energy control systems at buildings and other automatic controls	Development of low-energy applications and clean technologies
Control logic		
Location	Environmental impact assessment Forecasting of safe areas for product and waste storage	
Emissions, waste and dumping	Investment in emission/pollution control equipment Selective waste collection and proper waste management	
Emergency situation	Procedures of immediate response before emergencies	

TRANSPORTES DAVÍ			
Activity		CL	PL
Management	*Vehicles*	Suitable vehicle choice according to the weight of the load to be transported and to the operation to be carried out	Lorries and forklift trucks (CCE) with a low aerodynamic resistance and built with recyclable materials Use of radial tyres with a steel ring on the outside part CCE with a diesel or unleaded petrol engine with a catalytic converter
	Routes		Logistic distribution study (routes, vehicle size, etc.)
Waste/emissions		Adapting the storage area to the nature of the waste (waterproof cover, spillage contention system, etc.)	Purchase of vehicles which remain longer in operation Purchase of lubricants, grease removers and polish which are not aerosols
Driving		Avoiding sharp braking (screeching), sudden starts, excessive speed and unnecessary stops	Planning of routes to be followed Firm staff training and awareness campaigns

CORONA DEL MAR	
CL	PL
Dangerous waste segregation and management Periodical machinery inspections Selective paper and glass collection	Installation of credit card holders (wallets) in rooms, built-in fluorescent screens, “down light” spotlights, switches in terrace sliding doors, etc., to reduce energy and water consumption Installation of a high-performance boiler with insulated accumulators Lifts with Triples stop memory manoeuvre
CARTERA AMBIENTAL	

CL	PL
Equipment for waste conditioning and pre-treatment: disposal units, baler, can crushers, mixing tanks, etc. Waste analysis equipment: gas chromatography technology, atomic absorption equipment, calorimeters Emission, inmission and noise measurement Water analysis	Reuse, recovery or recycling treatments Changes in process and product design to reduce/eliminate environmental accidents, spillages and leakages Reduction of the total amount of material used
FUTURESPACE	
CL	PL
Thermostat control Selective waste collection and management	Installation of volume reducers at tanks, mixer taps with a saving system, low-consumption bulbs or fluorescent tubes Rejected paper and cardboard recycling Purchase of raw materials or products in bulk in larger-sized containers, phosphate-free detergents, etc. Use of returnable containers Drawing up good practice instructions by departments and train employees in the correct management of water

Relational EC links the firm with both its stakeholders and the market in which it operates (green or ecological brands, ecological labels and certifications). Table 3 shows the connections of the organisations analysed with the different agents.

It can be seen in Table 3 that the primary and secondary sectors seek a greater level of supplier involvement than service sector. For instance, ENPLATER has among its suppliers some firms belonging to the petrochemical sector, which is considered one of the most polluting sectors but, at the same time, is one of the most advanced in environmental matters, which forces them to demand minimum environmental efficiency criteria in their business operations. COATO, in turn, involves its partners in the conversion process from traditional growing techniques into sustainable ones and they even participate in environmental learning programmes. Aznar Textil fixed some environmental objectives which required the involvement of their suppliers, e.g. the reduction of paper and cardboard generation by 1% produced by the removal of cardboard boxes from the packaging used by some yarn suppliers. Anyway, this is a complicated goal taking into account that it is by no means easy to modify a supplier's productive system.

5. Conclusions

This paper had as its aim to integrate EC into the overall intellectual capital approach. For this purpose, the *Intellectus Model* was taken as a reference in order to use its structure and provide a reference framework from which it could be adaptable to the environmental context. This is characterised by its contribution to an increased EC within the organisation that can help to palliate or eliminate potential inefficiency situations in its environmental management. The research methodolodogy used was the multiple case study applied to eight Spanish firms belonging to the primary, secondary and tertiary sectors.

The results indicate that, from the point of view of human EC, the firms analysed publish their environmental policy in order to show the extent to which they are committed to the environment, organise environmental training, information and awareness sessions and often attend seminars, sessions and workshops in order to obtain new knowledge related to this field. As for structural EC, all the firms continuously introduce innovations and improvements in their environmental technology portfolio, basically formed by preventive practices; the creation of an environmental department, the appointment of a management representative and the existence of an environmental manager are the options taken by the firms examined. The analysis of relational EC reveals that primary and secondary sectors tend to involve suppliers in the environmental management process, whereas in the service sector, the customer is the most directly involved agent.

Despite the results obtained in this study it has some limitations: the specific nature of the multiple case approach and the fact the firms under study stand out as being some of the most advanced in environmental matters within their respective sectors. A suggestion for a future line of research could be to explore in greater depth the definition of EC and analyse its possible interactions with different functional areas within the firm.

Table 3: Relational environmental capital

COATO	ENP	AZT	CD	FS	TD	CM	CA
Characteristics of the relationships							
Investors: Caja Murcia office which benefits farmers who practise integrated or ecological agriculture Open-door society Competitors: cooperation Customers: greater international sensitivity Suppliers: products that are compatible with sustainable agriculture	Society: commitment to population (Agenda 21) and tourist sector (firm in harmony with the natural and urban milieu) Competitors: environmentally aware multinationals Customer: the environment as a characteristic, not as a demand. More international awareness (Germany, the Netherlands) Highly aware suppliers in the petrochemical sector	Industrial customer (it depends on the end consumer); end consumer (non-existent fidelisation). Greater international awareness (German) Suppliers: the firm demands minimum environment protection criteria to work with them Society: firm's harmony with the natural environment	Customer: 80% Government (the valuation of the environment in certifications is not very high); private sector (low valuation) Competitors: the firm carries out an organisational change in order to flexibilise its structure and become more competitive; Trade associations prefer to focus on work safety Industrials and subcontractors: the firm established minimum criteria to work with them.	Customer: Government main customer (valuation up to 30% of the concession), private sector (much lower demand because it is a low-polluting sector) Suppliers and subcontractors own ISO 14001 certification (a demand of the firm) Competition: the environment as just another characteristic which differentiates the service but does not improve it. There are no customer differences by countries	Customers and suppliers: the firm's environmental responsibility is not recognised	Competitors: the environment as a competitive argument; cooperation with other hotels in the search for environmental improvements Customers: valuation of the environment as a hotel quality improvement, but not as something which determines its selection Suppliers: no demands if they provide less harmful products Society: greater demands on the part of all stakeholders Tour operators: no demands because they work with Britons (they have demands in the case of Germans)	Society: rejection toward the firms at its early stages; now left behind. Competitors: the environment as a strategic differentiation factor Customer: no environmental responsibility is demanded; he is only valued. Greater international awareness: role in multinationals Suppliers: no demands Relevant role of sector associations in search of environmental solutions. It is compulsory to have the ISO norm certifications.
Type of cooperation							
Creation of an eco-park Communication channels with other nacional and international cooperatives Participation in various associations Participation with Government and University	Suggestion box Direct communication systems (Security and Health Committee; annual note to section managers to prepare environmental objectives)	Collaboration of suppliers to achieve environmental objectives Provision of ideas, suggestions and complaints in annual meetings	Suggestions box Transmission of ideas and opinions to any manager in the firm	Transmission of possible improvements to superior Annual environmental planning report Cooperation with other firms	Suggestions box Communication of suggestions or complaints to managers	Suggestions box Questionnaires to customers who provide ideas and suggestions. Collaboration with other hotels	Collaboration with different associations and the University Suggestions box or communication to superior (dangerous waste haulage contractor)

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Capturing Competence – Using Wiki for Transferring Tacit Knowledge

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Abstract: Most of a person's knowledge is tacit by nature and is difficult to externalize. In an organization, exploiting tacit knowledge is problematic but when it is done successfully it can increase the knowledge capital of the organization and make the decision-making process more effective. For example, transforming the tacit knowledge of an individual into knowledge that can be shared throughout the organization has a lot of potential. However, organizations often lack the methods of managing tacit knowledge. Transferring tacit knowledge requires a shared context and interaction. Could an information system act as a shared environment?The context of the paper is industrial maintenance. For supporting the integrated operation and maintenance there is a wide variety of different, more and less extensive information systems. Their main purpose is to capture the information needed in the integrated operation and maintenance and store it in one information system. Integrated operation and maintenance can be seen as a very knowledge-intensive process based on problem-solving. Therefore, sharing knowledge is essential and would improve the process. Information systems contain a lot of explicit knowledge which a person needs to absorb in order to turn it into action. However, tools for transferring tacit knowledge are missing even though the maintenance staff accumulates it constantly while working.In the paper we search for a solution to the problem of transferring tacit knowledge in integrated operation and maintenance using a wiki. Wikis have recently become a popular and handy way to create and edit knowledge and information using the Internet. One of the most well-known wikis is Wikipedia, which is surely familiar to all Internet users. The offspring of the paper is a general method with which tacit knowledge in integrated operation and maintenance can be transferred and shared within an organization using a wiki. The paper describes generally the functionalities and utilization of the system and the human-system-human interaction. The transfer of tacit knowledge is studied especially from the viewpoint of the smoothness and continuity of the operation. The method can be utilized extensively in the stages of different processes, for instance, for finding better solutions to fault situations and process development.

Keywords: Tacit knowledge, transfer of tacit knowledge, social media, wiki

1. Introduction

The successful transfer of tacit knowledge is not solely dependent on information systems. Because tacit knowledge is personal and people are strongly involved in transferring it, information and communications technology (ICT) as such is not a proper solution. Therefore, instead of a single information system this article discusses a comprehensive method, which includes ICT but also takes human-related factors into account. In addition to the information systems, it is important to get people to understand what tacit knowledge is, how it could be transferred and what the information systems can and cannot do. Knowledge of the information system but also of the whole method should be shared to the participants of the method.

The goal of this paper is to theoretically examine the potential of social media for transferring tacit knowledge. Wikis were chosen as an example of social media because of its conversational and collaborative nature. The theme will be studied in the context of integrated operation and maintenance (IOM). The outcome of this paper is a theoretical framework based on literature. Similar frameworks or models cannot be found in academic literature, although there are examples of applications transferring data or information using social media, like MapaWiki (McKelvie et al. 2007), RIKI (Rhee et al. 2008) and IkeWiki (Schaffert et al. 2005) . To date, wikis and other social media have been widely adopted by enterprises, but the academic research related to using social media for transferring tacit knowledge is limited.

1.1 Integrated operation and maintenance

According to a standard definition maintenance is a "combination of all technical, administrative and managerial actions during the life cycle of an item intended to retain it in, or restore it to, a state in which it can perform the required function". In addition, IOM is defined as the duties of the operating personnel, such as sanitation, minor repairs and machine-specific condition monitoring. (PSK 6201 2003, pp. 2–3.) The latter is considered to be more comprehensive and that is why it is used here. Knowledge management and tacit knowledge have a remarkable role in IOM. Besides, IOM is not a

continuous process, like developing. It has a clear start, steps and a point of termination. This clarifies the examination of transferring tacit knowledge, and has been chosen as the context of our study.

There are various information systems to give support to IOM. These computerized maintenance management systems (CMMSs) collect information about IOM, store and process it and assist forecasting (Duffuaa et al. 1998, p. 259). CMMSs could be considered as a kind of enterprise resource planning (ERP) system, but they specialize in managing IOM-related knowledge and information. The problem with the CMMSs from knowledge management's point of view is that they do not offer any tools for collecting tacit knowledge. A system called Arttu is one of Solteq PLC's computerized maintenance management systems, and is used in this study as an example of a CMMS.

1.2 Research approach

Neilimo & Näsi (1980) suggest four main types of research approaches, which suit business economics well. One of them is the decision-methodological approach, which is used here. According to Olkkonen (1994), it is theoretical research which uses mathematical deduction and aims for developing methods for decision-making. The research material consists of prior knowledge of interdependences, and reasoning is partly included in the deduction of the results. (Olkkonen 1994, pp. 52, 70.) The use of theoretical information and deduction is essential in generating the result, which is usually an application. This approach differs from the others because of the lack of empirical testing, and that is why it is used here. This is a theoretical and normative study and is groundwork for future empirical research. The target is to reflect the theme and to find relevant research questions for future research.

2. Defining the process of transferring tacit knowledge

Knowledge can exist in two different forms: explicit and tacit. Tacit knowledge is personal, context-bound and hard to put into words. It can contain cognitive elements, like beliefs and perspective but also technical elements, like know-how, skills and expertise. Explicit knowledge is, on the other hand, objective and impersonal. Storing it in an information system is uncomplicated. (Nonaka & Takeuchi 1995, pp. 59–60.)Explicit knowledge is mainly in written form, whereas tacit knowledge usually appears in social interaction (Ståhle & Grönroos 1999, p. 91). Being context-specific, tacit knowledge can be impossible to transfer to another person for example as a text. Instead, conversations, scenarios and metaphors can act as transfer channels (Awad & Ghaziri 2004, p. 47). According to Ståhle and Grönroos (1999, p. 90), experts act on the grounds of their intuition and previous experiences. This is called know-how. It is difficult to specify or communicate, but it appears in the expert's actions.

In organizations it is important that knowledge transfers between people. IOM is very knowledge-intensive, and therefore tacit knowledge has considerable significance in the success of the IOM process. However, employees' tacit knowledge is a challenge. Common ICT tools, like email and databases do not offer proper environment for transferring tacit knowledge as such. Therefore, more open and unstructured solutions are needed.There has been a lot of discussion of the transferability of tacit knowledge and of the types of methods that should be used to transfer it. Various transfer models of tacit knowledge have also been introduced, but none of them is particularly established. Even though the transfer of tacit knowledge has been modeled theoretically fairly well, there are still problems in practice because tacit knowledge has a strong linkage with the person and his personality.

In the figure below (Figure 1) are illustrated the processes of transferring tacit knowledge presented by Awad & Ghaziri (2004, p. 250) as well as Davenport & Prusak (1998, p. 101). Awad & Ghaziri suggest that transferring knowledge includes the stages of capture, codification, sharing and the actual transfer. According to Davenport & Prusak, transferring involves both the transmission, absorption and usage of knowledge. Therefore, knowledge has not been transferred if it has not been absorbed. Knowledge that is just at hand, for example in a database, is not transferred. (Davenport & Prusak 1998, p. 101.)

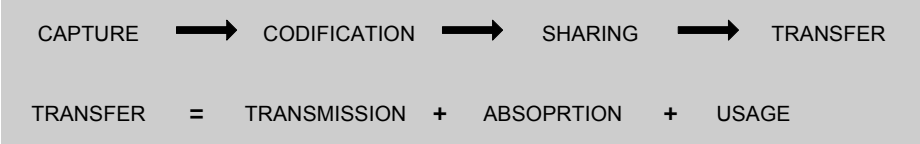

Figure 1: The processes of transferring tacit knowledge

According to Awad & Ghaziri (2004, p. 250) there are three important points to take into account:

- where knowledge is being transferred from
- how knowledge is being transferred and
- where knowledge is being transferred to.

These factors are equivalent to the general model of communication by Shannon & Weaver (1949). In the model the information source generates the message and its form (for example text or speech) and the transmitter, which sends the message. In the destination a reverse process takes place. (Shannon & Weaver 1949, pp. 98–99.) So, in transferring knowledge the most important elements are the information source, the transmission channel and the receiver.The two processes mentioned above have been partially merged in this study to fit the process of transferring tacit knowledge. The new process is depicted in figure 2. The phases of the process are capture, codification, transmission, sharing, absorption and usage. The first four of these are considered as the transmission suggested by Davenport & Prusak (1998, p. 101). The phase of transfer presented in the process of Awad & Ghaziri did not fit in the process as such because the whole process is considered to be transferring. The phase in question was split into two parts, since when taking the wiki into account it is important to distinguish transmitting knowledge from sharing it.

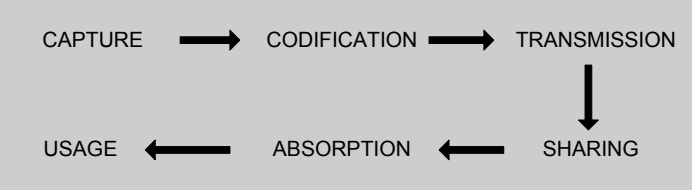

Figure 2: The process of transferring tacit knowledge

Figure 3 presents the new model of transferring tacit knowledge with the Shannon-Weaver communication model. In addition, the process has been connected with the process of using a wiki. Person A collects knowledge, codifies it and transmits it. After that the knowledge is shared and person B can absorb it and use it in the actual work. The transmission channel is always a wiki, but the form of the message can be chosen by the sender. Here the document functions as the message with a selected form. Person A acts as the sender and person B as the receiver.

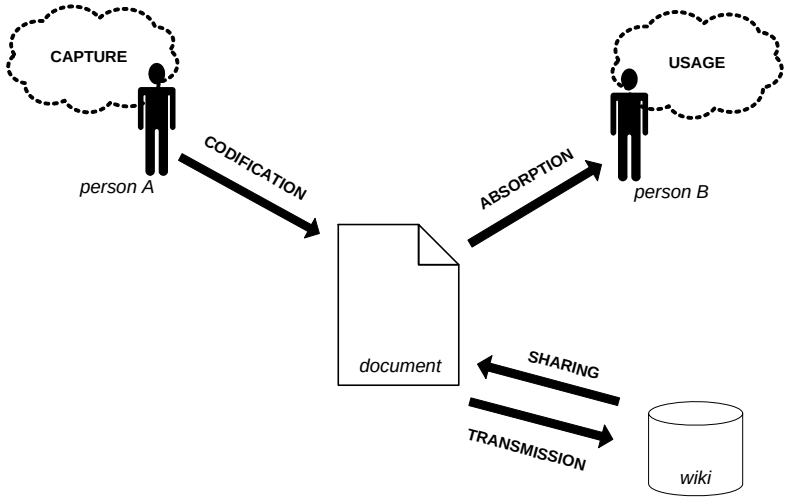

Figure 3: The process of transferring tacit knowledge by using wiki

In the figure, the wiki seems to participate only in *transmission* and *sharing*, but in reality it is part of the whole process. If a document is a wiki document, it is created in a wiki. If it is something else, like a video or a graph, it is included in a wiki page. So, creating documents (*codification*) and learning from them (*absorption*) are the basic ways of using a wiki. *Capturing* knowledge can happen anywhere and not solely in a wiki. But as a knowledge reservoir it is natural that a wiki is an important source of new knowledge. In the same way, *using* the accumulated knowledge can take place in the wiki, for example in the form of completing a wiki page created by someone else.

3. Wiki and other social media in transferring tacit knowledge

Tacit knowledge is challenging to transform into text and thereby to save, and therefore an ordinary database as such is not a workable method to transfer tacit knowledge. Today many different knowledge management systems (KMSs) are used to collect tacit knowledge to some extent. The usage of these kinds of systems calls for several employees who are dedicated to the subject. In addition, the transfer of tacit knowledge becomes a separate process from the actual work. Social media offer new ways of collecting, sharing and finding information and knowledge using an information system. "Social media refers to web services that are based on several separate contributors' shared contents that are of interest of a contributor or a specific community. The contents can be for example text, video, sound, animation or pictures. Most of these contents are produced and shared freely without a direct financial compensation." (Melakoski et al. 2007, p. 9.)

In enterprises, wikis are considered more versatile than other social media, such as blogs which are used to publish content. Table 1 shows some of the differences and similarities between discussion forums, blogs and wikis. According to Klobas (2006) wikis are a many-to-many communication channel, while blogs usually follow the one-to-many communication model. Wagner & Bolloju (2005) point out that the one-to-many model is more complicated to update because there are fewer users with editing rights using a blog. On the other hand, for an expert who has a notable amount of knowledge, it could be a suitable way of sharing knowledge with other people. (Wagner & Bolloju 2005, p. vi.)

Table 1: Comparison between different social media

	discussion forum	**blog**	**wiki**
communication model	many-to-many	one-to-many	many-to-many
hyperlinkit	often external	often external	both internal and external
display of content	chronological, partly hierarchical	chronological	hierarchical
navigation	threads	chronological	hyperlinks
version management	no	often	yes
constrained structure	yes	yes	no
key words / tagging	no	often	yes
editing by normal users	no	no	yes
notification of content editing	RSS	RSS	email, RSS
collaboration	conversational	by comments	real collaboration
editing modes	WYSIWYG	often WYSIWYG	WYSIWYG, mark-up

Blogs are restricted to chronological publishing, whereas wikis concentrate on the content and organizing knowledge by topics (Klobas 2006, p. 7). In addition, navigation in a wiki is based on a hierarchical structure together with contextual links. On a discussion forum, on the other hand, the user reads the whole thread and then moves on to the next.

Version management tools are well developed in social media, and in a wiki they are among the most important tools. When every user can modify wiki pages it is likely that something goes wrong. Therefore, it is crucial to have the version history easily available. In blogs and discussion forums the way of publishing differs considerably from that of a wiki, in which case the possibility to manage old versions is usually not that significant.

When discussing social media, especially blogs and wikis, are often considered to be the same. Dickerson (2004) comments this subject cleverly by writing on his blog that "equating the two is kind of like saying basketball and hockey are converging because in both cases, you are trying to put an object in a net". It is crucial to understand that these tools are different by nature and that they should be used accordingly. The biggest difference between a discussion forum, a blog and a wiki is the possibility to collaborate. In a discussion forum the only way of co-operate is to discuss about a certain topic. In blogs the only form of collaboration is to comment on the posted items. In a wiki, on the other hand, you can genuinely collaborate by creating new knowledge and enhancing existing content with the help of all the users. This is one of the main reasons why the wiki is considered to be a proper tool for transferring tacit knowledge.

Hovila & Okkonen (2006, p. 59) have divided the methods of knowledge transfer into four groups based on whether tacit or explicit knowledge is being transferred and how many persons are involved (see figure 4). The lower left field in the original fourfold table would be relatively empty without the wiki method. Wikis can be placed to the field of tacit knowledge transferred between two individuals.

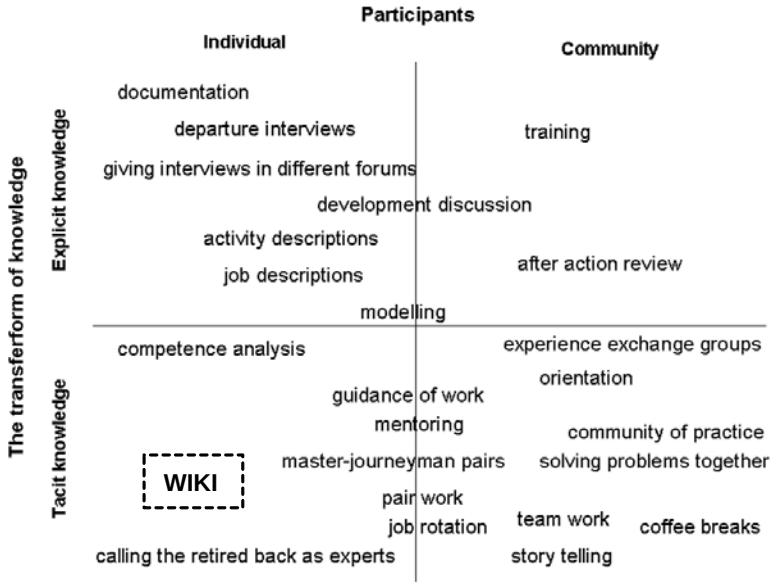

Figure 4: Methods of transferring tacit knowledge (adapted from Hovila & Okkonen 2006, s. 59)

Even though a wiki is used by a community, the actual knowledge is transferred on the level of an individual. The participants do not have to be in the same physical space at the same time and they can use the wiki by themselves. A wiki connects the methods of the individual–explicit field, such as documentation, as well as the methods of the community–tacit field, such as team work and communities of practice (CoP). The transfer is a process performed on an individual level, but the actual content in a wiki and the way of doing things are communal. According to Wagner (2004, p. 282) the content of a wiki is owned by its creators, not by individuals, because the content is created in collaboration, and every user has the right to revise someone else's output. An individual cannot have any right to his output because anybody could have modified it and contributed to it.

The purpose of a wiki is to act as an informal and open channel, so that every employee in IOM could share their tacit knowledge in a simple way. This is performed by adding and editing wiki pages using a CMMS, which they already use in their actual work. The free structure and informality of a wiki motivates its users to communicate freely (Klobas 2006, p. 100). A wiki helps to share ideas, discuss the content already available and to comment on other people's thoughts. The informality helps new users because the threshold to start is low. Beginners can at first just follow what is going on in the wiki and make their first edit for example as a short comment.

The structure of the content is free in a wiki and it can be changed constantly, so the final structure does not have to be decided beforehand. Some kind of structure has to be created at the beginning, but it cannot be too binding. The users should be able to change it. Accordingly, a wiki works in a different way than for example project management systems, which have fields ready to be filled in by the users. Because of the flexible structure wikis can be used in many different situations and for many different purposes.

Because a wiki is used with a web browser it is independent of time and place. Users do not need separate software for using a wiki. Especially in IOM it is crucial that using a wiki is not bound to a specific place but it can be used almost anywhere.

In organizations the validation of the content in a wiki is essential. The knowledge in the wiki should be correct. Incorrect knowledge spreads rapidly among wiki users and it is difficult to rectify. In IOM erroneous information may pose different threats, for example if there are errors in work instructions. However, correcting an error in a wiki is simple. Because every user can modify the content freely, everyone has the possibility to correct the information. Frumkin (2005, p. 21) states, that in a wiki

community errors are corrected quickly, and the quality of the information increases along with the corrections. The low number of errors in Wikipedia proves that this really works. According to Giles (2005, p. 900) there are four errors in the 42 randomly selected wiki articles in Wikipedia, whereas there are three errors in the same number of articles in Encyclopaedia Britannica. The difference is not substantial. However, it is important to remember that usually there are fewer users in an organization's wiki than in Wikipedia. Thus, the correction of the errors is not as efficient.

A wiki enables and even necessitates collaboration. Collaboration refers to "mutual efforts by two or more individuals who perform activities in order to accomplish certain tasks" (Turban et al. 2002, p. 140). Because every user can modify wiki pages, the content of a page is created in collaboration with other users. This might be an unfamiliar method for people who have not used wikis or other social media before. Klobas (2006, p. 18) points out that a wiki should be seen as a possibility to add, improve, and build knowledge. In a research conducted by Majchrzak et al. (2006, p. 101), 63 per cent of the respondents thought that the enhancement of collaboration is the most significant benefit of a wiki. On this account, collaboration in the creation of knowledge should not be underestimated.

The findings of the study carried out by Majchrzak et al. (2006) showed that one of the most frequently used targets of application of a wiki is knowledge management. According to the study, wikis are used to disseminate, among others, how-tos, best practices, innovative methods and processes, and organization policies and procedures. In addition, ad-hoc collaboration proved to be a popular way to use wikis. Hashing out ideas, brainstorming and remote collaboration were important modes of ad-hoc collaboration. (Majchrzak et al. 2006, p. 100.)

4. In conclusion

Wikis are used in organizations for various purposes. Due to the knowledge intensive nature of IOM it is significant that knowledge is shared among the personnel. A natural way of connecting a wiki with the process is the CMMS, which is widely used in the IOM processes. Integrating a wiki to a CMMS supports the use of the method as a part of the whole work process. Arttu is constantly used in IOM, and in this case the wiki acts as an additional feature – not as a separate system. This is how starting to use the wiki may feel like a smaller step than learning to use a completely new system. The wiki is integrated with Arttu through Arttu's card index and through the index card's documents. There is already a possibility to attach documents to the index cards in Arttu, and attaching a wiki page to a card is a similar process. Then, there is a straight connection between an index card and the related wiki page. The categories in the wiki should be identical with Arttu's structure, so that the terms and hierarchies are familiar to the users. When taking into account tacit knowledge, the most important single function is the ability to add different documents on the page. Because tacit knowledge is often difficult to codify into a text, it could be possible to codify knowledge, for example, into a video or a diagram. A wiki alone is not sufficient for editing other than wiki documents, and therefore, proper software and hardware should be offered to the users.

The implementation of a wiki is crucial for the success of the method. Without the contribution of the users there is little content in the wiki, and its benefits are minor. The ease of using and the communality of a wiki are its biggest strengths, with the help of which people could be motivated and the threshold of usage could be lowered. One important factor in the implementation is that the wiki should not be empty when starting to use it, because it is difficult for the users (Woods & Thoeny 2007, p. 183). Some content should be added beforehand, so that the users get a clue of what they could do in the wiki. The future users can, of course, take part in the content adding beforehand. Actually, it is good practice and could be part of user training. The target of the user training is to communicate the benefits and the potential of the wiki and to commit users (Turban et al. 2002, p. 614).

Before the method can be successful in an organization there should be trust between the participants and a right kind of organizational culture. This might be one of the most difficult factors because it cannot be solved with the help of ICT or any training. Trust nourishes knowledge sharing and makes it more effortless (Ipe 2003, p. 347). Because in most cases the sender does not know the receiver, it is important to take all the community members into account and not just the relationships between certain people. In a virtual community where people do not meet face to face building trust is more challenging than in physical communities. Swift trust usually exists in these situations, which is the base for conventional trust (Meyerson et al. 1996, p. 167). In the beginning of the relationship trust exists by default, but when the relationship develops the trust should be earned through trustworthy

actions. The trust built in a conventional way is stronger and it tolerates better small variations of trust level.

A reward system plays an important role in motivating the users to use a wiki. There should both intrinsic and extrinsic rewards used, and the rewards related to the wiki should be part of the comprehensive performance management. Extrinsic rewards include, for example, monetary rewards and appreciation within the community (Lawler & Porter 1967, p. 23). Intrinsic rewards include belonging to a community and contributing by sharing tacit knowledge (ibid.). Using these awards for motivating people to use a wiki and to share knowledge is disputed in the literature. According to many studies (Majchrzak et al. 2006, p. 104; Klobas 2006, p. 110; Moore & Serva 2007, p. 155), one of the most important motivating factors of a wiki is improving one's reputation and increasing one's reputation in a community. These are extrinsic but non-monetary rewards. In the long run, it is important that the motivational factor is the actual use of the wiki and not external rewards, like bonuses.

5. Discussion

In literature there are several differing attitudes towards transferring tacit knowledge. However, researchers agree on the problematic nature of the transfer. In this study the transfer was considered to be possible, but it was taken into account that not all tacit knowledge is transferable. The phases of transferring tacit knowledge are capture, codification, transmission, sharing, absorption and usage. The participants of the knowledge transfer process are the sender, the transmission channel and the receiver. Capture, codification and transmission are the phases of the sender, while sharing, absorption and usage are receiver's phases. The transmission channel is not part of any of the phases by itself, but supports transmission and sharing. There can be some ICT tools used in the phases of capture and codification but those tools are not part of the actual transfer process.

Because so far wikis have been studied narrowly, there are not many scientific studies about applying wikis to specific functions. Some references to using a wiki as an knowledge management tool have been done, but more accurate descriptions of the functionalities of the wiki or success of the implementation process still lack. In addition, there are no studies about the functionalities of wiki software and about the types of functionalities that the users consider as the most useful.

The testing of the result was excluded from this study, and that is why the findings have not been tested in any way. The aim here was to give recommendations on the grounds of theory. The results are theoretical and require empirical research. The context of the wiki was IOM, which limits the exploitability of the results. Transferring tacit knowledge should be researched in other contexts, too. Are the results the same? Is the method developed here functional also in other contexts or could it be adapted?

Other social media, such as blogs and discussion forums, should be studied as tools for transferring tacit knowledge, too. In this study it was argued that a wiki is the most suitable tool, but the examination was narrow and theoretical. In addition, a process for transferring tacit knowledge in a wiki should be defined. One proposal for a process was introduced in this paper but again, on the grounds of theory and without any empirical study.

The need for further empirical research has been emphasized. A follow-up to this study will start in the Department of Business Information Management and Logistics (Tampere University of Technology, Finland). The research plan has been made for an empirical research of using wikis for transferring tacit knowledge. The goal is to study if the suggestions made in this paper are valid and essential. The emphasis is on examining, *which features in a wiki are relevant for transferring tacit knowledge*, *which factors motivate people to use a wiki*, and *how tacit knowledge could be codified efficiently*.

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Developing the Intellectual Capital in the Romanian Emergent Economy

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Abstract: The purpose of this paper is to present some of our research results concerning the developing Intellectual Capital in the Romanian emergent economy. The transition to the new economy requires some changes in the way a business operates. Unless they are aware of the challenges they have to face and find solutions to deal with such challenges, most Romanian companies will have a difficult time competing or even surviving in a dynamic, global business environment.

In Romania, strategic management and the proper administration of intellectual capital have been done in a very unstructured way. This paper tries to show the new dimensions of Intellectual Capital up to the organizational level and the new characteristics that Romanian organizations may have. In order to become intelligent organizations, the first step for the Romanian companies is to develop their Intellectual Capital and one of the main ways to do this is by changing the organizational culture. Effective knowledge management is supported by an organizational culture that will facilitate the creation, transfer, share and effective use of knowledge. Do Romanian companies have such cultures? Probably a positive answer cannot be done, except for very few companies. The creation of such cultures will be a very difficult task, since in many Romanian companies, the level of bureaucracy is very high. Although many companies sustain and encourage the idea of a participative management, often, the management of Romanian companies is strongly dominated by control, sometimes excessive and inadequately applied. Moreover, organizational learning, that is very important in a knowledge-based company, requires a culture based on free communication, teamwork and trust.

A creative organizational environment based on trust and that should stimulate the creative flow of knowledge is very important. Creativity means initiative, crossing of boundaries, taking risks and accepting mistakes as stepping stones to move forward. Unfortunately, this type of organizational culture is not well developed in the Romanian companies, thus creativity is blocked. The challenge is, therefore, to change the Romanian organizational culture into a stimulating and rewarding one. It is a very slow and rather difficult process but it should be done if the companies should survive in the coming future and to become competitive in a knowledge-based economy.

Keywords: Emerging economies, knowledge, Intellectual Capital, organizational culture

1. Introduction

The transition from central planning to market-oriented economies in Eastern and Central Europe provides a fascinating laboratory for research in economic theory and business practice. Once the communism collapsed, the inefficiencies of centralized planning have been showed. Poznanski (1992), in his book, *Constructing Capitalism,* makes the following observation: "The experience of state socialist economies also validates the hypothesis that efficient production is not only impossible without market competition but also without private property as a principle form of resource ownership and use control."

Problems dealing with privatization, monetary reforms, trade and so forth are macro issues. Our research has focused more on the micro issues: the managerial and entrepreneurial problems in the transition. Among the many challenges confronting economies in transition is the promotion of entrepreneurship, organizational culture and successful business management. Exercising this ability and developing the talent necessary for successful market ventures was foreign to Romanians under the old regime. Creativity, innovation, entrepreneurship, organizational culture did not exist in the planned economies. To some extent, the mind-set that existed during the communist era remained intact after the collapse of the dictatorship and the liberalization of the economy.

The leading emerging economies are an increasingly dominant force in global economic, social and environmental affairs. Emerging economies represent the world's largest potential markets, the source of both the world's natural and human resources and of major sustainability challenges and increasingly the home of leading global brands and innovation. While many sustainability issues are relevant in both developed and emerging economies, the way they play out frequently differs. Some issues also pose particular challenges in emerging economies, affecting the context for sustainability.

Success in emerging economies requires a sophisticated understanding of the rapidly evolving expectations of governments, investors, customers and society, both national and international (Tung, R., Aycan Z., 2008). Sustainability tools and systems need to be adapted and tailored – or sometimes completely reinvented – to address local realities. Romania has been under the socialist domination for a long period. Now, it has an emerging economy, with a high potential market that if it is properly valued by appropriate strategies, will bring huge benefits for the entire economic system.

2. The initial state of transition

At the end of World War II Romania had a predominantly agrarian economy. The communist regime concentrated on the expansion of industry, especially on the heavy industries, such as metallurgy, chemical manufacture and engineering. Industrialization was assisted by cheap labor from rural areas, where collectivization and discriminatory price-fixing meant that farmers not only lost their own holdings but secured only modest returns as farm workers. Socialist development transformed the economy. In 1960s and '70s, dependence on foreign capital was minimized by the settlement of all foreign debts during the 1980s. This made many sectors of industry lack the investment in new technology and the persistence of a primitive command structure left people with little capacity to innovate and take initiatives.

The Romanian economy was dominated by the use of machines that imposed the nature and the structure of the production process. Factories became a model for shaping the organizational life and the activities and the processes were structured according to a mechanical principle. Under these conditions, the workers' life has been organized with the precision of a clock (Bratianu, 2005). In every organization, the daily program began and ended at the same time for all the employees. People performed a predefined set of activities, rested at appointed hours and resumed their tasks until work was over. The work was repetitive and mechanical, just as a mass-production factory. All the Romanian organizations emphasized regularity, precision, linearity, repeatability because they all had functional structures based on a fixed division of tasks, hierarchical supervision and detailed rules and regulations (Morgan, 1997; Vlasceanu, 2003). In the communist era, the Romanian organizations had a rigid and well defined organizational structure, with precise boundaries for departments and detailed job descriptions. The management hierarchy was vertical, with a clear chain of command, such that every individual had only one superior from whom to receive orders.

Every organization elaborated detailed rules for the organizational behavior, standard procedures that governed activities and all of them were clearly specified in written files and documents. In this long period of time, the only important resources of any organization were the tangible ones. The people were not considered resources, they did not generate solutions, ideas, knowledge, they did not participate to the decision making process, they were only executants. For a long time, the concept of "intellectual capital" had no meaning for the Romanian organizations. The mechanical structure of the organization was based on a linear and deterministic thinking (Bratianu, 2004; Bratianu, 2005), which enchases the predictability and the reliability of the organizational behavior. This mechanical model of the Romanian organizations has been successful for the static external environment that characterized the industrial era. All the features of these organizations become weaknesses when there are changes in the external environment, because the model is rigid and unable to adapt to new business requirements. The changes in the Romanian external environment started with 1989 revolution.

3. The transition era

In the years following the revolution, the conflict between the former managers of heavy industry, who opposed transition to a market economy, and laborers, who sought reform, was at the heart of Romania's development. The modernization of the Romanian economy during the communist period resulted in a considerable upsurge in its foreign trade and commercial contacts, which involved more than 100 countries. In the decade following the revolution, the Romanian government failed to implement many of the macroeconomic reforms that other eastern European countries with transitional economies had undertaken. The post communist government faced a difficult transition toward a market economy. It approached privatization cautiously, since few Romanians had significant capital to invest and many state-owned enterprises were not attractive to foreign investors. Despite expectations that the replacement of markets lost through the collapse of the Soviet Union would lead to a revival in production and that restructuring would then proceed gradually, the shift to a market economy was at best intermittent and slow. By the end of the 1990s, a mixed economy had evolved in Romania and a trend toward a market economy was clearly visible.

In the next 10 years, the Romanian organizations started the change. Even if it was very well defined, the organizational structure was not rigid any more and it could be changed to fit new tasks. It became flat and more flexible, because departments became open systems and their boundaries were more permeable to information fluxes. Flattening the organization also involved empowerment of the operating level, in such a way that the one responsible for implementing a decision had the power to make it or to participate in making it. Between 1990 and 2000, the Romanian government sustained the market development, by encouraging the entrepreneurial spirit. Organizations start to understand the importance of quality and become proactive in continuous improvement of their products and services by implementing the Total Quality Management systems.

For the first time, Romanian companies put people in some functional areas in direct contact with consumers, without the classic interface departments, in order to increase receptivity to change. As a result of the new informational technology system, the communication between people and departments increased. Unlike the industrial societies where knowledge was acquired especially through experience-"learning by doing", in the knowledge based economy, people must learn both before entering the labor market, in school and afterwards as well, adapting themselves to the more and more complex demands of the worldwide dynamics. The implementation of the knowledge-based economy in Romania is a process which can have significant benefits. One of them is the innovating type of learning which can bring about renewal and reorganization of problems so that Romanian organization could survive on the long run in times of change (Bratianu, 2007). People will have to be taught, in time, how to react in an environment of new, unpredictable conditions of partial or total uncertainty. A consequence we might witness here in Romania due to becoming a knowledge-based economy is represented by a change in mentality and attitude. If in the past the emphasis was put on the classical factors of production, in the context of the new economy, the qualitative aspects of the human factor must be rediscovered: people's ability to understand and accept cultural differences, think critically, approach problems from a global perspective, learn continuously, create, innovate (Vlasceanu, 2003). The knowledge-based economy gives birth to many other benefits which can be grouped together and they represent people's ability to understand and accept cultural differences, think critically, approach problems from a global perspective, change their life-style in order to protect the environment as much as possible.

4. Romanian organizations

Since the fall of Communism almost two decades ago, a number of Eastern European countries have made the transition from centrally planned to emerging market economies. A Fortune Magazine survey shows that 67% of U.S. executives now consider Eastern Europe to be a new major market. Investments in Romania have had important effects on the public, private and governmental sectors. The Ernst & Young 2005 Attractiveness survey noted that Europe as a continent attracted 3,066 instances of foreign direct investment. Romania, Bulgaria, and Turkey accounted for 85% of regional foreign direct investment between 2001-2005, resulting in over 19,000 jobs in South East Europe—equaling the number of projects in Germany and Poland" (Catsiapis and Kouris, 2007). Business leaders surveyed ranked South East Europe as more competitive in cost (40% of those polled), and more labor effective (31%) than the rest of Europe. Of those countries tallied, Romania is "in line with first wave accession countries," and was voted regional leader and most attractive by international decision makers. Romania's most promising qualities have been its high productivity levels (27%) and its leader status in foreign direct investment within the manufacturing, logistics, and call-center sectors, resulting in the production of over 42,000 jobs (*Catsiapis and Kouris, 2007*). Romania's appeal is not solely economic, offering a rich culture filled with social dynamics, historical heritage, warm hospitality, and scenic diversity. Despite this, Romania's difficult past has not completely disappeared. Challenges include a lack of management education, training and organizational knowledge, as well as a difficulty in cultivating an efficient and productive workforce, in developing organizational cultures, in generating and evaluating intellectual capital (Bratianu, 2007). Companies expecting successful outcomes in Romania should be aware of the cultural and economic challenges and be prepared to modify the organizational culture, invest in human resource development, and revise the traditional hierarchical management models. Elements of mistrust and obligation are deeply embedded in post-Communist culture, leaving lasting effects that are still evident today. Generational differences and a lack of an operational framework create challenges when working within Romania's market. In spite of the cultural baggage of Communism, there are innovative business strategies that offer hope for a fresh new start.

Multinational companies that invested in Romania represent examples for the Romanian organizations that are latecomers in our emergent economy. Multinationals have often-attempted workforce development reforms as a way to reshape the corporate culture of a country. In the first stage, the Romanian organizations might imitate the multinationals in order to build baseline competences, and to acquire the "good practice". Once these organizations get into race, they would start building capabilities that will help them and make the transition from imitation to innovation (Firer and Williams, 2003). For foreign investors or developed-economies, businesses have also their advantages, because the Romanian emergent economy provides an outlet for expansion by serving, for example, as a new place for a new factory or for new sources of revenue. Many of Eastern Europe countries remain in the transition era and Romania is no exception—trained to act collectively and take orders, employees as well as managers often find if difficult to take initiative. Fear of "the boss", blame and punishment, and the tendency to hide mistakes are still common issues in today's workforce. Successful market integration involves the Romania's ability to increase organizational knowledge, the organizational intelligence, to develop the organizational culture and to become aware of the intangible resources' importance.

Even if the Romanian organizations have bright perspectives, they have to face many difficulties. On the market, there is a shortage of managers and sales people. This is because, traditionally, our education system did not deal with developing these capacities. Along with the transfer of information and competences, there is also the need for a transfer of organizational culture and proper values. The managers of Romanian organizations can make their companies become winners in this very competitive world and can have an entrepreneurial attitude. In order to do this, they are the first who should adapt to the changing environment. They have to learn to communicate, to train their employees, to delegate power and responsibilities, to create organizational culture, to sustain initiatives, to encourage creativity and innovation.

Companies cannot compete without powerful individuals or a mature workforce. The most crucial factor in human resource development has proven to be the ability to establish trust. Companies currently working in Romania have realized the importance of inducing trust by keeping promises, providing open channels of communication, and maintaining regular involvement. Offsite activities such as team building retreats and "Company Days" create valuable opportunities for employees to get to know each other. Citibank Romania has a "Club-City" that organizes activities such as soccer teams or picnic days, creating the opportunity for employee involvement. "Managers that remain involved and have a positive attitude have had the best results." (*Citigroup, HR*). In a culture that longs for praise and individual attention, on-the-spot rewards and personal recognition have shown to be most successful in motivating and encouraging the employees. Benefits packages have also shown to be effective motivational tools, while offers of higher education opportunities - such as MBAs or professional training - are the greatest incentive. Shareholders must look beyond short-term profit as sustainable; efficiency depends on the development of their organizational culture. Once workers are nurtured in a culturally relative corporate strategy, organizational loyalty will naturally develop, ultimately leading to long-term profit and stability (Morgan, 2007). Romania's cultural framework also includes high levels of uncertainty avoidance, power distance, and individualism; confirming Romania's core issues with the distribution of power, its search for truth and the need to survive. Unlike other collective cultures, Romania scores low in "long-term orientation", indicating its perspective on the ability to overcome obstacles in time.

The organizational culture development models that have proven most successful have been those based on the understanding that an organization's corporate culture stems from the way management and staff communicates with one another. An employee's participation in these conversations influences the way one views their work experience, which in turn determines how they go about their daily work (Debowski, 2006*).* All it takes is one misunderstanding at work to completely ruin a person's mood and willingness to work. By creating a common method of communicating problems and opinions, companies can influence the way people view their work, thus impacting their actions. Shifting into this new method of communication fundamentally alters the nature of the organization, reducing problems such as gossip, and encouraging open communication and productivity, resulting in an environment that enables growth (Sudarsanam, Sorwar, Marr, 2003). Although Romania may differ from its fellow European Union members, the workforce development issues it faces are not special or unique to the challenges all companies face with organizational change. As the General Manager of Human Resources pointed out, "We were expecting the impossible from the employees. Headcount was going down, change was everywhere, and the business was built on shaky technical

assumptions. Yet, we needed people to become proactive, positive, energetic, and dramatically change their relationships with each other" (*Logan, 1998, 4-5*).

A company can become a learning organization if and only if there is at least a strong *integrator* to assure the transition from individual learning to team and organizational learning (Bratianu, 2007). Our search shows that we can change the perspective of looking to the Intellectual Capital. Putting in the center the Intellectual Capital, we are looking at its roots instead of its branches. Bratianu (Bratianu, 2008) demonstrated that its value depends on some organizational mechanisms called *integrators.* He defined *an integrator as a powerful field of forces capable of combining two or more elements into a new entity, based on interdependence and synergy. These elements may have a physical or virtual nature, and they must posses the capacity of interacting in a controlled way.* Organizational culture is also a powerful integrator since it acts especially on the individual intelligence and individual core values, generating the spirit of excellence. Organizational culture is a powerful field of forces influencing the way people in an organization perform tasks, set objectives and make decisions to achieve them. As many researchers in this field demonstrated, the excellent companies are marked by very strong cultures: "Our strong belief was that the excellent companies had gotten to be the way they are because of a unique set of cultural attributes that distinguish them from the rest" (Peters & Waterman, 1982, p.26). Great leaders have always understood the importance of the corporate culture and thus they contributed first in developing a strong, and stimulating culture. As an integrator, organizational culture contributes especially in building up an intellectual capital with a great potential for innovation. Also, it can play a significant role in strategic and change management, and in crafting a successful organizational behaviour (Dess & Lumpkin & Eisner, 2006; Bass & Riggio, 2006).

5. Barriers to developing Intellectual Capital in Romania

In his book "*The road to a Free Economy: Shifting from a Socialist System*", Janos Kornai supported the creation of an economic system in which private ownership would dominate. The need for private ownership left open the question of which is the best road of creating such a system, however. Creation of new firms has to be facilitated by breaking down barriers to entry, ensuring the security of private ownership, establishing institutions to enforce private contracts. In the former socialist countries, Kornai considers that most state-owned companies must be privatized. The basic techniques for doing so is the sale and the desirable type of owner is a strategic investor who is prepared to inject a significant amount of new capital in the company. Transition from socialism to capitalism has to be an organic development, the transformation of the society is not a horse race. Some of the former socialist countries (Poland, Hunngary) succeeded in over passing the change period faster and they reached stabilization by institutional reforms obtained systematically, by a series of larger and smaller block of reforms.

In Romania, the situation is different. Even if the there is a macroeconomic stabilization, we are still far from a knowledge based economy. In our research, we tried to identify the main the main causes that stop the Intellectual Capital development in Romania and we defined three barriers.

5.1 The ideology barrier

The communist regime developed in Romanian a certain mentality. In that era, factories were a model for shaping the organizational life, the activities, the processes and economy was dominated by the use of machines. Under these conditions, the factory workers represented the labor force and were considered the main supporters of the Romanian economy. On the other side, the intellectual class was neglected, insignificant and its voice was not important. The factory workers were the history makers and the superior strata of society ("We are working, not thinking"), while the knowledge workers were seen as a second hand strata.

Nowadays, the mentality is not totally over passed. In the Romanian organizations, the directors and managers had a strong need for certainty in a very uncertain world and they had an impulse to action rather to reflect and learn. The generalized idea is that it is better to be seen taking action rather than be accused of wasting time thinking. There is a strong resistance to taking time to think and learn, because the belief that "we are paid to do things around here, not to think" exists in many companies. It is seen as a weak point admitting to learn something, because this means that you did not know everything already. In most of the organizations, there is a constant feeling of vulnerability that as a manager, somebody can be found lacking when trying to understand other disciplines. The different

technical language that other directors used reinforced this feeling and it became even stronger for the leaders who tended to cling to their functional job titles rather than accept that being a director is about competence across an organization than within a single area of responsibility. The idea of learning to take a "generalist" view of the organization and its place in the changing world was seen as an impossible ideal, beyond the capacity of a "normal" director. (Andriessen, D. and Tissen, R., 2000)

5.2 The inertial barrier

For Romanians, the inertial forces have always been very strong and even more efficient than the change forces. The inertial principle also applies to the Romanian organizations, because as long as the organizations lie in a static environment, there is no need for changes. One of the main causes for the difficulties encountered in generating and developing the Intellectual Capital is the organizational inertia, acting through resistance forces, opposed to the changing process. Organizational resistance to change, which doubles individual resistance, may be due to structural inertia, limited interest for change or various threats that change brings in: threat to expertise, threat to power relationship, threat to resource allocation. Because the inertial forces are intangible, it is very difficult to identify them and, especially, to measure their power in order to counterbalance them.

5.3 The controlling barrier

Control systems are based on models. These models comprise, at a smaller scale, the organization in its complexity and they should behave the same as the real thing it takes after. Control systems are helpful for the organization and positively perceived by the employees. In many Romanian organizations, the managerial function of control applies to individuals instead of processes. Because it is too restrictive and people tend to feel aggressed, control has to overcome workforce resistance. It is well known that the most efficient undermining agents, spoiling the best-laid corporate plans, are no others than the staff members. In our country, the information resulting from the control process is nonsense, it is not an adequate feed-back pointing the measures which should be taken. The measurements standards are set by managers, without consensus and the only persons knowing the results of the control are top managers. In order to make the control function efficient, Romanian organization should design a comprehensible, fit in time, flexible and accurate control system.

6. Initiatives

From our research, it seems that these are the main barriers in developing the Intellectual Capital. Trying to counterbalance them, there are some initiatives at the level of different organizations. There are training programs about knowledge management and intellectual capital organized by universities and human resources companies, there are courses about knowledge management introduced in the new masters programs, and workshops debating these hew topics. We consider a timing initiative the creation of the Research Center for Intellectual Capital within the Academy of Economic Studies, Faculty of Business Administration, Bucharest. It is the first Romanian Research Center where Intellectual Capital is considered as an interdisciplinary research domain for doctoral students, researchers and professors.

7. Conclusions

In the transition period of time, which rarely is addressed by analysts, is that socialism and capitalism have different sets of cultural values and ways of thinking. However, the construction of a new set of cultural values and reshaping the way of thinking about organizations require time and a clear vision of the final stage of transition. Since Romanian organizations did not have a well-defined target and many of them are carriers of the old set of values, useful changes in the organizational system could not just happen. Although Romania may differ from its fellow European Union members, the workforce development issues it faces are not special or unique to the challenges all companies face with organizational change.

Romanian organizations need a model that will create a strategic direction for the company on a local level, and build an entirely new work culture supported by stakeholders and constituents: focusing on performance, agility, and an ability to maintain a competitive advantage. Profit and efficiency lie in the hands of the workforce. Resolving organizational issues through training and interventions creates organizational loyalty, which results in additional profit. Companies that understand the benefit of revising traditional hierarchical management models, investing in human resource development and

modifying the organizational culture, create their own opportunities to tap into a new and dynamic market. Only then, can companies fully address the limitations of the cultural past, establish trust and enroll their workforce in the possibilities that await them in the future.

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Intellectual Capital Management – SMEs Accreditation Methodology

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Abstract: Intellectual capital management, as the main driver of organizational success, is now recognized by both the scientific and the business communities. The multidimensional nature of intellectual capital has led to the emergence of many definitions, which are often unclear. Thus, according to this paper, intellectual capital is an intangible element, resulting from interactions involving the expertise of each individual in the organization. This element is formed by the wealth of expertise of the employees, by their level of qualification, their experience, their level of information and by their readiness to evolve in the acquisition of knowledge - that is, by their individual talents. Intellectual capital management must verify if each individual is applying their knowledge for the benefit of the organization. In the case of small and medium-sized enterprises (SMEs), the problem of intellectual capital management appears to be more complex because, normally, it is very difficult to measure and manage intangible assets, which, combined with the scarcity of resources, undermine competitiveness. Therefore, it is necessary to create reliable and accessible tools in this field. Thus, intellectual capital management, in a form which is able to be audited and certified in order to control the quality and dynamism of the knowledge generated in the organization, will enable the partner organizations (customers, suppliers and lenders) to determine the capacity for innovation, and verify the conformity of their management parameters, compared to a reference standard. If we develop a methodology for auditing the management of intellectual capital, that can verify the sustainability of capital in companies, we can build the foundations of an accreditation system for intellectual capital management. Empirical research, previously concluded, identified a set of parameters for auditing intellectual capital management. These parameters confirmed the audit model - the Intellectual Capital Model (ICM). Based on the ICM, we developed a methodology that allows auditing the intellectual capital management. This paper summarizes this methodology and explains the benefits that may result from its application. It shows that the capacity for innovation, and its part in revealing the development degree of intellectual capital, can be audited in a credible way, using the parameters of the ICM. In conclusion, ICM can be an important tool for the assessment of organizational performance.

Keywords: Intellectual capital management, ICM, accreditation, innovation, SMES

1. Introduction

At a time, when the world economy is in crisis, due to the financial collapse of many companies, the traditional valuation models of these companies are beginning to be questioned. The intellectual capital, as a driver of organizational innovation is gradually, to become a differentiating factor and generator of competitive advantage. According to the European Commission (2008), Small and Medium - sized Enterprises (SMEs) in Europe constitute 99% of all companies and represent the majority of new jobs created.

These companies are responsible for a lot of innovation that creates products and services with high value.

Further, empirical studies (Lopes and Matos, 2005 and 2006; Lopes and Mateus, 2003) indicate that organizational innovation, considered as the capacity that organizations have to develop themselves in a balanced manner, is related to how the internal innovation of their intellectual capital is managed, providing goods and services able to satisfy the client. The ability to manage the intellectual capital is therefore, a key element in assessing the innovative potential of a company. Thus, the creation of a methodology for auditing the intellectual capital management will be an important tool for assessing the sustainable innovation capacity of SMEs. The aim of this paper is to present this methodology. In the next sections of this paper, we will describe the methodology, concluding with the implications of their use and the objectives of future research.

2. The representative models of intellectual capital

The intellectual capital, as a key factor in organizational development, has been studied by several authors, who have proposed different methodologies to evaluate intellectual capital. Among these methods, some stand out for their relevance and particularly for his contribution to the development of intellectual capital.

In the sixties, authors such as Schultz (1961) or Becker (1964) were precursors in the development of methodologies for evaluating the intellectual capital.

However, the further development of these models was found with authors such as Sveiby (1997) or Edvinson and Malone (Edvinson and Malone, 1997).

Edvinson and Malone (1997), proposed a model, "Skandia Navigator", which divides intellectual capital into two categories: human capital and structural capital. Thus, according to this vision, intellectual capital is the sum of structural capital and human capital, this being the basic capacity for the creation of high quality value.

Sveiby, (1997), developed a measurement methodology, "The Intangible Asset Monitor", by dividing the intangible assets into three groups: individual skills, internal structure and external structure. This methodology is based on quantitative and qualitative indicators to assess the intellectual capital.

An ICS (Intellectual Capital Services) intellectual capital methodology put forward by Roos et al (2005) as a way of analyzing in detail an organization's intellectual capital. This methodology is based on analysis of the company's strategy, its daily operations and its business. More recently, this author proposed the driving forces which impel European companies to consider intellectual capital as a valuable resource and suggested establishing a method of operational reporting to enable the consistent evaluation of European companies (Burgman and Roos, 2007).

To Brooking (1996), the intellectual capital measurement is based in four intangible assets: market assets; human assets; assets of intellectual ownership, assets that need legal protection, such as brands, patents, etc. and assets of substructures (technologies, databases, methods, processes, etc.).

Among the most relevant methodologies are also the Balanced Scorecard" (Kaplan and Norton, 1992, 1996,1996a) the "IC Accounting System" (Mouritsen et al., 2001), the "Value Explorer" (Andriessen, 2001), and the "Intellectual Capital Benchmarking System" (Viedma, 2001, 2003, 2003a, 2003b).

These different approaches are based on the measurement of organizations intangible assets.

Now, the investigations are focused on how the intellectual capital is used to create value within organizations. And this capital, is inseparable from the strategy (Mouritsen et al., 2005a, 2005b) has a dynamic character.

Authors such as Leitner and Warden (2004) consider that the new models of intellectual capital must have a dynamic character, creator of value.

Andriessen (2004) by applying the "theory of multidimensional value measurement" to the nations, gives a new vision to strategic intellectual capital management.

According to Bontis (2000) there are many other models and methodologies for assessment of intellectual capital and many intellectual capital models have similar constructs and measures that are merely labelled differently. In the future it would be important to have a homogenization of the concepts used.

On the other hand, there are several research projects on the evaluation of intellectual capital, (See, for example: DATI 2001; FASB 2001; Meritum 2002, FRAME 2003, DMSTI 2003, Capital Statements – Made in Germany", 2004; RICARDIS 2006; InCAS, 2006).

Some of the newer approaches to evaluate the intellectual capital (Mertins et al., 2006, 2007a, 2007b) linking the assessment of intellectual capital with the ISO 9001 (ISO, 2008) certification quality systems and the EFQM Quality Model (EFQM, 2008).

These approaches, support the investigations of Lopes and Matos (Lopes and Matos 2007), when they argue that if it is possible to certify intellectual capital management, we can make an approach to quality, as is done with the processes or products certification.

However, in our view, certification of intellectual capital management, is a different process of quality certification ISO, because, the objective is the certification of a company capacity to produce, value and manage the intellectual capital, generating competitive factors and innovation.

These factors differentiate the ICM – Intellectual Capital Model (Lopes and Matos, 2007 and Matos, 2008), compared with other models, making it more adapted to the reality of SMEs. This model also considers the Network and New Technologies of Information and Communication (NTIC) as key elements of a good organizational performance. This is therefore a very complete model.

3. Intellectual Capital Model - ICM

The intellectual capital management accreditation system, that is being developed, is based on Intellectual Capital Model – ICM (Lopes and Matos, 2007; Matos 2008).

The ICM has a dynamic character, showing a good adaptation to SMEs, which has been studied.

This model allows us to identify, in an integrated and consistent way, the complexity of the factors in the framework of organizational knowledge.

It should be noted that the ICM is a dynamic model and therefore is not a model completely stabilized. Thus, as your application will be looking into more companies, may be further adjustments. Indeed, this is one of the advantages of model: its interactive dynamism, which has proved very good in turbulent business contexts.

The ICM methodology is based on the evaluation of a set of parameters. These parameters, allow us to audit the intellectual capital management of companies, checking that there is evidence the presence of indicators related to the dimensions of intellectual capital, if they are valued and managed.

The ICM methodology has the main objectives:

- Provide managers a tool for decision-making and innovation management.
- To be a tool for comparison of companies in national and international criteria.
- Promote the improvement of organizational performance of SMEs by providing it a management tool to improve its competitiveness.

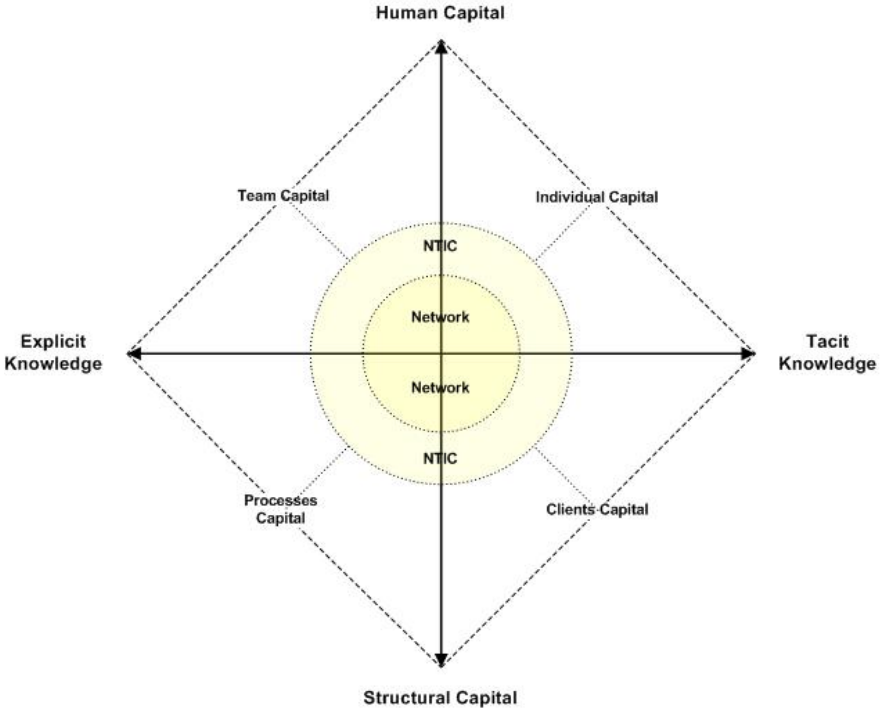

Figure 1: ICM - Intellectual Capital Model

The ICM, presented in Figure 1, consists of 4 Quadrants: Individual Capital, Team Capital, Processes Capital and Clients Capital.

The Quadrant Individual Capital, Team Capital and Processes Capital are related to the company's internal environment, the Quadrant Clients Capital is related to the external environment.

In ICM, is called Individual Capital the Tacit Knowledge / Human Capital Quadrant. It is the knowledge inherent to the individual himself, and containing the real source of value, talents and the skills to generate innovation. Here, one has included the theoretical and practical knowledge of the individuals and the capacities of different types, such as artistic, sporting or technical.

The Team Capital is the Human Capital / Explicit Knowledge Quadrant. The team shares the explicit knowledge. In this area, knowledge applies to the individual in the form of facts, concepts or tools.

When the Explicit Knowledge is associated to Structural Capital, we are in the presence of applied experience, as the whole organization is the holder of formalized knowledge, able to be passed on, this is the Processes Capital. This Quadrant represents the ensemble of shared knowledge, summed up by experts (scientific community), recognized as the most advanced form of knowledge. This type of knowledge covers, among other dimensions, the organizational routines or the organizational memory. Organizational memory represents the register of an organization, represented by a set of documents and artefacts. Its goal is to expand and amplify knowledge through its acquisition, organization, dissemination, usage and refinement. Organizational memory can be a way of registering tacit knowledge, making it explicit, so that through business processes it becomes part of the patrimony of the company, to be shared and recreated.

The Clients Capital is the result of the interaction Structural Capital / Tacit Knowledge. This typology represents the organizational knowledge in its practical form and is already incorporated into the tacit experiences formalized in the team. This knowledge, although hidden, becomes accessible through interaction, and it is the principal characteristic of the performance of highly specialized teams.

In the Model presented the Network and NTIC are essential in the relationship between the 4 Quadrants.
Thus, the companies that put the NTIC at the service of human resources have a great advantage, because they can reduce the administrative difficulties in solving simple problems, increase the quality of services and promote continuous improvement and personal growth.
The approach to the concept of Network is not a new concept. The network, as a social concept, is the genesis of the social constructs of individuals. More recent is the approach to the concept of network system as a factor in the acquisition of knowledge and innovative action.
In conclusion, the NTIC are crucial to be effective Networks.

4. ICM parameters

Following the research, developed by Matos and Lopes (see Lopes and Matos, 2007; Matos, 2008) there was a new empirical research. The aim of this research was to improve the ICM parameters.

This empirical research consists of the application of a questionnaire to a sample of 200 SMEs.

Of the total number chosen, 90 companies, corresponding to 45%, answered the questionnaire.

These companies applied the questionnaire used in previous investigations (see Lopes and Matos, 2006).

Based on this empirical research and other theoretical research, set up the parameters according to the ICM Quadrants.

It should be noted, that the ICM is a dynamic model, so with dynamic parameters, which may be revised.

They are below the parameters identified at the conclusion of this paper.

4.1 Individual capital quadrant

4.1.1 Use of NTIC

New technologies are an essential tool for company's organizational development. The purpose of this parameter is to demonstrate your domain for all employees.

4.1.2 Networks

The networks, supported by new technology, are essential for the development of a networking culture. The purpose of this parameter is to prove the existence of an internal network with knowledge and talents that the company can use.

4.1.3 Training / Qualification

The training / qualification are seen as the empowerment of individual employees. The purpose of this parameter is examining how the company encourages the acquisition of knowledge and develop the talents of each of its employees.

4.1.4 Valuation of Know - How

All employees of an organization have an inexhaustible stock of knowledge. However, often companies do not value and do not encourage these skills. Thus, the propose of this parameter is to see how the company rewards and encourages the development and availability of knowledge and individual skills of their employees.

4.1.5 Investment in Innovation and Development (ID)

Innovation is a source of competitive advantage of companies. The purpose of this parameter is to check whether the investment in ID, conducted by the company, aims to simplify processes or innovation.

4.2 Team Capital Quadrant

4.2.1 Use of NTIC

New technologies should be used as a management tool, integrated in a networking culture. The objective of this parameter is to see, how the new technologies are used in building a team culture.

4.2.2 Networks

The networks are forums for sharing knowledge and enable the dissemination of good practices. The purpose of this parameter is to demonstrate that the company promotes the existence of a network culture, where the teams interactive control, discuss and improve the procedures quality in order to satisfy the clients.

4.2.3 Training / Qualification

The training / qualification should be understood as an instrument that enables the exchange of synergies between the organization employees. The company must have a policy of training and qualification perfectly synchronized with the team culture. The aim of this policy is to transform the group cohesive teams, highly motivated and productive. The purpose of this parameter is verifying the existence of this policy of training and qualification.

4.2.4 Team Work

The work must be organized into teams, whose size will be most appropriate to the needs of the company. This parameter must show a teamwork culture.

4.3 Processes Capital Quadrant

4.3.1 Use of NTIC

The company should use the new technologies as an administration tool, maximizing the use of these technologies in their organizational performance. New technologies are very important in the register of organizational knowledge and the operationalization of the whole process. The purpose of this parameter is to demonstrate how the new technologies promote the improvement of procedures.

4.3.2 Networks

This parameter enables us to evaluate how the company uses the "networks", articulated with the NTIC, to improve the processes and create interactivity between different stakeholders.

4.3.3 Processes Systematization

The purpose of this parameter is to confirm the processes systematization and if it allows the formalization and transfer of knowledge among stakeholders.

4.3.4 Existence of Certification

Companies should be granted certification, including the ISO 9001 certification. This parameter should confirm the existence of certifications.

4.3.5 Registration of Organizational Knowledge

The organizational knowledge must be registered. These records should be computerized in order to be protected and easily be shared. This parameter must verify the operability of the record of organizational knowledge.

4.3.6 Partnerships

This parameter must verify the existence of a network of partnerships with various stakeholders.

4.3.7 Investment in Innovation and Development (ID)

The company must demonstrate how the innovation and development enable connection and simplification of procedures. The parameter should demonstrate such evidence.

4.3.8 The Brands Creation and Management

The purpose of this parameter is to demonstrate how the company's strategy relies on a process of creating and managing brands, which enables the improved reliability of products or services and organizational differentiation.

4.3.9 Complaints System

The company should have a formal system for registering complaints that serves its relationship with customers. The purpose of this parameter is to demonstrate the proper functioning of this complaints system.

4.3.10 The existence of Awards

The awards are understood as the recognition of the relationship process / customer, resulting from the interaction of explicit knowledge with the structural capital.
The purpose of this parameter is to check whether the company was awarded as a result of this recognition.

4.4 Clients Capital Quadrant

4.4.1 Use of NTIC

This parameter must verify the functionality of the use of NTIC in improving the quality of service and interaction with customers.

4.4.2 Networks

The networks should be part of an "act of collective intelligence" in which the expertise of each employee of the company is put at the service of customer satisfaction.
The parameter must verify the existence of these networks, as part of the company's culture.

4.4.3 Market Audits

The systematic market audit should enable the company to meet the market where it will identify opportunities and threats. The purpose of the parameter is to check if the company performs these audits as part of their strategy.

4.4.4 Management of the Clients' Satisfaction

The analysis of clients' satisfaction should be part of the company's organizational routines. Reports should be obtained, allowing the management of the company's relationship with clients. This parameter should check how the company manages its relationship with clients.

4.4.5 Complaints System

This parameter must demonstrate that the complaints system, in addition to being part of a process, is an intrinsic element in the company culture.

4.4.6 New Markets

The purpose of this parameter is to check if the company has a market strategy, in which the internationalization is one of the goals. The strategies of the market must be accompanied by strategies for innovation of products and services for new markets.

5. Conclusion

In conclusion, SMEs in Europe, are living in turbulent environments and need to demonstrate competitive advantages to its partners. The ICM can be an important tool for decision-making for some partners of SMEs, (State, Financial Institutions, etc.) for example in the granting of credits or other support.

If we consider the innovation (continuous improvement or creativity), as an indicator of the degree of development of intellectual capital, easily conclude that it results in the management of individual talents. Only individuals innovate, only individuals respected by the uniqueness of their talents build innovative organizations (Morin, 2008) and the key to innovation is within the organizations themselves (Portnoff, 2008), when accepting the plurality of those talents.

We are conducting a new research that aims to measure the ICM reality of Portuguese SMEs. This research is also being prepared to perform in other European countries, in order to measure the ICM in these countries.

It is also being completed, the Intellectual Capital Management Accreditation Process - ICMA Process, which will shortly be presented. The ICMA Process is supported by Intellectual Capital Model - ICM.

The Intellectual Capital Management Accreditation consists of a technical process validation and of acknowledgement of the global capacity of the entity to be accredited, converting it, into a member of a recognized group, in which the best practices are predominant; practices that direct the accredited entities on a constant search of alignment through excellence.

Our aim is that the ICMA will be an important recognition of the ability to manage the SMEs intellectual capital and therefore, a guarantee for SMEs with greater sustainability and innovation capacity.

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InCaS: Intellectual Capital Statement. Measuring Intellectual Capital in European Small- and Medium sized Enterprises

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Abstract: It is a common ground, that Intellectual Capital (IC) has become the critical success factor for enterprises operating in a knowledge driven economy. Especially for European small and medium-sized enterprises (SMEs) it is crucial to utilise and manage their intangible resources efficiently in order to obtain their competitive advantage, since they highly depend on specialised human, structural and relational capital for successful differentiation on the market. Therefore, the EU-project "InCaS: Intellectual Capital Statement – Made in Europe" has been designed to help European SMEs in detecting, analysing, managing and reporting their IC in order to strengthen their capability to quickly respond to market needs and thus, increase their competitiveness. As the main project result the "European Guideline for Intellectual Capital Statements (ICS)" has been published in November 2008 summarising the InCaS methodology that has been developed, empirically tested and enhanced during three project phases in close cooperation between IC experts, European business associations and 25 SMEs from five European countries.

Aiming at harmonising the different existing national ICS methods on a practical level suitable for SMEs, the InCaS research team discovered two main opposing approaches: While a quantitative measurement of intangible assets suits the requirements of external reporting as it can be standardised and compared more easily, it shares the problems of common balance sheets: standardised indicators and quantitative data can not display the individual business model and strategy in reasonable depth. Therefore, empirical evidence shows that little value for the management and development of IC can be drawn out of those solely quantitative approaches.Qualitative methods, on the other hand, aim at assessing the strengths and weaknesses of Intellectual Capital in regard to their future value, taking the individual business model and strategy of the single organisation into account.

The European ICS is an instrument to assess, develop and report an organisation's IC, to monitor critical success factors systematically, and to support strategic management decisions. Supported by the software "ICS Toolbox", the workshop-based approach of InCaS combines qualitative and quantitative methods in order to overcome the conceptual dilemma stated above. This paper will describe the InCaS method and implementation process as well as empirical findings from 50 pilot-implementations. The evaluation shows that the methodology has proven to be highly beneficial for internal management purposes allowing to derive specific actions for the well-targeted improvement of IC in the value adding processes of the company. Moreover, the standardised process and structure of the ICS report supports the communication of IC to external stakeholders, as well. If some basic quality requirements outlined in the European ICS Guideline are met, the method can also serve as a basis for comparability between different organisations. A quality assurance concept helps to ensure credibility and trustworthiness of the IC reports, especially for investors and banks.

Keywords: Intellectual capital statement, IC reporting, IC management, SME

1. Introduction

Today's economy is characterised by continuous globalisation of markets. Furthermore, the classical driving forces of economic growth changed towards the generation, application and exploitation of knowledge. The key to competitiveness increasingly turns on the way people combine, manage and commercialise their know-how. Taking this development into account, the Lisbon Agenda from 2000 declares the aim for the European Union to become the most dynamic and competitive knowledge-based market in the world until 2010. SMEs are especially affected by this plan as they are the driving force of Europe's economy. To obtain their competitive advantage, it is crucial for SMEs to utilise knowledge efficiently and to enhance their innovation potential. Thus, managing their specific Intellectual Capital actively becomes more and more important for future-oriented organisations. Furthermore, reporting those intangibles to customers, partners and investors systematically has become a critical factor of success in the context of the globalisation process (Mertins, Alwert, Will 2006).

In order to make IC manageable in a better way, different national approaches on IC measurement and reporting have been developed and tested in the recent years leading to the fact, that there is no European wide standard regarding the measurement and disclosure of IC. One of the most important reasons for a missing consensus is a conflicting view on Intellectual Capital being displayed in standardised quantitative terms on the one hand and the description of IC according to the individual business strategy on the other. The emerging need for a consistent method has been the starting-point for the European project "Intellectual Capital Statement – Made in Europe (InCaS)".

2. Existing approaches in IC measurement and reporting

Initial efforts to measure Intellectual Capital and evaluate its potential started in the nineteen-sixties, driven by Becker (Becker 1964) and Schultz (Schultz 1961), and later Flamholtz (Flamholtz 1974) and Fitz-enz (Fitz-enz 1984) in the context of "Human Resource Accounting", analysing the financial value of a companies investments in its employees. Also other Anglo-American researchers predominately developed monetary evaluations of IC, for instance "Tobin`s Q" (Tobin 1969) or the "market to book ratio" as well as "Calculated Intangible Value" (Steward 1997) or the "Intangibles Scoreboard" (Gu and Lev 2001). Different accounting boards like IASB (IASB 1998) or FASB (FASB 2001) paid their attention to intangible assets as well and tried to find solutions to measure and display them in balance sheets.

Along with the discussion of the last years on the declining value of traditional annual reports (Lev and Zarowin 1999), also the expression of Intellectual Capital in quantitative terms has been addressed as a major problem by many scientists and practitioners. "There is widespread and growing frustration with traditional financial reporting…They all argue that the financial reporting system is incapable of explaining 'new' resources such as relationships, internally generated assets and knowledge" (Mouritsen, Bukh, Marr 2004). Studies analysing the relevance of information on Intellectual Capital for financial market actors identified the need to supplement financial data with qualitative information for different reasons: to raise confidence in the numbers for valuation purposes of fund managers and make a more "educated guess or a 'leap in the dark' concerning the uncertain element to company value" (Holland 2003); to contribute to a better understanding of the future of a company, especially to the future cash flow in case of Venture Capitalists (Mørck et al. 2003); to relate investments in intangible resources, especially in human capital to a company's strategy and the value creation process (Johanson 2003).

Although information on intangibles plays a crucial role for financial market actors, the collection and use of this data is not followed in a systematic manner within the respective institutions (Hall 2003; Del Bello 2003). The information provided by the companies themselves is often subjectively incorporated into valuation procedures (Del Bello 2003) and/or misunderstood (Johanson 2003).

So, for external stakeholders approaches using quantitative indicators solely cannot provide valuable additional information on Intellectual Capital. No information is given about the importance and relevance of a company's Intellectual Capital in relation to its corporate strategy and specific business model. Important questions about *how* the organisation generates these intangible assets or *how* IC contributes to the companies' value creating processes and future value remain unanswered. Thus, the disclosure of such information could decrease uncertainty about future prospects of a company and allow for a more precise valuation of the company (Botosan, Plumlee 2000).

Other approaches have been developed to integrate the strategic view by taking a closer look at Intellectual Capital as a companies' intangible resources. An important role in the field of IC assessment played mainly the practitioners Edvinsson and Sveiby in the mid of the nineties. They developed two different models ("Skandia Navigator" [Edvinsson and Malone 1997] and the "Intangible Asset Monitor" [Sveiby 2002]) to measure single components of IC by using qualitative and quantitative indicators and communicate the results in a supplementary report, an Intellectual Capital Statement (ICS). Edvinsson subdivided Intellectual Capital into Human Capital, Structural Capital, and Relational Capital. This structure is currently the most frequently used to describe a company's intangible resources.

More recent approaches for the evaluation and management of IC, mainly developed by Austrian researchers and practitioners, try to include these aspects, as well as an operative link to the business processes. For instance, the model of the Austrian Research Centres Seibersdorf (ARCS 2004)

relates the IC to the operative business processes and combines it with the EFQM model (EFQM 2003).

Other approaches like the "Danish Guideline for Intellectual Capital Statements", supported by the Danish Ministry of Science, Technology and Innovation (DMSTI 2003) and the most recent German guideline "Wissensbilanz – Made in Germany" (Alwert, Bornemann, Will 2008) by the German Federal Ministry of Economics and Labour take a stronger focus on the practical application of ICS in companies. They combine qualitative and quantitative indicators for the assessment and evaluation of IC. These guidelines include practical tips and proposals for drafting an Intellectual Capital Statement as a supplement to the annual financial report. They both go far beyond the financial reporting standards for intangible assets, developed by the accounting boards. In addition, the German guideline is exclusively targeting the specific requirements of SMEs for the first time.

These models have taken a decisive step towards an integration of IC related topics into the companies' internal management procedures. Most enterprises are well aware of the importance of intellectual resources for their business success, but the greatest part does not manage them systematically (Alwert, Vorsatz 2005). This lack of procedures and models to capture and communicate IC related information within companies has also been identified as a major problem by commercial banks. Due to missing systematic methods or models, the IC information communicated internally as well as externally is highly firm-specific and very hard to interpret for externals (Hall 2003).

3. The InCaS project

These latest developments have been taken into account when setting up the European Project "InCaS: Intellectual Capital Statement – Made in Europe" in 2006. Funded by the European Commission, the project which was scientifically coordinated by Fraunhofer IPK assembled researchers, SME business associations and SMEs. Over a project lifetime of 2,5 years, research targeted at the design and development of a common methodology for Intellectual Capital Statements in the European Union.

The first aim of InCaS as a research project was the scientific evaluation and harmonisation of the different methods of the single national efforts in IC measurement and assessment. The most important conceptual problem identified was the conflict between individualised and standardised approaches:

Methodologies which use quantitative indicators to assess and describe Intellectual Capital, define a certain set of standardised indicators. The use of quantitative information facilitates comparability between different IC statements and serves better the purpose of external reporting.

Qualitative approaches, on the other hand, assess IC in relation to company specific strategies and business processes keeping the results of the IC report individual. Therefore, information communicated in an IC report can hardly be standardised and lacks a comparable basis. Although highly beneficiary for internal management, external readers e.g. from financial institutions will miss a basic standardised structure allowing to assess the quality of the IC report and comparing results with those of other companies.

Referring to the above mentioned, the scientific work focused on the development of a methodology, which generates firm-specific IC information on a basically standardised and comparable basis, in order to bridge the gap between the requirements for internal management purposes and external reporting.

As a result, the InCaS research team developed the European Intellectual Capital Statement (ICS) as the instrument to assess, develop and report an organisation's IC systematically. At the same time, there was a clear focus to develop a methodology which is suitable for the application in SMEs, meaning to pay strong attention to a good cost-benefit relationship of the management method.

To ensure an optimized adaptation to SMEs needs, InCaS chose a bottom-up procedure to enhance the ICS method: after setting up the basic methodological framework and ICS process, the ICS was implemented twice within three project phases in 25 pilot SME across 5 European countries (France,

Germany, Slovenia, Spain, and Poland). In between each implementation cycle, feedback and experiences with the methodology was collected from the InCaS pilot companies and served as a contribution to harmonisation and standardisation from practice.

4. Intellectual capital statement – Made in Europe

Starting with the consolidation of international approaches on IC management and reporting, InCaS first analysed and defined the basic assumptions on IC and its relation to a companies' value creation chain. A Structural Model has been set up taking a systemic view on the organisation.

4.1 InCaS structural model

The model aims to display all of the relevant organisational structures linking Intellectual Capital to Business Processes and Business Success and embedding the organisation in its business environment. The starting point is the vision and strategy of the organisation with a view to the possibilities and risks encountered in the business environment. Following the most frequently used structure to describe intangible resources, the InCaS methodological framework divides Intellectual Capital into the three dimensions: Human, Structural and Relational Capital.

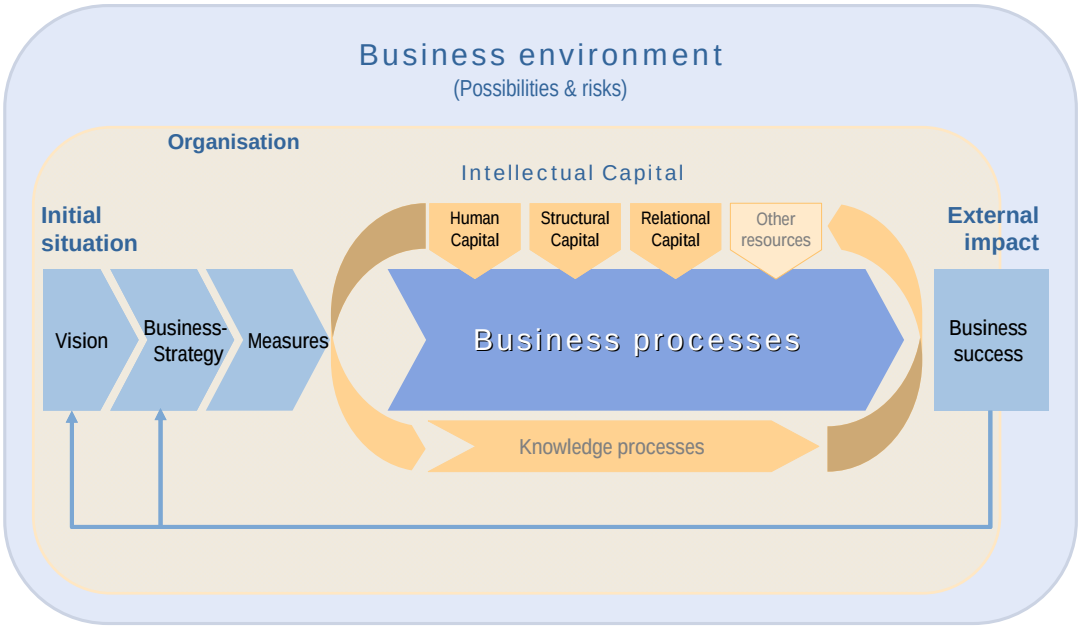

Figure 1: InCaS Structural Model (European ICS Guideline 2008)

*Human Capita*l includes the staff's competencies, skills, attitudes and the employee's motivation. It is owned by the employee and can be taken home or onto the next employer.

Structural Capital comprises all structures and processes needed by the employee in order to be productive and innovative. It "consists of those intangible structures which remain with the organisation when the employee leaves" (Edvinsson, Malone 1997).

Relational Capital sums up the organisation's relations to customers, suppliers, partners and the public in general.

According to this model the interaction of business and knowledge based processes, together with the other tangible and financial resources, leads to business success.

4.2 InCaS procedural model

Whereas the Structural Model defines the taxonomy/vocabulary as well as the basic interrelations between the single elements of Intellectual Capital, the procedural model was developed in order to structure the process of implementing an ICS. It defines and describes the single ICS steps as well as methodologies applied when going through the process of ICS implementation in structured detail.

After two cycles of pilot implementations within 25 InCaS SMEs, consensus on a basic standard procedure of the ICS implementation process has been gained and led to the following procedural model of European Intellectual Capital Statements:

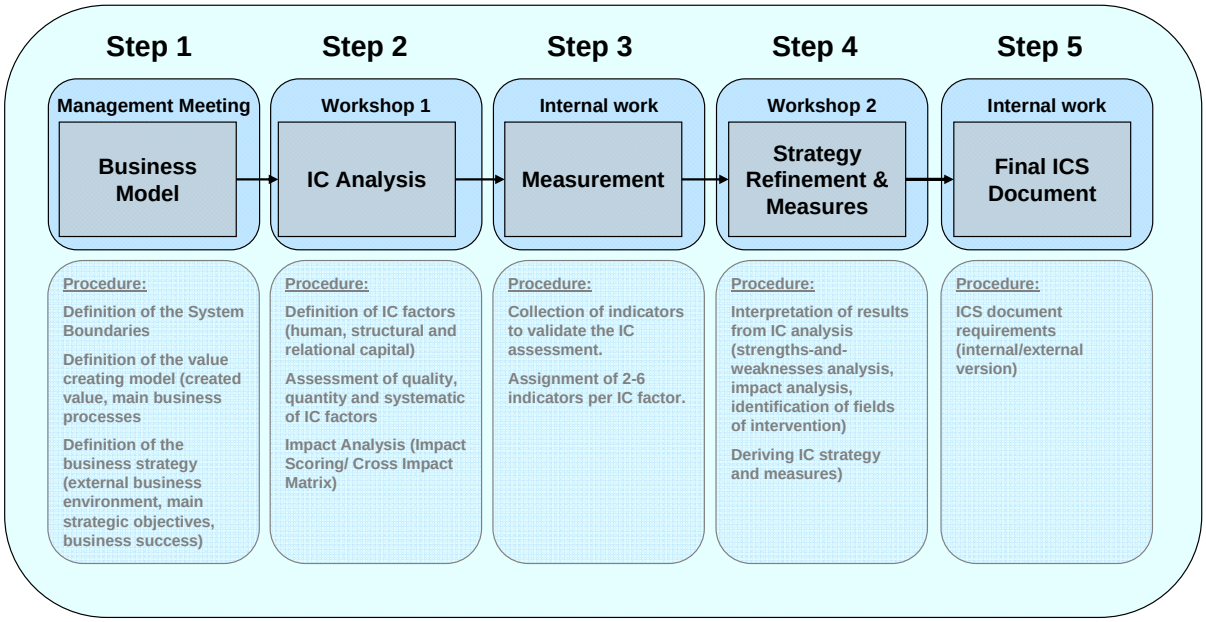

Figure 2: The Incas Procedural Model (European ICS Guideline 2008)

The approach of conducting an ICS is divided into five steps with each step building on the prior one. Basically, the ICS follows a workshop-based approach assembling members across all hierarchy levels of the implementing company in the ICS project team. Step 1, Step 2 and Step 4 are accomplished in direct support by ICS moderators. Step 3 and Step 5 are prepared internally without a direct participation of an ICS moderator on-site. Further help is provided through various support material: the basic procedure of how to implement an ICS is described in the European ICS Guideline. Checklists and working sheets supporting the single steps of the ICS are additionally offered as well as an ICS Toolbox capturing the relevant information and results generated during the ICS workshops in a structured way.

Step 1 is planned as a management meeting and comprises the description and definition of the business model, i.e. defining the value creating model, the external business environment, the main strategic objectives and the business processes and business success. Due to the fact that an ICS can be developed for the whole company, a department, a business process or any other part of the organisation it is also important to clearly define which part of the organisation shall be analysed.

Within *Step 2* the SME's IC is analysed in a workshop. As the analysis is done by the ICS project team by self-assessment, the valuation of the project team members will later be reflected in the ICS. Therefore, representativeness is crucial in order to avoid a too subjective or biased self-perception. This procedure ensures a comprehensive reflection of the company's Intellectual Capital by linking the strategic view of the top-management to the operative view of other employees.

In order to get a detailed view on a companies IC, the three dimension of Intellectual Capital (see ICS Structural Model) are broken down into several IC factors.

As a starting point, the crucial IC factors in the areas of Human (e.g. professional competence, motivation), Structural (e.g. cooperation and knowledge transfer, product and process innovation) and Relational Capital (e.g. customer relationships, partner network) are identified and defined according to their relevance to the companies' value-adding business processes and strategic business success.

In a second step, the IC factors identified are assessed in a structured discussion in order to identify their status quo. The current status of each IC factor is evaluated with regard to its current quantity, quality and systematic management (QQS). As a result of this so called "QQS assessment", strengths and weaknesses of the single IC factors can be identified.

The last task in Step 2 comprises the analysis of the interrelations between the different elements of Intellectual Capital. Within a cross impact matrix the single IC factors are assessed according to their influence on all other IC factors. The analysis of the relative influence of IC factors enables the prioritisation of fields of intervention in step 4 (Strategy Refinement & Measures).

For the measurement of IC, indicators are determined and related to the most important IC factors in Step 3. The team discusses and develops indicators that provide adequate facts and data to monitor the performance and development of the different IC factors over time. In this sense, they add validity to the IC analysis and help to monitor, whether implemented management actions were successful.

In *step 4* all relevant information from the previous steps is gathered for further interpretation and for the deduction of adequate measures specific to the organisational and strategic needs. With the help of the ICS Toolbox, results of the IC analysis are visualised in various diagrams and portfolios.

Hence, it is possible to quickly assess strengths and weaknesses as well as interrelations between IC, business processes and the firm's performance. Despite the inherent complexity, graphical representations support the efficient evaluation and interpretation of the data, for example by using the IC Management Portfolio, to deduce and prioritize fields of intervention (cf. figure 3).

The ICS implementation process is finalised in *Step 5*: the compilation and presentation of ICS process' results within a final ICS document. The document has two major functions and its actual structure and content depends on the purpose it is supposed to serve: First, it can be used for internal purposes displaying relevant information for management. Secondly, the ICS document can be used as an IC report dedicated to external stakeholders. The external version might not show all data whereas in the internal version all data should be disclosed in order to provide a sound basis for management decisions.

5. InCaS results and experiences

5.1 InCaS pilot experiences

As the InCaS experience shows, the companies participating in InCaS appreciated the systematic procedure of IC analysis offered by the ICS methodology. The ICS helped to structure and reduce the complexity of IC on a practical level for the first time. Although most of the IC topics addressed during the ICS workshops were in many cases known within the company and to the project team members before, they had not been explicitly discussed. Most SMEs had a more intuitive image of their strategic objectives and their relevant IC but were not able to structure, visualise and communicate this implicit knowledge. The systematic approach of InCaS helped to work out these issues and helped to identify those IC factors, which are really relevant for the companies' business objectives and success with regard to their specific business strategy. It made explicit the intuitive assumptions on the companies' core competencies and provided a clear view on the strategic potential of single IC factors.

Also assumptions on the strengths and weaknesses of crucial intangible resources had never been displayed systematically in the SMEs. Consequently, actions and measures for improvement had either been badly targeted or had not even been taken in the past, as the impact of such an investment could not be outlined clearly.

During the ICS process a companies' IC factors are systematically identified and assessed regarding their current status quo (*QQS-Assessment*) as well as concerning their relative influence with respect to the strategic objectives (*Impact Analysis*). The results of both evaluations are summed up within the IC Management Portfolio. The portfolio is generated by the ICS Toolbox (ICS Step 4) from the individual assessments of the companies ICS project team. It displays the future potential of the different IC factors:

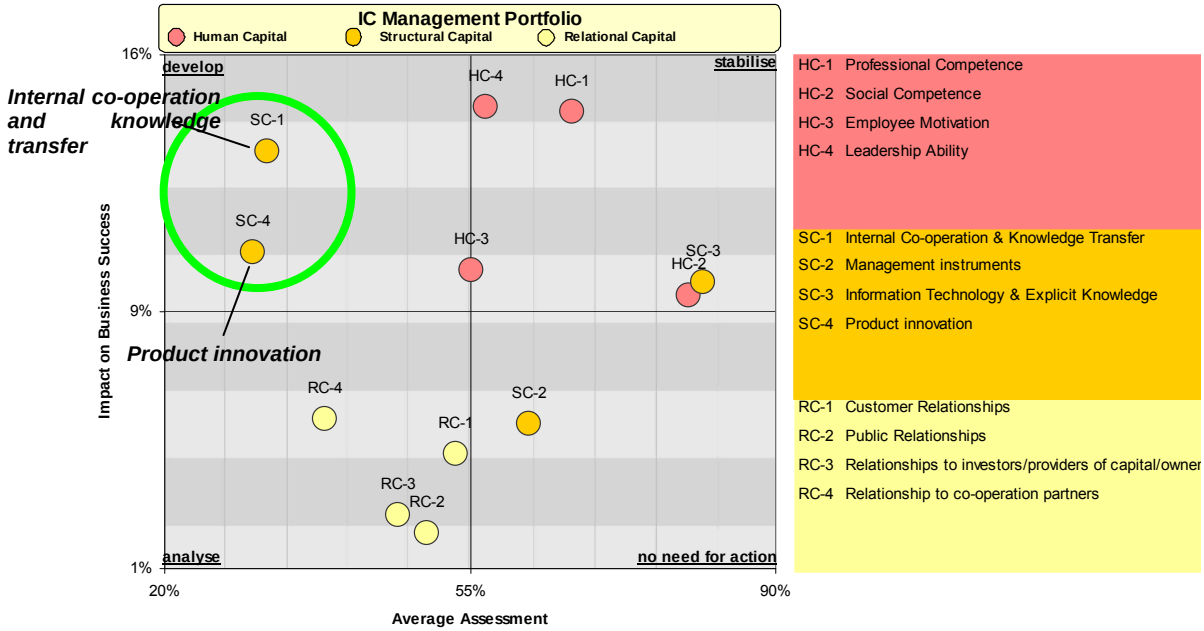

Figure 3: Example of an IC Management Portfolio

In general, IC factors in the upper left typically represent fields of intervention to be prioritized according to the specific strategy: the status quo of these factors has been assessed rather poor while their relative importance is rather high. As these IC factors have the highest impact on the strategic objectives and business performance, the fields to invest and to introduce actions for improvement can be identified. InCaS pilot SMEs confirmed, that the analysis of interrelations between IC factors and the visualisation of strengths and weaknesses within the IC management portfolio led to a better allocation of resources as the impact of investments is clearly visible. Especially those SMEs which introduced management actions as a result of their first ICS could monitor positive changes of the respective IC factors in the IC management portfolio of the follow-up ICS one year later. In other cases, a lower assessment of an IC factor in the second year indicated the risks of negative effects in the future, even if the respective IC factor did not yet appear in the quadrant “develop” in the upper left. This effect was used as an early warning indicator to initiate countermeasures to beware the IC factor of turning even more for the worse. In this sense, the ICS serves as a map of the enterprise which allows efficient deduction of improvement actions and continuous controlling of IC alignment with the strategic objectives. The success of management actions can be monitored by indicators, which are defined for those IC factors that are chosen for improvement.

Summarising these experiences from the InCaS pilot companies, the ICS proved record as a management instrument for both strategy development as well as strategy implementation, marking the beginning and end of the strategic management cycle.

5.2 InCaS harmonisation

With the development and recurring testing of the methodology, InCaS has harmonised the Intellectual Capital Statement on three levels:

A basic model has been defined (ICS Structural Model, section 4.1) which outlines the main elements of the ICS. It provides a common language, when talking about Intellectual Capital. Basic elements like Human, Structural and Relational Capital and their relation to strategy, business processes and business success are defined. The model is helpful for scientists as well as practitioners as it facilitates and structures the discussion by providing a basic taxonomy.

Furthermore, a standard process for the collection of IC information within the companies has been defined (ICS Procedural Model, section 4.2). Especially for practitioners, a clear procedure and a common set of tools is the basis for practicability. Furthermore, the ICS procedure leads to ICS documents with a standard structure.

Apart from the taxonomy and process, InCaS has started with the harmonisation of ICS content based on the empirical results collected in 50 pilot implementations: a first set of common IC factors could be identified by analysing the frequency of use and definition of IC factors. The results from practice proved, that approx. 80-90% of individual IC factors may be harmonised on an aggregated level, while remaining 10-20% are completely individual (Mertins, Will 2008). Consequently, the company specific assessment of those IC factors becomes basically comparable.

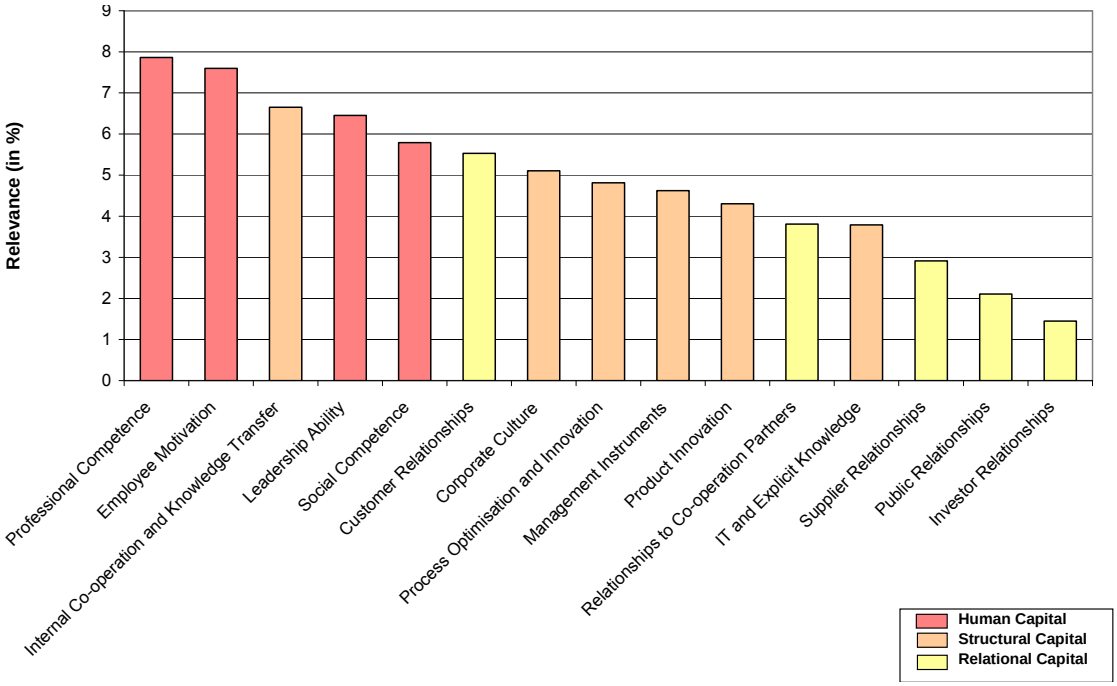

Figure 4: Most frequently used IC factors (Mertins, Will 2008)

As a major result, the consolidated ICS methodology has been summarised in the "European ICS Guideline" (see www.incas-europe.org). The guideline describes the single steps of the ICS implementation in detail with the aim to provide practical support for ICS moderators and/or companies who want to implement an Intellectual Capital Statement. Templates and checklists supplement the European ICS Guideline and the ICS Toolbox provides technical support for the collection and analysis of the IC information.

All harmonised elements (ICS taxonomy, process, standard IC factors) are the basis for the definition of basic quality requirements for European ICS. They have been laid down in a paper supplementing the European ICS Guideline and make sure, that certain must-have elements concerning ICS structure and content are included. Applying those quality requirements to the InCaS pilot implementations has consequently lead to a set of 50 ICSs which are comparable concerning their structure and basic content (ICS step 5).

6. Conclusion and outlook

The ICS methodology developed and tested in the InCaS project has proved to be a valuable instrument for the analysis and the development of Intellectual Capital. It generates individualised content and provides valuable information for the strategic management of a company's IC. Management actions to develop strategically relevant IC factors can be derived on the sound basis of a structured analysis of the companies' strengths and weaknesses in IC.

Defining quality requirements of a standard ICS procedure as well as basic must-have elements of content, the European ICS has successfully lead to a basic comparability of different ICS documents regarding structure and basic content.

This can facilitate the communication towards external stakeholders: field reports and surveys have shown that complementing financial data with information on intangible resources can sharpen the view on SMEs' creditworthiness (Thomas 2003; Will, Alwert, Bornemann, Wuscher 2007). If some requirements about structure, content and length of an IC report are fulfilled (Wuscher, Will, Alwert,

Bornemann 2006), it contributes to a more homogeneous rating of SMEs, than analysts' assessment based solely on information from annual financial reporting. Therefore it reduces risks for both banks and SMEs (Alwert, Bornemann, Will 2007). With the analysis and the identification of basic quality requirements on structure and content elements, InCaS has also successfully driven the development of the ICS as an external reporting instrument.

Furthermore, experiences from ISO 9001 or the EFQM assessment clearly show the necessity of validation from a third party in order to strengthen the general credibility of an ICS. To validate the matching between the ICS method and the factual implementation process, a concept for an ICS quality audit has been drafted and will be enhanced in the future (Mertins, Wang, Will 2007). This will contribute to the development of the ICS as an external reporting instrument and ensures to long-term quality of the ICS method.

Furthermore, future research must be dedicated to the collection of more empirical evidence in order to provide a sound basis for further harmonisation of ICS content. But also future research has to pay strong attention to keep a good balance between individualised and standardised IC information.

Standardised elements of the ICS could serve as a basis for the comparison of IC between companies and opens up the possibility for an "IC Benchmarking": on the basis of a firms' assessment of IC factors, strengths and weaknesses can either be compared between single companies or between a company and a whole group, e.g. the respective industrial sector. Comparing to a larger group of companies can be useful for a company to derive individual measures in order to catch up with the level of IC within the sector. The aim of a comparison between single companies can be to find suitable benchmarking partners in order to initiate best practice transfers or to exchange experiences between companies with similar or the same problems in a certain field of IC management.

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Self-directed Team Models in Healthcare Settings: What is Their Potential for Adding Value to the Intellectual Capital of Healthcare Organisations?

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Abstract: The concept of intellectual capital (IC) in organisations has been widely researched and its application is well understood, particularly in relation to business and commercial sectors. Despite the unique and vital role that healthcare organisations have in supporting the essential health and wellbeing of populations, awareness of IC and its implications may be underdeveloped in these organisations. Healthcare organisations rely on the expertise of a variety of medical, nursing, and other staff, thus optimisation of this human capital resource must surely be of interest to those that manage, fund, or direct policy in healthcare. Team working is a common feature of healthcare organisations, and it is of interest that a number of IC research papers have drawn attention to team styles in organisations. One particular mode of team working is that of the "self-directed team" model, and there is a substantial body of empirical research that describes the application of self-directed teams in various organisational settings. Within this body of research there are a small number of studies about the use of self-directed teams specifically in healthcare settings. The paucity of these studies and the diverse nature of methodologies employed in them means that it is difficult to generalise findings. This paper is premised on the idea that self-direction in healthcare teams is worthy of further exploration in order to determine whether self-direction is compatible with the expansion of intellectual capital in healthcare organisations. The aim of this conceptual paper is to propose a framework for describing the relationship between self-directed teams and intellectual capital in healthcare-specific settings. Drawing on a range of perspectives and examples from our own and others' work, we explore the application of a model of team self direction in a healthcare organisation, and attempt to ascertain the value adding potential of self-directed teams to the organisation's intellectual capital. We then outline some considerations for further research. Using an existing framework that describes IC in the healthcare sector we sketch out the elements we would expect to see in the IC landscape of a health organisation. We then critically examine both the potential contribution that the self-directed team model may make to the IC of healthcare organisations, and factors that might hinder the agency of the self-directed team model.

Keywords: Self-directed teams; healthcare organisations; intellectual capital; value adding potential

1. The purpose and aims of this paper

The purpose of this conceptual paper is to explore the potential relationships between intellectual capital (IC) in healthcare and self-directed teams in healthcare settings, in order to ascertain the role that could be played by self-directed teams in adding value to the intellectual capital of healthcare organisations. The aims of this paper are to propose a framework to situate self-directed teams in relation to IC in healthcare-specific settings; to explore the application of a model of self-directed teams in a healthcare organisation; to attempt to ascertain the value-adding potential of self-directed teams to the IC of healthcare organisations; and to outline considerations for further research.

2. Background

2.1 Intellectual Capital and Healthcare

Intellectual capital (IC) has its basis in practice, being rooted in ideas about understanding the nature and value of non financial assets in organisations in order to achieve better management of the things that generate value (Petty and Guthrie, 2000) and realise competitive advantage (Brennan and Connell, 2000). The emergence of the concept of IC seems, in part, to have been a response to a new business economy based on the widening availability of knowledge through new technologies. Stewart cited in Robert (1997) suggests that IC is a source of "wealth" not just for the organisation but also for the employee. "It is an object of common ownership, and both parties must seek to extract the greatest returns possible from it". (Robert, 1997)

From these initial thoughts about exploiting the knowledge contained within an organisation, other investigations of IC have followed. Marr et al (2003) suggest that early work regarding IC was concerned with raising awareness of the existence and value of IC in organisations and developing frameworks for its classification. From subsequent work on intellectual assets the concept of the *knowledge-based organisation* emerged. A further spin-off from this has been *knowledge management* (KM) in organisations, and how KM performance outcomes can be measured in organisations (Choy et al, 2006).

IC appears to follow two paths: the strategic route and the measurement route. The strategic route focuses on the creation and use of knowledge, notably tacit knowledge and the relationship between knowledge and value creation. The measurement path challenges traditional value measures by demanding measurement of non financial data as well as financial ones. The management of these paths was found to be important for an organisation's long term success as those that managed their own IC out-performed others (Brennan and Connell, 2000). In order for healthcare organisations to successfully perform in markets increasingly characterised by competition, those organisations must demonstrate their advantage over other competitors. Healthcare organisations need to be acquainted with all of their assets, including those that appear to be more difficult to define such as intellectual capital, in order to exploit this IC. This is likely to require an enlarged understanding of IC amongst health organisations. The comparatively small number of studies about intellectual capital in healthcare settings may indicate a lack of acknowledgement or understanding of the concept of IC in the healthcare setting. Alternatively it is possible that IC has become unconsciously embedded into the language of healthcare via terms such as "knowledge management" and "organisational learning", or integrated into health services performance measurement systems through tools such as the Balanced Scorecard (Kaplan and Norton, 1996). Whilst useful, these lenses on IC do not reflect its totality.

4 recent studies were found that explored the concept of IC in a healthcare setting. A study by Liu and Lin (2007) asserted that in order to remain competitive in the healthcare market, hospitals need to develop customer capital. Their study aimed to provide a taxonomy for cultivating market-based organisational learning, leading to the accumulation of customer capital and ultimately improved financial performance in the hospital setting. A study by Donato (2002) looked at 6 healthcare organisations in Tuscany to evaluate whether the performance measurement systems of these organisations encompassed intangible assets. Habersam and Piber (2003) used a qualitative case study to explore the relevance and awareness of IC in hospitals. Peng, Pike and Roos (2007) investigated how hospitals in Taiwan viewed the worth of IC and performance in the healthcare sector. They suggested that healthcare organisations combine characteristics of a people-centred approach with a process-oriented approach. This notion was supported in results from the study in that human capital was identified as the most important element of IC. This reflected the mission of those healthcare organisations for *"people to care for people".*

IC papers in the field of nursing have explored ideas about evaluating intellectual capital within nursing and the potential influences of this capital. One study looked at nurses' knowledge stocks, skills and experience, and the sorts of influence these may have on outcomes for patients and the organisation (Covell, 2008). The concept of measuring nurse productivity as an intellectual capital asset was discussed by Moody (2004) and McGillis Hall (2003). Clarke and colleagues (2008) set up nursing interventions designed around the rationale that people can pursue goals and objectives that contribute to their perceived quality of life. Nursing interventions were designed to increase patients' knowledge and choice in their use of health and social care services as a way of stimulating growth in human capital. One conclusion we might draw from these studies is that IC has the potential for being a valid strategic management conceptual framework for NHS providers. In fact, the above discussion would suggest that a thorough understanding of and commitment to the development of IC within the NHS could increase healthcare organisations' competence and capability to deliver competitive and effective services in the future. NHS organisations must therefore be able to define and classify IC, deploy, protect and renew intellectual assets, and measure them in a way that facilitates decision making.

3. Self-directed teams in Healthcare

In healthcare organisations multi-disciplinary teams are commonly established in relation to particular work processes or service areas: for example - hospital surgical teams, physiotherapy teams, and

community mental health teams. This paper is interested in how one particular team conceptualisation, referred to here as the "self-directed team", functions in a healthcare-specific setting. Other definitions for the self-directed team include the "autonomous team", "self managed team", "self managing team", "semi-autonomous work group", "self-leading team" and "high performance work team". Whilst there is no single prototype that determines all applications of self-directed teams in healthcare, an earlier study did identify a number of underpinning principles commonly shared by these teams. A qualitative meta-synthesis of 7 papers derived from empirical studies (Molesworth, 2008) found that the implementation of self-directed teams in healthcare settings was commonly informed by the principles of enhancing team work; promoting flattened organisational structures; and effecting cultural change (Macdonald and Bodzak,1999; Hurst et al, 2002; Woodward and Wilson, 2006; Robinson and Rosher, 2006; Yeatts and Cready, 2007; Cready et al, 2008). The participation and empowerment of staff and service users in health settings was identified as a principle of self-directed teams by Parker (2008), although in order for this principle to be realised Parker suggested that teams needed to have the authority to influence strategy and performance, facilitate problem solving, and engage in double loop learning. Self directed teams are seen as the building blocks of a successful organisation. They encourage individual motivation, commitment to quality, flexibility, efficiency and innovation through mutual support (Tranfield and Smith, 2002) thus enabling an organisation to respond to and adapt to the competitive challenges of a complex economy (Espinosa et al, 2005). As the NHS market becomes more competitive, and services that were historically secure are increasingly contested, self directed teams could enable healthcare organisations to adapt more successfully.

Teams represent a key resource of an organisation; its human resource. One of the tools available to an organisation for optimising its performance is human resource management (HRM), and recent research has started to separate out some critical human resources practices that appear to significantly contribute to organisational performance. Based on work by Pfeffer (1998), Vlachos (2008) developed a set of hypotheses about the effects of HRM on organisation performance. One hypothesis concerned *decentralization and self-managed teams,* a combination that promotes commitment and participation amongst employees, and creates a sense of attachment. Decentralization and self-managed teams are highlighted as positively related to organisational performance. Other work by Evans and Davis (2005) drew on theories from social network analysis, and explored the relationship between high performance work systems (HPWS) and organisational performance. Their study described how outcomes in organisations can be examined in terms of patterns of relationships which are described as "ties". In organisations "ties" have a bridging function, with *weak* "ties" being more beneficial to organisations than *strong* "ties" because the former facilitate the flow of information and exchange of resources between groups within an organisation. Evans and Davis (2005) note that "HPWS facilitate the development of bridging ties primarily through the use of flexible work and self-managed teams". Even though there are few empirical studies that have explored the application of self-directed teams in healthcare-specific settings, evidence from the research literature indicates that the self-directed team model is congruent with high performance in organisations. On this basis the application of self-directed teams to healthcare settings is relevant to academic debate.

4. Approach and methods

In order to explore the IC of a healthcare organisation and the possible contribution of self-directed teams to this IC, we began by identifying research studies that had looked at IC in healthcare-specific settings. From amongst the studies we found Habersam and Piber's (2003) IC landscape framework for hospital settings which has its origins in the taxonomy proposed by the Meritum Project (2002). The Meritum taxonomy is widely agreed to be the authoritative tool for managing and reporting IC. Our rationale for using Habersam and Piber's framework in our own study was three-fold. Firstly, whilst Habersam and Piber's (2003) study mapped empirical data onto a framework, and our study attempted a mapping exercise based on recorded information within an organisation about non financial assets, the notion of mapping IC in healthcare was common to both studies. Secondly, our use of an existing framework was informed by ideas from Miles and Huberman (1984) and Yin (2003) who suggested that frameworks developed from literature act as a guide for analysis and can add validity to the data. Thirdly, Habersam and Piber's framework expanded on previous structures such as the Balanced Scorecard proposed by Kaplan and Norton (1996), and the Value Platform described by Petrash (1996), cited in Brennan and Connell (2000), by adding an extra type of capital which Habersam and Piber called "connectivity capital". They posited that connectivity capital becomes

obvious in a hospital setting where *"social, organisational and physical frame enables interaction with patients, communication between professional groups, and an intermixture of different competencies".* Habersam and Piber list "self guiding autonomous teams" under connectivity capital, thus supporting the notion that self-directed teams may contribute to IC. For our mapping exercise we used the case of a specific UK healthcare organisation where self-directed teams had been implemented. This organisation is an NHS Trust that provides specialist adult and children's mental health and learning disability services, as well as services to other groups including older people and mentally disordered offenders. We began by mapping the non financial assets of this organisation onto Habersam and Piber's framework (see figure 1). We posited that where the presence of an asset has been recorded in some way within the organisation it becomes identifiable, and can be mapped. Assets may include organisational policies, procedures, plans, meetings, services activities, and systems, as well as all human resources (staff and customers and their abilities, know-how, and experiences).

When we came to the spheres of "intuitive" and "black box" we found that these were much more elusive, and evidence that might indicate the presence of capital in these spheres was not easily located. The complexity of intuitive and black box capital has been raised by Habersam and Piber (2003) who note that intuitive capital can be explained but not written down, and black box capital cannot be explained. How we dealt with this was to acknowledge the complexity, and make an attempt to represent what would likely be within the spheres of intuitive and black box based on our knowledge of the organisation and anecdotal evidence from within the organisation. As we worked through the mapping process we used bold italics to highlight any assets we considered to be specific to the application of self-directed teams. Having completed this mapping exercise our discussion and reflections led us back to consideration of other IC frameworks, particularly Petrash's (1996) Value Platform.

5. Results, findings and discussion

Our knowledg	Structural	Relational/Customer	Human	Connectivity
Finance	Budgetary controls; Financial plans; Adequate IT; Chairman's Award; National Awards; *Financial reward for teams who engaged.*	Commissioners of services.	Chairman's Award; National Awards; *Use of financial reward to teams for developing themselves and the service.*	
Metric	Performance Management; Standards for Better Health; Balanced Scorecard; Patient information systems such as CHIPs and other databases; Staff survey; Strategic Planning; *Number of distributed leads per self-directed team;* *Benefits realisation framework;* *"Delivering Health" (interactive database of individual and team activity)*	Person Centred Planning; Care Co-ordination; Talking Therapies; Time spent; Mental Health survey; Patient Public Involvement; *Users and carers as team members;* *Co-designing services.*	*(Awareness that) Patient and Public Involvement (PPI) generates customer capital;* *Stress Audits.*	Team meetings; Ref. Practice; Supervision; *Team away days/focus groups.*
Literal	Accountability; Re-organisation into teams; Team Based Working; "Productive Ward"; "Creating Capable Teams" Service Line Management; Job descriptions or plans/KSF; Agenda for Change Certification (ISO, Healthcare Commission, IiP, IWL, and others; Policy & procedures;	Care plans; Discharge planning; Case conferences; Leaflets; Education, promotion; Networking – inter-agency; Press/media; *Leaflets about services;* *Leaflets about self-directed team model.*	Statutory and mandatory training; Training needs analysis; Personal Development Plans; "New Ways of Working"; Problem solving; Solution Focused Approaches; Supervision/reflecting on care process; *Distributed leadership – task delegation;*	Reflection; Vision and values; Teamwork; Trust membership; Governors; Carers/patient groups; Positive feedback; Credibility and trust document; *Users and carers as team members.*

Spheres of Transparency	Structural	Relational/Customer	Human	Connectivity
Literal (continued)	Audit; *PALS lead in each team to highlight PPI;* *Guidance/explanation about Distributed Leads in teams.*		*Additional responsibilities & additional freedom;* *Team Directions and PDP.*	
Intuitive	Corporate Induction; *Mobilising previous experience and existing knowledge more effectively (as a result of common understanding).*	Patients involved in care; Staff/service user interaction – may be defined in terms of care and/or emotion; *Long-term relationship between staff/organisation and service users (due to long term usage of services);* *Patients as co-producers of their health;* *Teams feeling trusted (not having to ask permission)*	*Reflection/sense making;* *Pushing the boundaries;* *Capacity to embrace change.*	*Team Direction (process);* *Stories (benefits realisation);* *Self-directed teams.*
Black box	Organisational memory.	Uncaptured/non-verbalised service user experience (specific client groups); Service users' history and experience; *Impact of service user empowerment on service users*	Mental models; Personal history; *Positive Mental models;* *Passion;* *Experience of freedom vs possible conflict /tension in terms of adherence to policies/procedures.*	Culture; *Team solidarity;* *Organisational development;* *Experience of freedom – what it is about freedom that is shared, and what is not shared, for staff, service users, and carers;*

Figure 1: UK healthcare organisation intellectual capital landscape

Columns of relational, human, and connectivity capital, these assets were also present to a similar degree in the column of structural capital. We reflected on possible explanations for why assets relating to self-directed teams showed up so obviously as structural capital. One likely reason was that in our example of a healthcare organisation, when self-directed teams were being implemented a lot of explanation was required about what self-directed teams were and what was expected of staff for the implementation of self-directed teams. Explanations were given to staff and, over time, these were written down and became more formalised, sometimes as policies and procedures. Instead of teams looking to the underpinning philosophy and *spirit* of self-direction to inform implementation, they now had policies and procedures to follow instead. This raises the important question of how you increase human and relational capital without increasing processes, and placing too great an emphasis on structural capital. A study by Parker (2008) highlighted that centrally controlled cultures encourage the mechanistic behaviours that foster an emphasis on cost containment, efficiencies and traditional performance measurement. Recent regulation and policy changes in the UK National Health Service (for example: Standards for Better Health, and systems specifically designed to improve productivity and efficiencies) have placed a further emphasis on these behaviours, and as Peng et al (2007) have argued, a growing focus on structural capital. Peng and colleagues (2007) found that the balance across the different types of capital is critical, but that in healthcare organisations there is a tendency to invest most in organisational and relational capital and least in

human capital. The capitals are interrelated as Peng and colleagues (2007) suggest, and it is the connectivity capital (Habersam and Piber, 2003) that enhances the relationships and therefore the value of each of the capitals.

"*Human capital* is connected with *structural capital*, for instance, by participative leadership, becoming confident in others or knowing the myths and stories of the organization, working in autonomous teams, an intense communication and democratic exchange of ideas, and a specific cultural background to react adequately in cases of emergency." (Habersam and Piber, 2003)

Having mapped self-directed teams as connectivity capital we then considered the implications of this, taking into account that it is through the activity of self-directed teams that connectivity capital is seen. As the UK healthcare environment has become more competitive conditions have been created where healthcare organisations compete with each other in terms of the quality and delivery of services they provide. Competition has been accompanied by a shift in the way that patients and service users are perceived with more reference to them as *customers* of healthcare services. In the healthcare organisation which is our example, a key element of self-directed teams is that service users and carers become members of the team, and that this is demonstrated through a range of involvement activities. Theoretically this shifts the role of service users and carers from recipients of services to participating members of the team, potentially enabling a different relationship to exist between service users and staff. This is captured in the framework as relational/customer capital, suggesting that self-directed teams have a role in extending this type of capital. Co-membership of teams by service users and carers enables service user and carer experience to be more readily captured through, for example, patient stories. Participation of service users and carers in the team can also be through shared decision making, and exercising influence over developments in the service for which the team has responsibilities. These activities and the learning gained from them, when more widely disseminated in the organisation, become the connectors between individual service users and carers and the organisation, and can be termed connectivity capital.

Another connector we mapped onto the framework was vision and values. A recent qualitative study about self-directed teams by Beddows (2008) noted that for self-directed teams to be effective they needed to have a *shared* vision and values in order to make sense of their shared purpose. This finding is reflected in other examples of implementing self-directed teams in healthcare settings (Robinson and Rosher, 2006; Yeatts and Cready, 2007; Cready et al, 2008), where training, preparation, and culture change activities helped to support the development of shared vision and values. For self-directed teams to enhance the intellectual capital of healthcare organisations it is likely that investment in activities and training that support a common vision and values amongst staff will need to be a priority.

Self-directed teams in our example of a healthcare organisation were implemented and supported using organisational development (OD) tools. Andriessen (2007) suggests that the origins of IC as outlined by Sveiby (1997) and Edvinsson (1997) are founded on the same principles as OD in that both are driven by a desire to create a healthy, sustainable organisation that seeks to release human potential and apply a holistic view. They argue that by using OD tools the hidden IC of an organisation can be uncovered. Habersam and Piber's (2003) intuitive, literal, and black box spheres of transparency reflect similar activities. The focus of OD is usually to identify and understand connections and relationships in organisations, requiring qualitative rather than quantitative methods. An overview of 14 empirical research studies on intellectual capital in organisations (Brennan and Connell, 2000) showed, unsurprisingly, the dominance of qualitative methodologies. Peng et al (2007) argue that in countries such as the UK where there is greater government control over the healthcare industry, the focus is on more traditional performance measures with little emphasis on IC. At the level of individual organisational culture, Peng et al (2007) suggest that where directive decision making and strong control measures were in place emphasis was placed on metrics to gain understanding. However where the culture focussed on participative decision making and people then IC was measured and understood through more literal and intuitive evaluation and dialogue. This may suggest that in organisations where decisions are made lower down the organisation, and particularly where decisions are made in conjunction with patients (e.g. the self-directed team model), a more comprehensive understanding of IC is possible.

The framework mapping exercise seems to indicate that implementing self directed teams in a healthcare organisation did not increase assets in the black box sphere of transparency under the

column of structural capital. Possible explanations for this are that organisational memory simply is the only black box asset for structural capital, and we cannot establish whether self-directed teams have a role in generating or contributing to organisational memory. Alternatively it could be that self-directed teams need to become sufficiently embedded in the organisation in order for black box assets to be revealed within structural capital.

The mapped framework suggests that black box assets were present for relational, human, and connectivity capital. In our NHS Trust example the type of disabilities of some client groups means that it is not possible to access and capture their first hand experience, and often the best that can be achieved is the interpretations of their experiences via carers or advocates. Thus it may be that the capital of a proportion of service users remains an unknown quantity. In self-directed teams in healthcare the involvement of service users and carers as part of the team is a factor that can help to bring to visibility the stories and experiences of service users (customer capital), and can also harness the customer capital of service users in being co-producers of their health.

6. Conclusions

Whilst the discussion of findings points to a lack of understanding of intellectual capital and its value in healthcare organisations, there are promising signs that self-directed teams have potential to add value to intellectual capital in a number of ways.

Self-directed teams seem to be able to add value to relational/customer capital by situating service users and carers differently in relation to the team. Actively including service users and carers in decision-making, facilitating their influence on services, and improving opportunities for service users and carers to be better informed about services and support, may all be evidence of this. Despite the tendency of healthcare organisations to invest most in organisational and relational capital, the framework mapping exercise suggests that self-directed teams can also add value to human capital. This may happen through the giving of incentives to support team development and service development; supporting teams to become more aware of the impact of what they do, for example in terms of how they situate service users and carers in relation to the rest of the team; the giving of freedom and greater autonomy to teams and the impact this can have both professionally and personally; and the excitement and passion that teams may experience in relation to a new model of team working.

Earlier we noted that our reflections on the mapping exercise led us back to other IC frameworks, in particular the value platform of Petrash (1996). This framework is interested in increasing the number of inter-relationships between the types of capital, in order to maximise the value. Habersam and Piber's (2003) connectivity capital is essentially a connector which could be viewed as increasing the inter-relationships between capitals. In our mapping exercise we situate self-directed teams as connectivity capital, which may suggest that self-directed teams add value by, for example, being the bridge between service users and carers and the wider organisation. Teams are uniquely placed to understand both the language of individual service users and carers and that of the organisation. This may best position them to facilitate the wider organisation in receiving and making sense of service user and carer experience. Connectivity capital may also be added to through team solidarity, teams' participation in organisational development, and the experience that teams gain of advanced autonomy or freedom.

This paper draws attention to potential new lines of research enquiry in the area of intellectual capital in healthcare. The chief goal of such enquiry should be to expand the concept of IC in healthcare organisations. To work towards this goal we propose that a future research agenda requires two concurrent strands. One strand should focus on exploring the benefits to healthcare organisations of their IC assets. This would likely include empirical studies that draw both on the case study approach used by Habersam and Piber (2005), and the work in identifying indicators of IC in healthcare organisations conducted by Donato (2002). Refinement of existing methodologies to increase their pertinence to healthcare organisational settings should also be considered. Habersam and Piber suggested that in order to achieve more transparency in the areas of literal, intuitive, and black box capital, practices of representing IC such as storytelling, narratives, or visualisations could be made greater use of.

The second strand would be further exploratory research about the value adding potential of self-directed teams to IC in healthcare organisations. The scarcity of empirical studies about self-directed teams in healthcare settings may in part indicate the difficulties associated with measuring their impact, yet the work of Evans and Davis (2005) and Vlachos (2008) which offered evidence supporting the alignment of self-directed teams with high performance work systems, may be a useful starting point for further studies. We suggest that nested qualitative investigations of self-directed teams in healthcare organisations to explore their potential contribution to IC may also lead to a better overall understanding of their value within healthcare settings. Focusing on the little known territory of self-directed teams in healthcare may also offer an innovative lens for looking at IC.

In addition, for both strands outlined here it is suggested that the research methodologies employed should engage with the notion of organisational development and change. This is advocated in a number of IC studies, including Andriessen (2007) who used a design based research approach to construct and test a tool for the reporting of IC in organisations, and Habersam and Piber (2005) who stated that IC behaves according to its changing context and that it should be seen as both an object *and* a dynamic essence that triggers organisational change.

There are potential applications of IC in specific organisational aspects, such as in the area of teamwork. For example, notions such as team innovation and creativity could be re-conceptualised as aspects of intellectual capital. Areas that could be explored are the identification of innovation and creativity and how increases and improvements could be measured.

The contributions that future IC research could make to healthcare organisations seem promising. The development of approaches to mapping, reporting and managing IC in healthcare settings is likely to be of interest to healthcare leaders, particularly in the current economic situation where added value from IC may give a healthcare organisation competitive advantage. IC is a validated lens for looking at organisations, a factor which may help to legitimise it amongst policy makers and commissioners of services, thus making it an acceptable element of the toolkit that organisations use to measure their performance and capability, and to assess outcomes.

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Academic Research Performance and Intellectual Capital Measurement System: Evidence from Italian Universities

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Abstract: the paper investigates the correlation between some indicators promoted in international experience of measuring the Intellectual Capital of universities and the scientific performance of these insitutions. This study uses data reported to the researchers of Chemistry of Italian universities (over the period 2000-2007) and integrates the results of peer assessment of first Italian Research Assessment Exercise (VTR) with bibliometric indicators. Relations between quantitative and qualitative research evaluation methods are underlined. The analysis shows significant correlations among size of university, financial resources, teaching load, mobility and scientific performance and suggests an integration of ICU report. Also, have been proposed some hypotheses about the possible conditioning of the Impact Factor on the peer evaluations.

Keywords: Academic research performance; research evaluation methods; intellectual capital; accountability; governance

1. Introduction

The consideration of the functionalities existing between research evaluation and intellectual capital measurement in universities stems from three observations: the growing interest on the part of government institutions in promoting transparency in the results produced and in the use of public funds intended for research activities; the emphasis given to voluntary disclosure on intellectual capital not only by private firms, but also by countries, public organizations and research centres; the growing relevance that both private and public organizations give to the subject of research evaluation a complex and fundamental activity for the economic growth of each Country.

Accredited literature [Bueno, 2002; Leitner and Warden, 2004; Mouritsen *et al*. 2001; Petty and Guthrie, 2000; Sanchez and Elena, 2006] and international experience [ARC, 2005; ETRI; 2005; Autonomous University of Madrid (UAM), 2006] show how the tools of measurement of intellectual capital can effectively support decisions regarding research management, allocation of human and financial resources, the organizational structures of institutions. In Italian Universities the changing process has been initiated in the 90's with regulation of Universities' financial autonomy, establishment of mechanisms of governmental performance-based resources allocation and goes on with implementation of evaluation methods inherent to such autonomy. The first Italian Research Assessment Exercise (VTR), carried out by Italian Committee for Research Evaluation [CIVR, 2006], has assessed the scientific output of years 2001-03, self-selected by the Universities and the national Research Institutions. The complexity that characterizes the University management increases the need for an analytical information about the description of the resources used and related results, which are not effectively detected neither by traditional systems of research assessment nor by the economic-financial reporting. In the Research Organizations the intellectual capital is seen as a dynamic system of intangible assets, essential to generate scientific performance [Leitner and Warden, 2004; Sanchez and Elena 2006]. Therefore these businesses models and methods for intellectual capital assessment must be integrated with the models and methods of scientific performance evaluation. Universities have a further element of complexity compared to Research Institutions as the scientific performance is accompanied by teaching and by external development: the three outputs coming to share the same input. In the present paper we describe the drivers of the Intellectual Capital in Italian Universities, integrating the system of indicators derived from the intellectual capital report for University [European Commission, 2006; Observatory of European University-OEU, 2006] with the results on scientific performance available on CIVR database, with bibliometric data available in SCOPUS and with data on the teaching load of researchers, derived from the database of Italian Ministry of Education, Research and University (MIUR). This analysis has been conducted on all Chemistry permanent researchers[1] that the Italian Universities, at the VTR,

[1] In this paper, we consider permanent researcher a full-time researcher or a university professor in service, at 31 December 2007.

classified as medium and large size compared to the number of researchers in service of the same scientific field.

2. Previous studies on research evaluation

Some experiences of research evaluation, reported at different levels (universities, departments, research groups, researchers), show a significant relationship with the models of accountability and external reporting and generate an intense scientific debate. Other studies show that the scientific productivity of the research organizations is linked to forms of legal protection of intellectual property [Geuna and Nesta, 2006], highlighting that researchers who generate patents are more productive from the bibliographic point of view. As far as the analysis of the drivers of research is concerned, some authors note the impact on productivity of scientific researchers produced by the following variables: the size, the prestige [Carayol and Matt, 2004] and the policies adopted by the research organizations [Cole and Cole, 1973]; age and gender of researcher [Zuckerman and Merton, 1972; Stephan, 1998], training [Garcia-Romero and Modrego, 2001], the researcher's life cycle [Levin and Stephan, 1991; Rauber and Ursprung, 2006] and the teaching load [Fox, 1992]. The analysis methods of assessment highlights the limitations related to the use of indicators based on impact factor system [Carmona *et al*., 2005; Moed, 2002; Van Leeuwen et al., 2003]. The bibliometric methods are controversial and, when judging the productivity of human capital, they fail to consider the relations vis-à-vis assessment processes [Adams and Griliches, 1998; Fayl 2001]. The citation analysis needs to focus on carefully defined disciplines (hard science), because some scientific products are extraneous to impact factor or h-index system [Hirsch, 2005; Van Raan, 2006]. The selection of evaluation methods is reflected on the reliability of results; practices combine approaches based on product quality (peer review) with quantitative methods focused on the assessment process and input of research. The subjectivity of the former contrasts with the determinism of the latter, generating criticism which impose the integration of approaches. Among the process variables great attention has been set to the level of attractiveness of resources. In this area, it has been demonstrated the impact on the degree of attraction of resources by distinguishing features of the proponent of research projects [Laudel, 2005], finding in this capacity an indicator of input rather than output of research. The ability to produce a high number of scientific products compared to the amount of resources committed is affected by political allocation of financial resources and the research internationalization degree. The degree of internationalization of knowledge is the object of studies [Van der Meulen, 2002; Hakala et al., 2004], which defined it both as the degree of product diffusion in international journals, whose importance is measured by impact factor, and also as collaboration with international research units or foreign co-authors. About the financial resources allocation, literature [Geuna, 1999] proposes variables that affect the criteria for funding of research, summarized in the quality of performance, productivity of proposing institutions, also linked to the degree of concentration of scientific capabilities. However, there are not appropriate demonstrations of relationship among size, source of public-private funding and quality of scientific results.

2.1 The intellectual capital: Literature survey

The extensive literature measurement methods and approaches to manage the intellectual capital, effectively analyzed and synthesized in some publications [Bontis, 2001; Mouritsen et al., 2001, Petty and Guthrie, 2000], offers a variety of concepts and classifications of this concept, in a confluent structure divided into three components: human capital, organizational capital and relational capital. At the same time these studies reveal inherent limits on the following aspects: lack of a shared theoretical construct and incorrect assignment of a general value to heterogeneous approaches; inclusion in these components of resources that qualify themselves as activators or results of intellectual capital; difficulty of building objective indicators, representing created value extracted from this capital; limited sector nature of the case-studies. About the latter point, during the last decade there has been a gradual extension of the approaches considering the following new areas: non profit organizations and public sector [Mouritsen et al., 2004; Wall, 2005], health care organizations [Habersam and Piber, 2003] Research Organizations and Universities [Leitner and Warden, 2004; Sanchez and Elena, 2006], nations and local governments [Andriessen and Stem, 2004; Bontis, 2002].

Recognizing the important role assumed by the intellectual capital in the institutions appointed to the production of knowledge and research is usually acquired in the scientific community and society. The same intellectual capital report in Universities is supported by different European projects promoted by European Commission that recommends these models to improve useful information to manage

the strategic resources and processes. The main purpose found in the report in question concerns need of greater transparency in public funds use, results produced from research and educational effort, and need to address the management to development of decision-making and operative processes. The framework suggested by RICARDIS document [EC, 2006] and by Observatory of European University [OEU, 2006] proposes a structure of the intellectual capital of Universities (Intellectual Capital University-ICU) based on these components: human, organizational, relational.
The framework considers geographical diversity, size, different scientific fields, universities legal nature. These difference are greatly reflected on the results and on the same structure indicators taken in drafting the report [Sanchez and Elena, 2006]. Another peculiarity of the model shows in identifying Faculty as a minimum level of analysis, being too expensive, although preferable, one focused on departments, the laboratories or research units. Among the limitations on the grounds, OEU will collect the following: size of investigated sample, considered too small to make demands of generality; absence of indicators which can properly assess efficiency, due to the need to avoid conflict with another concurrent project, it is only intended to measure the performance in the public sector; the focus on resources rather than on activities due to the need to promote comparability of the report, made easier by the measures connected with the input process in place [OEU,2006; EC, 2006]. Austria's experience is significant [Altenburger *et al*., 2005; Leitner, 2004]; it has transformed voluntary disclosure of an obligation extended to Universities through enactment of University Act in 2002, followed by adoption of a new model of governance and reporting in the institutions in question consistent with those three components. In other experiences, some research institutes [ARC, 2005; ETRI, 2005] adopt a structure of indicators aimed to measure the following performance: the degree of efficiency and internationalization [opening] of human capital; autonomy; the degree of codification of knowledge and effectiveness of the strategies upon decided, with respect of organizational capital; externalities produced with reference to reports, through contracts, spin-off, social fallout, involvement in private companies operation [Leitner, 2004; UAM, 2006]. Therefore, the methods are mainly focused on resources, leaving out descriptions of the interactions with the internal components of intellectual capital and external context, found between these components and research activities.

3. The first assessment exercise of Italian research [2001-2003]

In Italy has recently completed the first evaluation exercise of scientific performance [VTR 2001-03] led by CIVR (established by the Ministry of University and Research) on all Universities (No.77) and Research Institutes (No.11) financed with government funds. The VTR was based on peer review of 18,508 scientific products from all scientific areas. Products research, undergo anonymous peer review, were selected by the Universities of number proportional to its researchers (at a rate of 1 product every 4 researchers). The assessment, therefore, had concerned the selection of the best products[2] of the structures chosen by processes of self-evaluation. Each scientific area was assigned to a Panel of Experts. They have chosen Italian and foreign independent[3] referees in order to express an evaluation. Each product has been reviewed by at least two experts and has been attributed to one of four levels of merit (excellent, good, acceptable, limited) on basis of 4 criteria (quality, relevance, originality and innovation, internationalization). The rating for each product was combined with the ownership ratio of excellent products, given for each of them as follow: number of authors who relate to the structure/total number of authors. Although a low-grade ownership index is greater propensity of the structure to work with outside researchers, a high degree of ownership of excellent products can be considered an expression of scientific leadership of the best products. The weighted sum of products and the average weight of each structure for each area has made it possible to order a ranking list of Chemistry field [*see Table 1.1-1.2*]. At the same time the CIVR has collected more data reported to the context of individual research activities in each area and in each structure (see § 4).

4. Sample and variables used

The identification of the suspect sample was made in two steps: first, we chose chemistry for the relief that it takes the bibliometric indicators (in VTR 2001-03 the 93% of selected products in Chemistry were represented by articles with impact factor); second, we excluded small universities (universities with fewer than 40 researchers in chemistry)..

[2] The products were divided in 14 research areas [used in MIUR], including the area of chemistry subject Analysis of this work [corresponding to 1.3, the Natural Sciences, in the classification proposed by Frascati Manual.
[3] The number of referees in the database amounted to 17,000.

The variables and some descriptive data: lead and lag indicators

The bibliometric data per researcher and the indicators used by VTR per university have been compared with selected indicators linked to the three sections of ICU report [OEU, 2006]. The unavailability of information on spin offs, research contracts with other institutions or enterprises and organization of events aimed at spreading knowledge outside, did not allow a full investigation of the relational component of intellectual capital.

Input indicators [*lead indicators*] employed are the followings:
- Data from the Scientific Area level [source VTR 2001-03]:

- Number of researchers working for the Structure (permanent staff) on mobility in foreign countries and number of foreign researchers working for the Structure as non-permanent staff [for more than 3 months], average annual 2001-2003 [No/FTE Researchers];
- Number of PhD's, scholarships and post-docs, average annual 2001-2003 [No/FTE Researchers];
- Funding of research projects by MIUR, by International Bodies, self-funded, by others [000€/FTE Researchers];

Data from the University-wide [source VTR 2001-03]:

Table 1.1: Ranking list - Chemistry (sample) – Medium Structures

Medium structures (10-24 products)	Rating (1)	Weighted products (2)	Judgment (3) E%	Judgment (3) E	Judgment (3) G	Judgment (3) A	Judgment (3) L	Judgment (3) NA	No. Products	FTE Researchers	OI (4) of products	OI (4) of excellent products	Average IF (5)	No. products with IF (5)
Univ. URBINO	0,93	10,2	64	7	4	0	0	0	11	19,17	0,7	0,6	9,36	11
Univ. TRIESTE	0,93	17,6	63	12	7	0	0	0	19	35,67	0,55	0,5	6,33	19
Univ. PAVIA	0,87	16,6	37	7	12	0	0	0	19	45,33	0,76	0,58	8,19	19
Univ. BASILICATA	0,85	13,6	38	6	8	2	0	0	16	15,33	0,56	0,64	4,77	16
Univ. FERRARA	0,85	13,6	31	5	10	1	0	0	16	34	0,84	0,77	5,66	15
Univ. PARMA	0,84	16,8	45	9	6	5	0	0	20	39,33	0,79	0,8	6,07	18
Univ. PERUGIA	0,83	19,2	39	9	9	5	0	0	23	46,83	0,8	0,8	5,68	18
Univ. TORINO	0,83	17,4	38	8	10	2	1	0	21	42,17	0,78	0,82	5,68	19
Univ. SALERNO	0,83	10,8	23	3	9	1	0	0	13	24,83	0,78	1	4,21	12
Univ. SIENA	0,81	12,2	33	5	8	1	1	0	15	27,33	0,5	0,57	7,39	11
Univ. VENEZIA	0,81	15,4	21	4	12	3	0	0	19	33,83	0,72	0,92	4,72	17
Univ. MODENA e REGGIO EMILIA	0,79	15	26	5	10	3	1	0	19	36	0,71	0,51	4,98	19
Univ. MESSINA	0,77	18,4	21	5	12	6	1	0	24	30,67	0,85	0,89	5,05	23
Univ. BARI	0,77	17,6	17	4	13	5	1	0	23	45,33	0,76	0,75	4,8	19
Univ. SASSARI	0,76	12,2	19	3	9	3	1	0	16	29,67	0,58	0,63	5,87	15
Univ. CAGLIARI	0,72	10,8	20	3	7	3	2	0	15	29,83	0,87	0,73	4,16	15
Univ. CAMERINO	0,71	10,6	7	1	8	5	1	0	15	28	0,8	1	4,02	14

(1) = Weighted products ÷ products
(2) = E + 0.8*G + 0.6*A + 0.2*L E: Excellent; G: Good; A: Acceptable; L: Limited; NA: Not assessable
(3) E%: % of excellent products; The products could not be evaluated if (a) not belonging to the typologies clearly quoted by the Ministerial Decree 2206/03 (art 11); (b) submitted twice by the same Structure, in contrast with the Ministerial Decree 2206/03 (art 11); (c) no ownership ratio can be assigned to the Structure.
(4) Ownership index (OI) of a product is given by: number of the authors belonging in the Structure (also considering possible multiple affiliations) / total number of authors.
(5) Impact Factor (ISI)

Source VTR 2001-03 (CIVR, 2006)

Table 1.2: Ranking list - Chemistry (sample) – Large Structures

Large structures (25-74 products)	Rating (1)	Weighted products (2)	Judgment (3) E%	Judgment (3) E	Judgment (3) G	Judgment (3) A	Judgment (3) L	Judgment (3) NA	No. Products	FTE Researchers	OI (4) of products	OI (4) of excellent products	Average IF (5)	No. Products with IF (5)
Univ. FIRENZE	0,92	32,2	66	23	10	2	0	0	35	67,17	0,94	0,94	8,63	33
Univ. PISA	0,91	27,4	60	18	11	1	0	0	30	55,33	0,67	0,66	6,69	28
Univ. BOLOGNA	0,89	51,8	57	33	21	3	1	0	58	123,67	0,66	0,58	7,54	55
Univ. PADOVA	0,89	25,8	52	15	12	2	0	0	29	58,83	0,59	0,51	5,82	29
Univ. NAPOLI FEDERICO II	0,85	40,8	46	22	20	4	2	0	48	81,83	0,75	0,73	6,04	45
Univ. MILANO	0,84	33,4	38	15	19	5	1	0	40	81,83	0,83	0,78	5,7	36
Univ. ROMA LA SAPIENZA	0,84	37,6	33	15	25	4	1	0	45	102,67	0,86	0,84	6,31	43
Univ. CATANIA	0,81	21,8	26	7	16	3	1	0	27	53,5	0,66	0,72	5,67	25
Univ. GENOVA	0,76	21,2	11	3	16	9	0	0	28	56	0,83	0,83	3,07	27
Univ. PALERMO	0,63	18,8	0	0	10	17	3	0	30	48,67	0,8	0	3,29	29

(1) = Weighted products ~ products
(2) = E + 0.8*G + 0.6*A + 0.2*L E: Excellent; G: Good; A: Acceptable; L: Limited; NA: Not assessable
(3) E%: % of excellent products; The products could not be evaluated if (a) not belonging to the typologies clearly quoted by the Ministerial Decree 2206/03 (art 11); (b) submitted twice by the same Structure, in contrast with the Ministerial Decree 2206/03 (art 11); (c) no ownership ratio can be assigned to the Structure.
(4) Ownership index of a product is given by: number of the authors belonging in the Structure (also considering possible multiple affiliations) / total number of authors.
(5) Impact Factor (ISI)

Source VTR 2001-03 (CIVR, 2006)

- Technical and administrative personnel working for the Structure, annual mean for 2001-2003 [No/FTE Researchers];
- Structure receipts for the three years from State current appropriations, from State investment appropriations, from real estates, from loans [No/FTE Researchers];

Data on researchers working at 31 December 2007, taken in the period 2000-07 [Source MIUR]:

- Number of permanent researchers in Chemistry per University, Department, Faculty and Scientific-Disciplinary Sector (No. 2884)
- Youth index per academic researcher (that is 1 for all researchers recruited during the period 2000-07);
- Horizontal mobility index per researcher (that is 1 for every transfer among Universities in the intervening period 2000-07);
- Vertical mobility index (career advancement) per researcher [that is 1 for every promotion than 3 levels of career came in 2000-07];
- Turnover Index within Universities (holds 1 for every researcher entered and 1 for every researcher exit from the Italian university system during the period 2000-07);

The measures related to the results (l*ag indicators*) refer mainly to the scientific output per researcher collected through the Scopus database and the results from the VTR analysis. Bibliometric data have been collected through a research protocol that led to the outsourcing of this phase[4]. However, some limits are also underlined: each author is present with a number of different affiliations on the database; there are researchers homonyms belonging to the same Scopus category, sometimes in

[4] Data collection has been conducted by a team of 2 PhD Students under the guidance of the authors

the same field within the same University. The absence of a unique primary key, that link each researcher to his scientific output, and the presence of homonyms have represented a significant problem at the stage of data collection. For these reasons, data collection cannot be considered merely the result of automation. For *each product of each researcher* of the sample have been collected the following data: year of publication; names of authors; number of co-authors; lead author index (1 if the researcher is listed as the first signatory of the product); number of citations[5] pre 1996; number of annual citations (from 1996 to 2007); number of citations after 2007. The total number of products collected (162,021) and the total number of citations (1,152,506 for the period 2001-07) present numerous repetitions, as many as there are authors of each product as a service researchers of the University investigated at 31 December 2007.That is why the analysis has been preferred to refer to the variables "Number of weighted Products" and "Number of weighted citations". Universities develop their research activity with a substantial teaching activity; for this reason, a "Teaching load" per researcher has also been calculated. [source MIUR]. This index is calculated by determining the average number of students enrolled in degree programs of each Faculty in the 2003-07 period, then dividing the average for the total number of permanent researchers for each Faculty, not only in Chemistry. This index, while being an output of University's production processes, is seen as driver of performance in science, considering that the research processes use the same resources, through a process in many respects joined.

5. Analysis of scientific performance: Descriptive data

The first part concerns the relations existing among the various scientific performance indicators attributable to selected Universities. To compare the results of VRT 2001-03 with the bibliometric indicators, for these latter the products published in the three years 2001-03 (Y2001-03, No. 25,343) have been selected. The citations of these products are those recorded in the period 2001-2007. The number of variables, which include the repetitions of joint publications, has been normalized dividing each product for the number of co-authors (weighted products) that has a significant weight in Chemistry (the maximum for a single product 124) (*see Appendix a-b).* The dimensions identified by the variables may be summarized as follows (*Table 2*). Relationships among the performance indicators have been investigated by Pearson Index, in which two different levels of acceptable significance (a. less than 0.01; b. between 0.01 and 0.05) and two intensity range of correlation (a. > 0.6 or <-0.6; b.> 0.3 and <0.6 or > -0.6 and <-0.3 are highlighted. Correlations between the VTR rating (peer review) and the following variables are significant and relevant: average number of weighted citations (of weighted product) (0.655), confirming that both indicators measure the impact of specific scientific products; average number of weighted citations (per researcher) (0.631), productivity index; average of Impact Factor (per products selected for the VTR 2001-03 from University, in Chemistry) (0.763). The convergence between bibliometric indicators and peer review evaluation suggests a possible conditioning of the first one on the second approach.

6. Analysis of the scientific performance drivers

The objective of this section is to present the results emerging from the analysis of correlation among indicators, classified by homogeneous groups. Tables 3-7 illustrates the correlation matrixes in which we describe only correlations with a significance at a 0.05 level. There are positive but not significant correlations among major indicators of mobility (vertical and horizontal), age and other academic indicators (number of scientific products-overall and lead author, citations, number of co-authors, weighted products, weighted citations). Among the results that are irrelevant but significant, horizontal mobility of researchers is negatively correlated to production and productivity, where vertical mobility has a positive correlation.

[5] Self citations of all authors have been excluded for each product.

Table 2: Performance indicators

Dimensions	Variables – period 2001-2003	Source
Volume indicators (1)	No. products No. citations (per product) No. Permanent Researchers No. Researchers present in Scopus No. Researchers with products like lead author No. weighted Products (total) No. weighted Products (like lead author)	MIUR/Civr Our elaboration of Scopus Data
Productivity indicators(2)	average number of Researchers present in Scopus (per Researchers) average number of Researchers with Products like lead author (per Researchers) average number of citations (per product) average number of weighted Products (per Researcher) average number of weighted citations (per Researcher) average number of weighted Products like lead author (per Researcher) average number of lead author's weighted citations (per Researchers)	Our elaboration of Scopus Data
Leadership indicators (3)	No. Researchers with Products like lead author average number of Researchers with Products like lead author (per Researchers) No. weighted Products (like lead author) No. weighted citations (within Products like lead author) average number of Authors number (within products like lead author) average number of weighted citations per weighted Product (like lead author) average number of weighted Products like lead author (per Researcher) average number of weighted citations (within products like lead author -per Researchers) Ownership Index of Excellent Scientific Products (per University)	CIVR-VTR Our elaboration of Scopus Data
Overall Impact indicators (4)	No. weighted citations (total products) No. weighted citations per Products like lead author average number of weighted citations per Researchers (total products) average number of weighted citations (within product like lead author) per Researchers	Our elaboration of Scopus Data
Collaboration indicators (5)	average number number of co-authors (total products) weighted of co-authors (within Products like lead author) Ownership index (per University within chemistry field)	CIVR-VTR Our elaboration of Scopus Data
Specific impact Indicators (6) (Weight Specific Products)	average number number of weighted citations (per weighted Product) average number number of weighted citations (per weighted Product like For lead author) Rating VTR Excellent Rate VTR (%) Average IF (per University – Chemistry field)	CIVR-VTR Our elaboration of Scopus Data

Table 3.1: Mobility, youth academic index and scientific performance

		Horizontal Mobility	Vertical Mobility	Youth academic index	N Produtcs Y2001-03	N Co-authors per product Y2001-03	N Citations Y2001-03	N weighted product Y2001-03	N weighted citations Y2001-03	Average number of weighted citations per weighted product Y2001-03
Horizontal Mobility	Pearson Correlation	**1,000**	**0,626**	**0,964**	-0,087	-0,071	-0,039	-0,086	-0,035	0,060
	Sig. (2-tailed)		0,000	0,000	0,000	0,000	0,048	0,000	0,075	0,001
	N	2844	2272	2844	2570	2567	2570	2567	2567	2844
Vertical mobility	Pearson Correlation	**0,626**	**1,000**	**0,627**	0,202	0,146	0,155	0,170	0,144	0,108
	Sig. (2-tailed)	0,000		0,000	0,000	0,000	0,000	0,000	0,000	0,000
	N	2272	2272	2272	2041	2039	2041	2039	2039	2272
Youth academic index	Pearson Correlation	**0,964**	**0,627**	**1,000**	-0,090	-0,072	-0,042	-0,093	-0,043	0,059
	Sig. (2-tailed)	0,000	0,000		0,000	0,000	0,032	0,000	0,030	0,002
	N	2844	2272	2844	2570	2567	2570	2567	2567	2844

Table 3.2: Mobility, youth academic index and scientific performance

		N product (lead author) Y2001-03	N co-authors (lead author's products) Y2001-03	N citations (lead author's products) Y2001-03	N weighted product (lead author) Y2001-03	N weighted citations (lead author's products) Y2001-03	Average number of weighted citations (per weighted products of lead author)	Funding Of research Projects Per FTE By MIUR	Funding Of research Projects Per FTE By International Bodies	Funding Of research Projects Per FTE Self-Funded	Teaching load
Horizontal Mobility	Pearson Correlation	-0,050	-0,029	0,015	-0,065	0,005	0,026	0,043	0,047	0,064	0,062
	Sig. (2-tailed)	0,045	0,240	0,552	0,009	0,832	0,167	0,020	0,013	0,001	0,001
	N	1605	1605	1605	1605	1605	2844	2844	2844	2844	2777
Vertical Mobility	Pearson Correlation	0,122	0,160	0,122	0,048	0,088	0,117	0,070	0,055	0,040	0,069
	Sig. (2-tailed)	0,000	0,000	0,000	0,084	0,002	0,000	0,001	0,008	0,057	0,001
	N	1308	1308	1308	1308	1308	2272	2272	2272	2272	2218
Youth academic index	Pearson Correlation	-0,054	-0,031	0,001	-0,068	-0,010	0,024	0,040	0,043	0,065	0,063
	Sig. (2-tailed)	0,031	0,217	0,954	0,006	0,680	0,195	0,035	0,023	0,000	0,001
	N	1605	1605	1605	1605	1605	2844	2844	2844	2844	2777

On the contrary, there are significant and relevant correlations among the size (number of permanent researchers at 31/12/07), the Rating VTR 2001-03 and the Funding of Research Projects per researcher (Self-Funded). This result demonstrates the presence of economies of scale in these two dimensions.

Table 4: Size and scientific performance

		N researchers present on Scopus Y2001-03	N researchers with products like lead author Y2001-03	Rating VTR 2001-03	Ownership index (average) of all products VTR) 2001-03	Mean IF VTR2001-03	% researchers in training (per researcher FTE)	% rsearchers in international mobility (per researcher FTE)	Funding Of research Projects Per FTE By MIUR	Funding Of research Projects Per FTE Self-Funded	N administrative and techn. Per Researcher FTE	Teaching load
N researchers	Pearson Correlation	**0,995**	**0,969**	0,354	0,080	0,359	0,094	-0,037	0,187	0,475	0,149	0,077
	Sig. (2-tailed)	0,000	0,000	0,000	0,000	0,000	0,000	0,046	0,000	0,000	0,000	0,000
	N	2844	2844	2844	2844	2844	2844	2844	2844	2844	2844	2777

The indicators relating to researchers in training and researchers involved in international mobility have been analyzed together, in order of their correlation and because both are indicators of collaboration. The following links appear significant and relevant:

- positive correlation among researchers in training and researchers involved in international mobility with research funding of projects (by MIUR and by others), likely because the latter depend on such funding;
- negative correlation among researchers in training and research in international mobility with the number of administrative and technical employees. This result suggests that the administrative and technical staff account for a variable that absorbs a part of resources shared with researchers rather than a resource for scientific research;
- positive correlation between researchers in training and teaching load. This result suggests the possibility that, in the Faculty with a teaching load greater than the average, part of that activity is carried out by PhD students and other scholarships.

Table 4.1: Researchers in training, International mobility and scientific performance

		% researchers in training (Per researcher FTE)	% researchers in international mobility (per researcher FTE)	N products Y2001-03	N authors per product Y2001-03	N citations Y2001-03	N weighted citations Y2001-03	N researchers	N researchers present on Scopus Y2001-03	N researchers with products lie lead author Y2001-03	Rating VTR 2001-03	Ownership index (average) of all products VTR2001-03	Mean IF VTR2001-03
Researchers in training(per researcher in FTE)	Pearson Correlation	**1,000**	0,234	0,049	0,046	0,043	0,052	0,094	0,097	0,123	0,291	-0,046	0,259
	Sig. (2-tailed)		0,000	0,014	0,019	0,030	0,009	0,000	0,000	0,000	0,000	0,014	0,000
	N	2844	2844	2570	2567	2570	2567	2844	2844	2844	2844	2844	2844
Researchers in international mobility (per researcher FTE)	Pearson Correlation	0,234	**1,000**	0,063	0,061	0,051	0,025	-0,03	-0,022	0,018	0,179	-0,219	0,108
	Sig. (2-tailed)	0,000		0,001	0,002	0,010	0,214	0,046	0,246	0,327	0,000	0,000	0,000
	N	2844	2844	2570	2567	2570	2567	2844	2844	2844	2844	2844	2844

Table 4.2: Researchers in training, International mobility and scientific performance

		Funding Of research Projects Per FTE By MIUR	Funding Of research Projects Per FTE By International Bodies	Funding Of research Projects Per FTE By Others	Funding Of research Projects Per FTE Self-Funded	N administrative/ techn. Per FTE Researcher	Teaching load
Researchers in training (per researcher FTE)	Pearson Correlation	**0,621**	0,061	0,400	0,188	-0,226	0,314
	Sig. (2-tailed)	0,000	0,001	0,000	0,000	0,000	0,000
	N	2844	2844	2844	2844	2844	2777
Researcher in international mobility (Per researcher FTE)	Pearson Correlation	0,302	0,049	0,272	0,164	-0,348	0,029
	Sig. (2-tailed)	0,000	0,009	0,000	0,000	0,000	0,125
	N	2844	2844	2844	2844	2844	2777

The indicators relating to finance and administrative staff have been analyzed together, as it is assumed the role of their shared resource for scientific research. This hypothesis, as anticipated, is partially contradicted by the correlations identified.

The following correlations appear significant and important:

- positive correlation among funding of research projects per FTE researcher (by MIUR and by the Others), VTR Rating 2001-03 and the average of IF of products selected for VTR 2001-2003;
- positive connections (seen above) between funding of research projects per FTE researcher (by MIUR and by Others) with researchers in training and in international mobility;
- negative correlations between the number of technical and administrative staff per FTE researcher and VTR Rating; this results confirms the assumption that the administrative and technical staff account for a variable can divert resources to research rather than represent a resource for research activity.

Table 5.1: Funding, administrative staff and scientific performance

		Funding Of research Projects Per FTE By MIUR	Funding Of research Projects Per FTE By International Bodies	Funding Of research Projects Per FTE By Others	Funding Of research Projects Per FTE Self-Funded	N administrative/techn. FTE Researcher	Horizontal mobility	Youth academic index	Vertical mobility	N products Y2001-03	N authors per product Y2001-03	N citationsY2001-03	N wighted products Y2001-03	N weighted citations Y2001-03	Average number of weighted citations per weighted product Y2001-03
Funding Of research Projects Per FTE By MIUR	Pearson Correlation	**1,000**	0,188	0,563	0,039	-0,115	0,043	0,040	0,070	0,067	0,040	0,064	0,085	0,089	0,056
	Sig. (2-tailed)		0,000	0,000	0,038	0,000	0,020	0,035	0,001	0,001	0,041	0,001	0,000	0,000	0,003
Funding Of research Projects Per FTE By International Bodies	Pearson Correlation	0,188	**1,000**	0,260	0,467	0,108	0,047	0,043	0,055	-0,012	-0,024	-0,003	0,000	-0,001	-0,011
	Sig. (2-tailed)	0,000		0,000	0,000	0,000	0,013	0,023	0,008	0,557	0,231	0,884	0,985	0,978	0,565

		Funding Of research Projects Per FTE By MIUR	Funding Of research Projects Per FTE By International Bodies	Funding Of research Projects Per FTE By Others	Funding Of research Projects Per FTE Self-Funded	N administrative/techn. FTE Researcher	Horizontal mobility	Youth academic index	Vertical mobility	N products Y2001-03	N authors per product Y2001-03	N citationsY2001-03	N wighted products Y2001-03	N weighted citations Y2001-03	Average number of weighted citations per weighted product Y2001-03
Funding Of research Projects Per FTE By Others	Pearson Correlation	0,563	0,260	**1,000**	0,005	0,015	0,006	0,001	0,027	0,097	0,091	0,098	0,065	0,087	0,076
	Sig. (2-tailed)	0,000	0,000		0,779	0,434	0,765	0,969	0,199	0,000	0,000	0,000	0,001	0,000	0,000
Funding Of research Projects Per FTE Self-Funded	Pearson Correlation	0,039	0,467	0,005	**1,000**	-0,154	0,064	0,065	0,040	-0,018	-0,019	-0,005	-0,016	-0,003	-0,028
	Sig. (2-tailed)	0,038	0,000	0,779		0,000	0,001	0,000	0,057	0,356	0,345	0,792	0,403	0,872	0,135
N administrative personnel Per FTE Researcher	Pearson Correlation	-0,115	0,108	0,015	-0,154	**1,000**	-0,002	-0,011	0,036	-0,051	-0,041	-0,072	-0,047	-0,063	-0,072
	Sig. (2-tailed)	0,000	0,000	0,434	0,000		0,929	0,547	0,090	0,010	0,036	0,000	0,016	0,001	0,000

Table 5.2: Funding, administrative staff and scientific performance

	N citations lead author Y2001-03	N weighted citations per lead author's product Y2001-03	Average number of weighted citations per weighted product of lead author	N researchers	N researchers present on Scopus Y2001-03	N researchers with product like lead author Y2001-03 Della Struttura	Rating VTR 2001-03	Degree of ownership (average) of all products VTR2001-03	mean IF VTR2001-03	% researchers in training per researcher FTE	% researchers in International mobility per researcher FTE	Teaching load
Funding Of research Projects Per FTE By MIUR	0,060	0,067	0,039	0,187	0,219	0,206	0,453	0,236	0,390	**0,621**	0,302	0,181
	0,016	0,007	0,038	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
Funding Of research Projects Per FTE By International Bodies	-0,016	-0,016	0,017	-0,012	-0,010	0,051	0,109	0,190	0,017	0,061	0,049	-0,140
	0,535	0,529	0,376	0,523	0,580	0,006	0,000	0,000	0,367	0,001	0,009	0,000
Funding Of research Projects Per FTE By Others	0,074	0,056	0,049	0,016	0,052	0,054	0,393	0,225	0,569	0,400	0,272	-0,130
	0,003	0,024	0,009	0,382	0,006	0,004	0,000	0,000	0,000	0,000	0,000	0,000
Funding Of research Projects Per FTE Self-Funded	-0,014	-0,001	0,027	0,475	0,450	0,535	0,176	-0,059	0,127	0,188	0,164	0,031
	0,589	0,977	0,145	0,000	0,000	0,000	0,000	0,002	0,000	0,000	0,000	0,103
N administrative pers. per FTE Researcher	-0,066	-0,050	-0,079	0,149	0,111	-0,021	-0,346	0,164	-0,256	-0,226	-0,348	0,189
	0,008	0,046	0,000	0,000	0,000	0,270	0,000	0,000	0,000	0,000	0,000	0,000

University performance indicators (rating VTR, researcher in training, teaching load, funding, IF, administrative staff..) are correlated with the ownership index in a significant and negative way. The major linkage concern the external funding for research projects, probably because the national research projects are carried out by groups involving inter-research unit.

Table 6: Ownership index and scientific performance

		% researchers in training Per researcher FTE	% researchers in international mobility Per Researcher FTE	N researchers	N researchers present on Scopus Y2001-03	N researchers with products like lead author Y2001-03	Rating VTR 2001-03	mean IF VTR2001-03	Funding Of research Projects Per FTE By MIUR	Funding Of research Projects Per FTE By International Bodies	Funding Of research Projects Per FTE By Others	Funding Of research Projects Per FTE Self-Funded	N administrative Per FTE Researcher	Teaching load
Degree of ownership (mean) of all products VTR2001-03	Pearson Correlation	-0,046	-0,219	0,080	0,109	0,073	-0,231	-0,141	0,236	0,190	0,225	-0,059	0,164	-0,086
	Sig. (2-tailed)	0,014	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,002	0,000	0,000

At this level of analysis, the teaching load is prominently correlated with the number of researchers in training. The report has already been commented previously.

Table 7: Teaching load per University and academic performance

		Horizontal mobility	Youth academic index	Vertical mobility	N researchers	Rating VTR 2001-03	Degree of ownership (average) of all products VTR2001-03	mean IF VTR2001-03	% researchers in training Per researcher FTE	Funding Of research Projects Per FTE By MIUR	Funding Of research Projects Per FTE By International Bodies	Funding Of research Projects Per FTE By Others	N administrative person. Per FTE Researcher
Teaching load	Pearson Correlation	0,062	0,063	0,069	0,077	0,094	-0,086	-0,100	0,314	0,181	-0,140	-0,130	0,189
	Sig. (2-tailed	0,001	0,001	0,001	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000
	N	2777	2777	2218	2777	2777	2777	2777	2777	2777	2777	2777	2777

7. Conclusions

The scientific performance of human capital and the codification of knowledge through the publications into the organization are expression of the intellectual capital of University. However the ICU model doesn't include, into the human capital section, the indicators concerning the individual scientific activity and, into the organizational section, the research evaluation judgment. This analysis shows that the ICU must also consider these variables: the qualitative judgment; the ownership degree of publications, the ratio of products in which the inside researcher results the first author and the teaching load effects; to consider the weighted citations and to exclude the self citations. In the Italian context the experience of VTR is very useful to integrate the ICU model as a tool to manage and communicate the results of the University, with particular reference to the factors affecting the research activity.

This analysis confirms a convergence between the results of qualitative assessments of CIVR conducted with peer review method and bibliometric indicators collected for each product published in the same period in relation to each Italian chemistry researcher.

The correlations found between the results of VTR and the average number of weighted citations (per weighted products) confirm the suitability of the two indicators to measure the weight of scientific products and this is useful to analyze the quality of the publications produced by the organization. Less obvious is the correlation between the average number of weighted citations per researchers and the results of VTR, as the first can be considered as an indicator of productivity, where the VTR took into account a limited number of scientific outputs. In this last case, the tip of the iceberg has been evaluated, ignoring the consistence of the deeper area.

The correlation between the average of Impact Factor of products selected for the VTR2001-03 and the outcomes of peer review suggests a possible conditioning of the first one on the second (the referees have information concerning the impact factor in evaluation process). Besides the economies of scale found in the rating of VTR, the size shows a positive correlation with the funding of research projects per researcher (self-funded). The absence of correlation between the size and the bibliometric indicators suggests to investigate the hypothesis that the referee, in the peer review analysis, have been influenced by the size of Universities evaluated.

The indicators concerning researchers in training as well as those involved in international mobility are correlated. The reason may lie in the fact that most of researchers in training are those who are prominently involved in international mobility. Correlations between these indicators and the funding of research projects (by MIUR and by Others) are also relevant and significant, probably because

doctoral programs, research grants, and international mobility are all financed with these resources, therefore this information can improve the financial resources allocation system.

Rating VTR, international mobility and scholarships are negatively correlated with technical and administrative staff. The hypothesis which is reinforced by this work is that the administrative staff and technicians account for a variable that absorbs a part of resources shared with researchers rather than representing a resource for scientific research.

The positive relationship between scholarships and teaching load suggests an involvement of doctoral students in educational processes in relation to Faculties which have a higher ratio of students / teachers. The teaching load was found to be significantly and relevant correlated only with the number of researchers in training per researcher FTE.

Collaboration, measured by the ownership index of products evaluated in VTR in particular, is significantly correlated to external funding for research projects, probably because national research projects are carried out by groups involving inter-University units.

Finally, the analyses conducted suggest the following developments: to expand the analysis to another area where the scientific article belonging to ISI database represents the main vehicle to disseminate the results of scientific research (e.g. biology); to investigate the effect of cross-correlations, in particular with reference to the levels of department, faculty and scientific-disciplinary sector; to develop a model showing the dynamic relationship between the variables considered in the reference period; to elaborate a single primary key to assign each product to its author, in order to study the relationships between research groups; to introduce more variables, such as gender, age, place of birth, to analyze the researcher's scientific performance.

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High Education: Towards Development of Innovative Human Capital

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Abstract: This article discusses an activity based approach for teaching and learning applied in Higher Education to the development of Human Capital capability. According to the Leif Edvinsson, in one of the classic works in the area of Knowledge Management, Human Capital plays a significant role in overall Intellectual Capital. "… Intellectual capital is the sum of structural capital and human capital. Human capital refers to the knowledge, skill, and experience of the employees. Structural capital refers to the extension and manifestation of human capital. It includes tangibles such as the information technology systems, brand and company images, customer databases, organizational concepts and manuals." [Bucklew and Edvinsson, 1999] From other, social and economics points of view, Eva Gamarnikow and Antony Green summarised Human Capital thus: "In economic, capital refers to resources (whether financial or physical) that are used for the production of goods. It can also refer to all resources that bring in income. Social Capital and Human Capital are terms used in the social science to discuss analogous concepts with regard to social resources derived from social interaction (social capital) and individual development (human capital)." [Gamarnicow, 2003] For Higher Education in general, and for the development of activity based teaching and learning in particular, a comprehensive understanding of human capital is essential. Gamarnikow and Green clarify: "There are at least four ways of thinking about human capital. For economists, human capital has a specific, narrow meaning: It refers to the opportunity cost of individuals' or states' investing in education-forgone earnings plus the cost of education set against expectations of future (higher) earnings and economic productivity, respectively. At the other extreme, the term human capital is often as used merely as popular shorthand for education in general. The two intermediate perspectives are much more critical and compare the human capital approach to education unfavourably with other approaches. The first of these critical perspectives focuses on the social role of education. The other critical perspective focuses on the ways in which education operates at the level of the individual. It criticises the human capital approach for reducing education to the inculcation of marketable skills rather than taking a holistic approach and educating the whole person." As part of its strategic plans to support development of the Knowledge-based Economy, Southampton Solent University (SSU) aims to advance appropriate programmes of study. For this purpose an activity based approach for teaching and learning is in process of deployment at Faculty of Technology at SSU.
The article discusses definitions of Intellectual Capital, Human Capital, Social Capital, Knowledge Management and Knowledge, their interaction in the global information environment and in the particular context of Higher Education. It presents also the principles and design of an activity-based model for learning and teaching and relevant illustrations.

Keywords: Active learning, human capital, intellectual capital, social capital, knowledge management, knowledge

1. Introduction

In support of knowledge based economy development in its region, Southampton Solent University aims to implement an advanced activity-based approach for teaching and learning. Activity based learning and teaching is a model based on the concept for Active Learning, widely discussed in the literature [Robinson and Udall, 2003][Udall and Wright, 2005].

This model of education endeavours to optimise teaching and to maximise learning outcomes by effective employment of students' efforts. In this instance, it is enriched with novel subjects and topics from the area of Knowledge Management, essential for the sustained development of knowledge based economy. The aim of this article is to define the elements of the teaching as a set of activities, which will stimulate the students' creativity, will encourage them to build comprehensive knowledge, to develop sufficient understanding and to gain competitive practical skills.

2. Teaching framework

This section discusses considered framework for teaching determined by definitions of Social Capital, Human Capital, Intellectual Capital, Knowledge Management and Knowledge available in the literature. In order to justify the human capital creativity importance for community, it relates social, cognitive and technological issues with the process of teaching and learning.

2.1 Social Capital

According to the literature "Social Capital is one of the most popular, as well as the most contested, terms in contemporary social science. At the most general level, it refers to the quality and quantity of social connections, as captured in the popular aphorism "It's not what you know, it's who you know." [Michael W., 2003] In this context the attempts of corporate Internet sites, entertainment sites, and online services to move away from the static presentation of information to interactive communities, involving the members of the community in ongoing public dialog deserves attention [Levitt, et al., 1999].

Higher Education can be considered as an advanced environment for development of social capital

> *"In the contemporary academic literature, social capital is discussed in two related (but clearly different) ways. The first, primarily associated with sociologists, refers to the resources (e.g., information, ideas, support) that individuals are able to procure by virtue of their relationships with other people. These resources could be considered as a social capital in that they are accessible only in and through these relationships". [Michael W., 2003][Lin et al., 2001][Cohen et al., 2001]*

Other point of view to social capital refers to the nature and extent of involvement in informal and formal interactions. "From chatting with neighbours and hosting card nights to joining environmental organisations and political parties, social capital in this sense is used as a conceptual term to characterise the many and varied ways in which a community's members interact." [Putnam, 2000]

Harmonisation of various types of interactions with modern technologies and globally distributed knowledge in Higher Education Institutions could contribute to the effective process of learning and teaching and then to building of students innovative abilities.

> *"A range of social problems - crime, health, poverty, unemployment have been linked empirically to a community's endowment of social capital (or lack thereof), and with them a concern among citizens and policymakers alike that new forms of social capital must be constructed, ones appropriate to the technological and demographic realities of the twenty-first-century information economy." [Michael W., 2003].*

As an example, so called Communities of Practice could be considered as a highly successful form of social capital [Lesser and Prusak, 1999][Wenger et al., 2002][Wenger and Snyder, 2000].

In summary the novel form of association based on modern communications technologies offers a wide potential for constructing new forms of social capital. Therefore incorporation of this subject in new courses will contribute to the development of innovative thinking and skills.

2.2 Human Capital

In the literature Human Capital is determined as: "In economic, capital refers to resources (whether financial or physical) that are used for the production of goods. It can also refer to all resources that bring in income. Social Capital and Human Capital are terms used in the social science to discuss analogous concepts with regard to social resources derived from social interaction (social capital) individual development (human capital)." [Gamarnicow, 2003]

For sustained development of competitive human capital in general and for a feasible implementation of activity based teaching end learning in particular a comprehensive understanding of human capital is essential.

In the academic environment social – human capital has specific dimensions. Presence of modern technologies such as remote access to resources, which could be unavailable in local neighbour environments, combined with activity-based approaches in the process of learning, could be very productive and beneficial. Interactions and competitions in remotely distributed heterogeneous environments stimulate the ability to invent successful solutions and intuitive thinking. There is potention for negative outcomes. Special attention is required for example in student –computer interaction when the student could perceive and trust computer-mediated interaction with remote (and potentially malign) parties as interaction with friends and colleagues. This case must be explicitly addressed, to prevent unauthorised access and influence, particularly with younger students.

2.3 Intellectual Capital

Intellectual Capital has been described by one commercial organisation as: "…the knowledge, skill, and technologies used to create a competitive edge for Skandia. Intellectual capital encompasses the access to and use of all employees' knowledge and applied experience, and the organizational structure, technology, and professional systems within a firm. These elements translate into competitive advantage and monetary gains.

Intellectual capital is the soft and intangible part of the value of the company in addition to the financial balance sheet. It is sometimes referred to as goodwill, technologies, competence, etc. A more managerial definition of Intellectual capital is the sum of structural capital and human capital. Human capital refers to the knowledge, skill, and experience of the employees. Structural capital refers to the extension and manifestation of human capital. It includes tangibles such as the information technology systems, brand and company images, customer databases, organizational concepts and manuals." [BuckLew and Edvinsson, 1999]

Other authors try to determine Intellectual Capital together with Knowledge and Knowledge Management.

"The first use of the term is thus to describe the dynamic effects of individuals´ intellect. What caught the attention of managers (and management consultants) is that Tom Stewart makes IC the attribute of an organisation." [Sveiby,2001]. This publication summarises several definitions such as "Intellectual material that has been formalized, captured and leveraged to produce a higher-valued asset." [Klein and Prusak, 1994] and "Knowledge that can be converted into value." [Edvinsson and Sullivan, 1996] and then stress to the advantage for the firm "to transform the innovations produced by its human resource into intellectual assets, to which the firm can assert rights of ownership. One major task of IC managers is to transform human resource into intellectual assets." [Edvinsson and Sullivan, 1996].

2.4 Knowledge Management

"The origins of the term "Knowledge Management" are more obscure and have not been properly researched. " [Sveiby, 2001]. "The "Management of Knowledge" is very abstract and the notion is an unfortunate oxymoron. I prefer to define KM as: The Art of Creating Value from Intangible Assets. "Value" being both financial and non-financial. " [Sveiby, 2001].

Knowledge Management (KM) can be considered as a process, which includes several stages amongst, which perhaps are knowledge creation, identification of knowledge value, knowledge transformation and presentation, knowledge share and knowledge utilization. A specific understanding on KM add to the definition and interpretation of this term:

> *"You can't manage knowledge — nobody can. What you can do is to manage the environment in which knowledge can be created, discovered, captured, shared, distilled, validated, transferred, adopted, adapted and applied. " [Collison and Parcell, 2004].*

In the modern information space Knowledge Management acquires an e-dimension [Frappaolo, 2006]. It is interpreted in the following manner: "Clearly, knowledge management is not about technology. But, technology has heightened the need for, and powers of, knowledge management. Practical technology approaches to knowledge management include: - personal profiling; - categorization/taxonomy; - visualization of knowledge; - search and retrieval; - agents; - workflow; - decision-support." [Frappaolo, 2006].

However, some research and experimental results suggest slightly different understanding about technologies, namely digital electronic systems are capable of generation of processes, which independently identify knowledge, essential for certain purposes, then abstract, transform and store this knowledge and then use it in order to solve given task. This in high extent could be considered as a model of the purposeful behaviour of biological systems. [Penev, 2008]

Information technologies also relate social capital and knowledge management. "A range of technologies can facilitate intermediation. These technologies are especially valuable for organizations that are highly distributed geographically and therefore less likely to encounter face-to-face or synchronous communication in the normal course of interaction among knowledge workers. In

support of the need for personal communication, intranets, instant messaging, online collaboration, e-mail and groupware applications can serve as meeting-places for establishing contact between knowledge seekers and knowledge providers." [Frappaolo, 2006].

2.5 Knowledge

Attempts to define Knowledge Management raise the question "What is knowledge?"

Various literature sources propose several points of view. Two types of interpretation can be identified in the domain of KM . "IT-Track KM = Management of Information. Researchers and practitioners in this field tend to have their education in computer and/or information science. They are involved in construction of information management systems, AI, reengineering, group ware etc. To them knowledge = objects that can be identified and handled in information systems.

This track is new and is growing very fast at the moment, assisted by new developments in IT.

People-Track KM = Management of People. Researchers and practitioners in this field tend to have their education in philosophy, psychology, sociology or business/management. They are primarily involved in assessing, changing and improving human individual skills and/or behaviour. To them knowledge = processes, a complex set of dynamic skills, know-how etc, that is constantly changing. They are traditionally involved in learning and in managing these competencies individually - like psychologists - or on an organisational level - like philosophers, sociologists or organisational theorists. This track is very old, and is not growing so fast."

However definition of the second track "Knowledge – Process" may face criticism. "a complex set of dynamic skills" is a static entity different from process interpretation and "constantly changing" is learning or knowledge updating rather than knowledge itself.

Other modern authors proceed from their particular experience:

> *"Most people have an intuitive sense that knowledge is broader, deeper and richer than data or information. . . . Knowledge derives from minds at work. … Knowledge is a fluid mix of framed experience, values, contextual information, and expert insights that provides a framework for evaluation and incorporation new experiences and information. It originates and is applied in the minds of knowers. In organisation, it often becomes embedded not only in documents or repositories, but also in organizational routines, processes, practices, and norms." [Davenport and Prusak, 1998, p5]*

Asian understanding on the notion knowledge is suggested implicitly by native philosophic traditions: "Japanese Intellectual Tradition based on Asian philosophers – Buda, Confucius states: - oneness of human and nature; - oneness of body and mind; - oneness of self and other."

[Nonaka and Takeuchi, 2000, p27]. Contributing to knowledge interpretation is discussion on explicit knowledge and tacit knowledge [Nonaka and Takeuchi, 2000, p27], which can be related with earlier speculations on "what is knowledge?" This question has been the subject of investigation and discussion for thousands years.

Intuitive cognition is defined as an act of apprehension in virtue of which the intellect can evidently judge that the apprehended object exists or does not exist, or that it has or does not have some particular quality or other condition; in short, an intuitive cognition is an act of immediate awareness in virtue of which an evident judgment of contingent fact can be made.

Abstractive cognition is defined as any act of cognition in virtue of which it cannot be evidently known whether the apprehended object exists or does not exist, and in virtue of which an evident contingent judgment cannot be made. William of Ockham (1285 – 1349)" [Encyclopaedia of Philosophy, Vol.8, p. 308]

> *"Knowledge of the external world can be obtained either by intuition or by abstraction. . . . By abstraction, one obtains only an indistinct and confused image of a thing. Tommaso Campanella (1568-1639)" [Encyclopaedia of Philosophy, Vol.2, p. 12.]*

Relation of abstraction and intuition with knowledge could clarify knowledge identification and acquisition. The Cognitive value of Abstractions could be summarised in: - understanding and learning of reality; - thinking and imagination; - behaviour and action; - change of reality. Then abstraction – classifications could contribute significantly to the discussion about the process of knowledge management. Abstractions can be classified as: - abstraction as an *entity* and as a *process*; - levels of abstraction; - temporal, spatial, event and process abstractions. Then abstraction – definition contribute to the knowledge definition namely: Abstraction is a form of cognition, based on separation in thought of essential properties, features, characteristics and relationships. Main types – separation, generalization, idealization. [Penev, 2001]

Now managers come close to the understanding "By its own Knowledge is power. (Nam et ipsa scientia potestas est.) [Francis Bacon, 2008].

Perhaps a definition, which bridges information and cognitive interpretation of knowledge, is: "Knowledge is the perception of the agreement or disagreement of two ideas." [John Locke, 1996], and only Plato's sentence "knowledge is truth beliefs" could be added in concussion of this section.

3. Active learning and teaching

The teaching approach, which is in the process of implementation as mentioned above, is based on the concept for Active Learning [Udall and Wright, 2005]. The course consists of separate sections, referred to as activities. Each activity starts with a seminar where a number of academics and experts introduce relevant social and technical issues. The seminars are presented and distributed across the teaching period. After the seminar the section includes definition of certain tasks to the learners. For successful completion of the task the student should be encouraged to do research, independent investigation and to attend lectures in relevant available units. A statement of task in the presence of knowledge deficit indirectly creates a dilemma for students – either study and learn how to solve given task or to invent a method to solve it. In addition specific characteristics of this approach can be described as simultaneous multilevel student education. This characteristic requires determination of the expected outcomes and criteria for assessment for each particular level. More details about learning outcomes could be found in earlier publications [Penev and Rees, 2008].

3.1 Learning and teaching strategy

Integration of learning and teaching methods involves seminars, small group tutorial sessions and practical exercises used as the means of providing comprehensive understanding of the advanced concepts, techniques and tools that are involved in the activity. [Penev and Rees, 2008].

The objective of the pedagogical approach primarily based on activities is to encourage and develop students creativity and innovative practical skills in the context of theory and best practice. The linkage is developed through seminar and group work elements, and demonstrated and reflected upon though the individual work and assessment vehicles.

> *"The close blend of theory and practice, characteristic of Southampton Solent University's curriculum approach, is developed particularly through the practical tutorials, where the students get the opportunity to see the implications of various approaches demonstrated through their own work. This bridges the cognitive skills development gap through incremental assimilation and embeds genuine understanding of the professional implications of the adoption of the various approaches. Although role differentiation (administrator, content developer, etc.) is not practiced, the necessary awareness will emerge from the acquired skills base." [Penev and Rees, 2008].*

Details on assessment, employability and complement with existing units are already published.

4. Conclusion

The article introduces a framework of activity based approach for teaching and learning. It overviews a general knowledge in the field of Knowledge Management, which will be exploit in order to enhance development of innovative and competitive human capital. The aim is to take advantage of exciting at Southampton Solent University knowledge assets, in terms of available units and academics expertise, which can be optimised in order to deliver diversification of the portfolio of courses and to meet the challenges in Higher Education for extensive development of social and human capital.

For future work the case will be subject of rigorous study after planed start from next academic year. The objectives of further investigation involve analysis of collected sufficient material which together with applied methodology will be a subject of additional examination. Further research will focus on comprehensive evaluation of vide range relevant literature sources, which could benefit modern knowledge in this field. The article contributes to the discussion for the role of High Education in generation of human capital.

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Social Capital in an Intra-organizations Higher Education Setting

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Abstract: Historically, the higher education system was the first knowledge economy. Today, though, it is no longer alone; it is but one knowledge industry among many. Academia is currently facing many challenges: new laws (intellectual property), competition, and internal challenges such as financial problems and technological learning. In order to meet the challenge of joint research that goes beyond the boundaries of institution, nation and discipline, the higher education system needs to take action to rationally manage both internal and external knowledge and capital. Universities must consolidate learning procedures, some of which exist and are based on the academic culture, and use all its social capital and "collective value of all 'social networks' and the inclinations that arise from these networks to do things for each other". (Putnam, 2000).

Keywords: higher education, social capital

1. Introduction

Social capital is defined by Coleman (1998) as a resource of people relationships, enabling action in order to achieve goals and objectives, usually shared by the people assisting a respective individual. From this research it emerges that many processes in the Israeli higher education system occur primarily in intra-organizational frameworks. The processes utilize activities, terminology and frameworks taken from the academic side of the university. The production and use of social capital from a network of colleagues from other universities is implemented in management as well as academic forums. Those settings of networks, or communities of practices in higher education systems, where the knowledge and learning processes occur, consist of representatives from all of the universities in the country we researched.

The purpose of this study is to present a grounded theory for the management of organization-wide technological changes in Israeli research universities. The research was guided by two principal questions: What are the sources for organization-wide technological changes in the higher education system? What are the central processes used for managing change in organizations of this type? The clearest outcome of this research is the importance and use of social capital in intra-organizations higher education settings in Israel. Further implications of the research show the social capital concept as a managerial tool for higher education system efficiency and effectiveness.

2. The higher education system

Educational organizations are different in essence from business or commercial organizations. The managerial parameters are different, the organization functions differently, and the organizational values and methods by which it is judged for its activities are often different in substance. An educational organization fits the definition of a “loosely-coupled” organization. The term “loosely-coupled” is used to describe a situation in which two phenomena share several common variables.

In a loosely-coupled system, the subsystems are partially connected to each other, as are their operations while each subsystem maintains its own identity and autonomy. There are only limited relationships of dependence and supervision between the various parts of the system. Loose coupling in an organization is primarily expressed by the limited guidelines provided to direct the activity of any particular unit, yet all of the various units are included in a single, more comprehensive organization, whose instructions do obligate people working in those units. The degree of connection between the two systems, though, depends on the activity of the common components.

Researchers have also defined universities as “organized anarchy” (Cohen, March and Olsen, 1972). Since a university does not have unequivocal goals but rather goals that are unclear or even contradictory, standard theories of management, decision-making, and control are inapplicable. The goals of the university, despite their universal definition, do not meet the basic criteria for well-defined goals. Questions regarding the university’s goals: – Have they been achieved? Are they problematic? Might they be achieved in the future? Do most factions within the university agree to the goals? –

cannot be answered. In most cases, overly generalized definitions of goals are detrimental to clarity. But focusing clearly on a defined goal thwarts any possibility of the goal's acceptance by a majority of the university's senior decision makers (Cohen, March and Olsen, 1972). The researchers noted that policies of higher education systems are characterized by a lack of consistency. That, combined with the inability to reach agreement in those cases where operating goals have been defined, makes universities difficult to manage.

The changes occurring around the world influence not only organizations and government agencies, but also universities. The forces of change acting on higher education are varied (Scott, 2003):

- **Increased competition**: Competition with other domestic universities as well as with foreign universities and private institutions.
- **Significant decrease in government funding and public scrutiny**: This change is primarily a result of a changed perspective, one that sees public education not as a service but rather a valuable product. Education is not an investment, but rather an expense that requires strict scrutiny of government spending on it.
- **Mounting trend towards consumer rights**: The high cost of education leads students to insist on receiving a quality product and good service from the university. Students are even willing to initiate legal action.
- **Increased distribution of communications and information technology in all areas of life**: In the past, colleges and universities had a monopoly on up-to-date, quality information. Today, this information is available on the Internet and in many other formats, some of which do require payment (Kaiser, *et al*, 2003). The higher education system has been transformed into a complex system that is open to external influences, from domestic and international forces. The system has become dynamic; therefore control, current data, and information are needed.

3. Changes in the Israeli Higher Education System

The accelerated changes that began in the late twentieth century had a major effect on Israeli universities. As elite institutions, the universities must compete for students and an ever-shrinking pool of resources while also contending with a trend towards increased government intervention (Guri-Rosenblit, 2002). Competition for students intensified even more following the establishment of the first private colleges in Israel and the transformation of the public teachers' colleges into academic colleges that began to offer bachelor's degrees in a wider range of subjects.

On the one hand, the society that funds the universities' cultural and scientific activity demands accountability and managerial leadership. On the other hand, the demands of the economy, technology, and clients require that the university abandon the "ivory tower" in which it has long resided without major changes, and adapt itself to the environment. The Meltz Committee Report on Higher Education recommended structural changes and noted that the current structure of the universities prevents free movement between units and limits the possibilities for essential changes and renewal. "The current structure of most academic institutions is characterized by loose coupling between its academic and general units. The system's deficiencies are found at several central weak points related to the work patterns of its official bodies, the distribution of functions and authority, and the mutual relationship between them (Council for Higher Education, 2000).

The Meltz Report (Council for Higher Education, 2000, p. 4) notes, "In the organization of the university there is a gap between the need for using new information technology and what actually exists. The university's current infrastructure for information technology requires an integrative perspective. And there is a need in large business frameworks and universities around the world to establish a position for a person to be responsible for information systems." The recommendations were intended to help the universities achieve their goals and respond quickly to changes taking place in their scientific, social, and economic environment in Israel and internationally.

This field research was based on thirty-four interviews with key actors in the higher education system and in the universities themselves. "Key actors" were defined people who were involved in the process of deciding on change before it was implemented, and functionaries who worked on the actual implementation. We also interviewed some university staff members at whom the change was directed. The interviewees included officials on the Planning and Budgeting Committee and other inter-university frameworks who are involved in changes of types being studied, the managers of the

E-learning programs and ERP project coordinators at each university, managers of the computerization and technology units, senior officials of the universities and faculties, as well as the objects of change; academic faculty members and managers of various university departments on different levels. During the interviews both types of change processes were considered.

4. Research method

The constant comparative method, an inductive method for theoretical discovery (Sabar Ben-Yehoshua, 1990), was used as the basic research method. It includes systematic coding and analysis of a theoretical sample for theoretical generalization that is integrative, consistent, and closely linked to the data. The method offers a flexible space that supports the construction of a creative generalization of the theory. The constant comparative method includes five stages:

- Comparison of events and placement in a set category ("open coding")
- Integration of categories (according to variables and sub-variables) ("axial coding")
- Definition of a hierarchy, connections, and relationships between categories ("selective coding")
- Development of a theoretical framework
- Writing the theory and comparing it to existing theories.

During the first stage, "open coding," the initial findings of the research (the information derived from the interviews with key actors in the universities, faculty members and officials) were examined and repeated. Characterizable themes, subjects and headings were identified and named. The material was then sorted on the basis of these subjects and themes according to established analysis units. The themes served as preliminary categories and guidelines for the process of structuring the research, "the theoretical sample." In the second stage, "axial coding," analysis was done along the axis of the categories that had been formulated. They were then refined and precise definitions were developed for the categories on the basis of information gathered during the interviews.

This was followed by "selective coding" in which more data was gathered and coded according to the existing system of categories, in order to enhance the internal validity of the findings. Augmenting the amount of data belonging to each category is necessary to confirm that the existing structure and categories do indeed exist in the reality being studied. These stages are conducted simultaneously. During each stage it is possible to return and redesign the categories, criteria, and information sources. To develop the theoretical framework, connections of many types are made between the various categories. One category might be interpreted in terms of another with effort made to determine which category is the cause and which is the effect. Possibilities examined during this stage include connecting categories via a hierarchical, conceptual model, identifying resemblances between categories, dividing categories into groups with similar characteristics, or representing them in graphic form to enhance understanding of the process.

The final stage consists of describing the findings and conclusions in theoretical terms relevant to the research field and constructing a system of constraints or rings that situate the research object (the universities being studied) in the broadest possible, universal terms.

5. Findings and discussion

Several themes emerged from the thirty-four interviews conducted during the information gathering stage and these were sorted into categories defined by set criteria. Within the framework of these criteria, the various themes and subjects that arose from the interviewees' comments were gathered into general fields, each with a clear central idea. Criteria for distinguishing between the various fields and defining the "threshold" for assignment to each category were established to ensure that each particular expression or idea was relevant to the category and to differentiate between the various ideas and categories. The main categories were further sorted into subcategories.

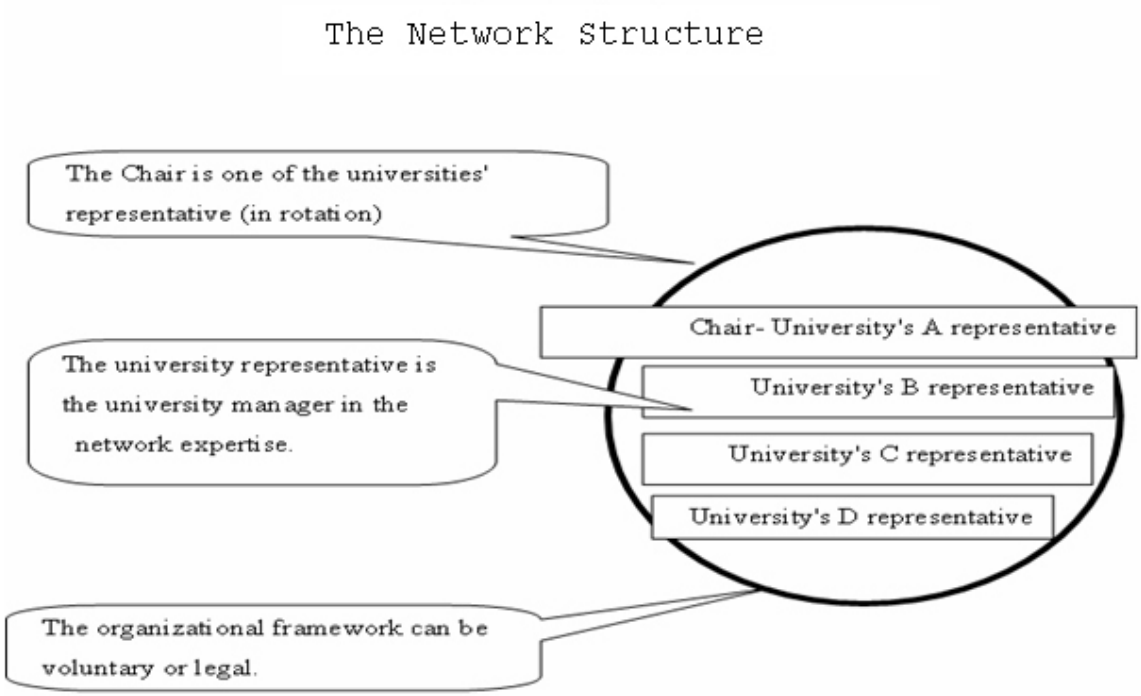
Table 1: Meta-categories and Sub-categories

Meta-Categories	Sub-categories	Sub-categories	Sub-categories	Sub-categories	Sub-categories
Causes of change	Internal factors	External factors	Objectives of the change		
Agents for change	Change agents	Change leaders			
Substance of the change	Substance of the change				
Mechanism for change	Analysis and mapping	Cooperation and learning	Managing the change process	Transmitting the message	Opposition

The cooperation seems to be fundamental to them. Expressions included in the cooperation and learning category included: "The cooperation with University X is very close" (head of computation center). "You cannot receive unless you cooperate; you must also give" (head of computation center). "There are questions and consultations and very large amounts of information is shared" (senior faculty member). "We have many joint professional forums, on almost all levels" dither cooperation between us is exceptional. The cooperation goes beyond sharing information; it is the foundation for taking action and making decisions (senior administrator). "The universities decided to work together" (ERP project manager). "There is complete cooperation; materials and samples are submitted (ERP project manager). "University A requests materials and our opinion of processes or ways for implementing them, it's a two-way street" (consultant). "Other universities work together closely even if the projects are dissimilar" (ERP project manager). "We planned this project together with University A" (computer unit manager). "Cooperation is important for making the system more efficient" (senior member of the computation center committee). "Cooperation is educational for everyone. Too bad it is not done with greater vigor" (consultant). "Everything is done with close cooperation, throughout the entire process, even now (senior technology official). "Although we are currently at different points in terms of the process, there is complete cooperation for personnel, managers, experts and experience" (senior faculty member). The cooperation that exists throughout the system is not specific to a particular technological change. All interviewees on all levels and from all parts of the system (academic, administrative, internal and external) spoke about cooperation and learning.

From the research, it emerges that the change management process occurs primarily in intra-organizational frameworks and networking. The process itself utilizes activities, terminology and frameworks taken from the academic side of the university's work developing new knowledge in academic disciplines and it is very similar to the process of knowledge management. The process involves a high degree of cooperation and working in a networking mode in any given field and issue. This pattern emerges regarding cooperation in the information technologies, human resource management, general management, as well as academic management, etc.

The networking pattern in the Israeli higher education system, where knowledge and learning processes occur, consists of representatives from all of the universities. They can be either voluntary entities (not legally mandated) that grow naturally out of the members' work, or obligatory, legal entities that are established by the National Committee for Planning and Budgeting Higher Education or another relevant government agency. They are cooperative frameworks that bring together professionals in a variety of fields (for example: research, senior administration, library science, computerization, E-learning, human resources), with similar seniority. Leadership of the communities rotates between the representatives of the different universities who serve as chairperson for a given period and assist with the organization of meetings and activities.



The network functions as expert Communities of Knowledge whose goal is cooperation for the purpose of facilitating the best possible implementation of the tasks for which the members are responsible and achieving the universities' goals. While promoting the purposes of each organization (university) this framework also brings together managers from across the higher education system. They meet for on-going activity at regularly scheduled intervals, by demand or as necessary

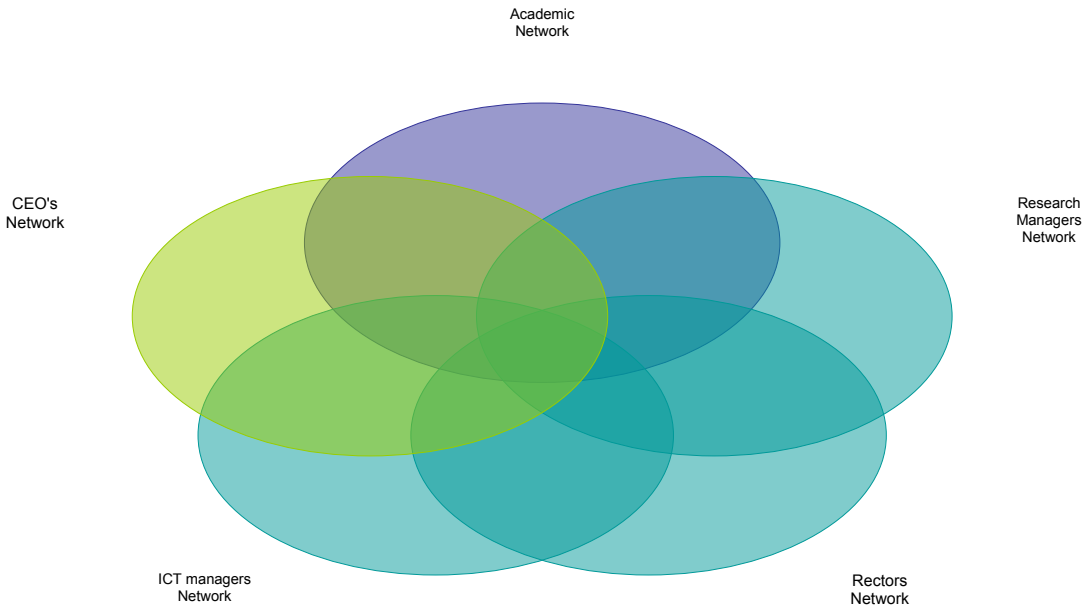
The networks were initially founded to help representatives of the universities function more efficiently and guide the university's work in a particular field, using existing know-how as social capital. Some networks were established as the result of decisions made by the Committee for Planning and Budgeting or other legally and organizationally mandatory frameworks. Examples of these technological communities include the Inter-University Computation Center (*MACHBA*), the Israel Center for Learning Technologies (*MEITAL*) and Information Services (*MALMAD*), whose main function is the acquisition, licensing and operation of information services for all Israeli universities, the Committee of Library Directors, the Standing Library Committee and the Computation Center Committee of the Committee for Planning and Budgeting.

The committees function as expert Communities of Knowledge whose goal is cooperation for the purpose of facilitating the best possible implementation of the tasks for which the members are responsible. While promoting the purposes of each organization (university) this framework also brings together change agents from across the higher education system. They meet for on-going activity at regularly scheduled intervals, by demand or as necessary. One can appreciate the use of social capital as the sum of the network knowledge and experience resources executed by individual managers who are members of a network in institutionalized relationships for long periods of their professional lives.

This process of social capital and knowledge management used by the inter-university networks as a mechanism for change includes mapping and analysis of knowledge, cooperation and collaborative learning, and enables the universities to adapt themselves to the environment. Change management is accomplished by mapping existing knowledge and through cooperative learning. Transmitting the message of change and dealing with opposition are handled through cooperative effort, support, and intervention. All the theories define these as building an organizational climate that encourages experimentation and change, reducing opposition, diminishing its force, and sometimes eliminating its very source. Cooperation and support from the networks reduces the politicization of an organization, eases anxiety about the future and increases commitment to the change, as well as contributing to a deeper understanding of the need for change and the opportunities that it creates. The learning

process facilitates acquaintance with the people initiating the change and with the internal and external agents of change, making it possible to deal cognitively, emotionally, and behaviorally with the expected change, thereby increasing commitment to it. The diagram below portrays the relation between the networks in which any given network is influencing the other networks, as well.

INTERRELATION BETWEEN NETWORKS



The process used by the network begins by relating to a defined organizational purpose or organizational need. Knowledge inputs are examined within the organization or in its vicinity. The existing knowledge, both internal and external to the organization, is analyzed and alternative activities are mapped. The processes of cooperation and transmitting accumulated knowledge and experience between members of the group creates new knowledge to be used for decision-making and activating the change. The process is accomplished through cooperation and the sharing of information among participants, utilizing all their knowledge, best practices, and accumulative experience. These processes include the extensive use of individuals' connections in the social networks and connections among networks themselves or as Field (2003) puts it "relationships matter".

6. In conclusion

For generations, universities have dealt with the creation and preservation of human knowledge through research and evaluation, in a society that places the highest value on physical and financial assets. In a knowledge society, where the most important assets are knowledge assets, human capital, and social capital, instruction and education play a very central role.

The conclusion emerging from this research indicates that Israeli universities and the higher education system have used social capital processes and mechanisms for managing the organization-wide technological changes that have occurred during the last decade. The organizational and cultural framework and infrastructure already exists as part of the collegial culture of academia and is suitable because it makes use of existing academic language, culture, and ethos.

Summation of the data gathered in this study indicates that management of organization-wide technological changes at Israeli universities occurs without a directed, rational management model. Furthermore, there is no methodology, guidelines, or even defined know-how, neither in the universities nor outside of them, in the regulatory agencies. Analysis of the research data reveals that an (irrational) mechanism for managing organization-wide technological changes is operating in

Israeli universities and in their environment. Through it the universities influence each other using the social capital concept. The people and the system use colleagues' experiences and connections and keep them for the long run in order to achieve mutual goals and objectives.

Managers in universities work together to achieve "things that they either could not achieve by themselves or could achieve with great difficulty. They tend to share common values with other members of the network to the extent that these constitute a resource they can capital" (Field,2003, p.1)

Members of the network “digest” and “process” the information they receive from the university’s members. They map the knowledge in their possession (either in the community or their home institution), analyze the alternative solutions available in Israel or abroad, while developing a stance and new information in order "to make things happen" (Field, 2003, p.2)

On this basis they then make decisions and implement them at their home institution or throughout the higher education system. The network's members trust their friends, help them, and count on their help and advice. "They share mutual understanding and values and act for mutual goals" (Field, 2003).

This system is undefined and unnamed, yet it is a good example of putting social capital in use. Although the process is directed at other goals and is intuitive (at best), or partial (at worst), it is well-established. This understanding, which emerges from the research findings, facilitates the description of a consolidated model that is recommended for use in Israeli universities.

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Communities of Practice: Powerful Environments for Inter-organizational Knowledge Alliances?

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Abstract: The purpose of this research is to gain understanding about how communities of practice might serve as rich environments for generating knowledge alliances between members of different, and sometimes competing, organizations. Communities of practice (CoPs) are groups of people who come together in order to learn, solve organizational problems and innovate in their field. Knowledge alliances are an important way for organizations to increase their learning in order to innovate and remain competitive. However, knowledge alliances between competing organizations can be difficult to cultivate and are not always productive. This has to do with factors such as mistrust, problems with communication between unlike actors, and an inability to exploit knowledge gained from outside sources. The literature on communities of practice illustrates how these self-directed, practice-based learning environments can help overcome cognitive and motivational barriers to knowledge exchange by raising social capital among participants. However, most work on the subject employs an intra-organizational perspective; there is little research on how communities of practice work when participants come from different organizations. Understanding how CoPs can be used as mechanisms to help overcome specific barriers to inter-organizational knowledge alliances could aid organizations in improving their learning and consequently improve its capabilities.

Keywords: communities of practice, knowledge alliances, social capital, and knowledge transfer

1. Introduction: why firms enter alliances

Organizations are continually facing critical challenges in order to achieve and maintain competitive advantage, regardless of sector, size or age (Collins & Hitt 2006). Developing strategic alliances is one competitive strategy employed by many organizations seeking market access, economies of scale, new competence development, and other critical resources (Gulati, 1998; Larsson, Bengtsson, Henriksson, & Sparks, 1998). A strategic alliance is broadly defined as any type of cooperative agreement between two or more organizations and can take different forms such as joint ventures, research and development initiatives, supply and distribution agreements, marketing agreements and technological alliances. Knowledge alliances allow for access to new knowledge, which in turn creates possibilities for organizations wanting to undergo change and renewal. The actual introduction of new knowledge into the organization is the basis behind innovation, change, and core competence development (Crossen, Lane, & White, 1999; Nonaka & Takeuchi, 1995).

According to Gulati (1998) the formation of alliances is guided by the social network in which the organization operates. Gulati points out that alliances and alliance formation are constructions closely linked to how an organization is embedded within a social network. This would imply that access to networks alone is not enough for organizations to try and initiate an alliance, but that a certain level of embeddedness within the network is requisite.

Alliances allow for fast and flexible access to partner organization's knowledge base and help leverage one's strengths (Inkpen, 1998; Larsson et al., 1998). However, forming alliances is not a simple process. Problems associated with such things as trust, knowledge transfer and uncertainty (Vangen & Huxham, 2003) are major hindrances.

Communities of practice are one type of social network that organizational members may participate in as part of their professional life. We define communities of practice as groups of professionals who come together in order to exchange and build knowledge, solve organizational problems, and innovate in a particular field (Wenger, McDermott, & Snyder, 2002). These theme-based social collaborative learning environments have been shown to be effective mechanisms for knowledge exchange and innovation in varying sectors (Brown & Duguid, 2001; Hakkarainen, Paavlova, & Lipponen, 2004; Wenger, 2000).

Communities of practice can vary in their degree of locality. Some are situated within a single business unit of an organization, some cross intra-organizational borders, and others are inter-

organizational and industry wide. An example of the latter type of community of practice is the focus of our case study.

In this paper we take a socio-centric approach to alliance formation, rather than a transaction cost or strategic interdependence one. We do this because these theories cannot always explain the actions of participants in forming alliances (Sampson, 2004). Following this, we propose that in a network like a CoP, social capital works to promote alliance formation in several ways. Firstly, it helps to reduce uncertainty – a major barrier to alliance formation – between organizations. Mistrust is a mechanism for uncertainty, as is the worry that knowledge transfer and absorption within an alliance will not happen efficiently, or even at all. By building shared understandings, CoPs reduce knowledge transfer and absorption problems and thus reduce the uncertainty surrounding these issues. We argue that the ongoing interactions of individuals participating in a community of practice help build social capital and thus facilitate alliance formation. We use a case study of an existing inter-organizational CoP to help us explore this question.

The paper is structured as follows: first we present a theoretical framework for understanding alliance formation and the role social capital plays in it, followed by a look at social capital formation in CoPs. We then present the case study and draw some conclusions from the data gathered.

2. Knowledge alliance formation

Much of the literature looks at why alliances form (exogenous factors), not how (endogenous factors) (Gulati, 1998; Gulati & Gargiulo, 1999). In this paper we mostly focus on the later question of how alliances form, and, more importantly, how can they be facilitated in their initial formation. In this section we first look at the motivational factors behind entering an alliance followed by a discussion of how knowledge alliances form, specifically looking at what factors facilitate the process. Motivations and search for partners mirror the first two steps of the alliance-forming sequence as proposed by Gulati (1998), who refers to them as 'decision to enter an alliance' and 'choice of appropriate partner'. Kogut (2000) lists three key motivations for firms to decide on entering an alliance: transaction costs, market power and knowledge acquisition.

The second step in alliance formation concerns the question of partners, which is closely linked to the decision to enter an alliance (Gulati, 1998). Strategic interdependence is one perspective on alliance formation that can explain why an organization chooses a specific alliance. This perspective considers that organizations work with whom they share the greatest interdependence. However, a critical strategic interdependence perspective alone cannot explain alliance formation (Gulati & Gargiulo, 1999). There is still the question of how organizations learn of new opportunities and more importantly, mitigate blocking factors such as uncertainty, that are associated with alliances

Being embedded in a social network opens up possibilities for organizations looking for new alliances. The information an organization has about others in the network helps to mitigate uncertainty, a main driver of organizational action. Other issues such as trust and shared vision also play a role. This is referred to as social capital and in the following sections we look at how social capital is an important enabler for alliance formation.

2.1 Social capital, alliance formation and communities of practice

In the preceding section we referred to Gulati's (1998) point that being embedded in a social network is an important factor for organizations trying to forge alliances. Here we expand on this. While the importance of social capital in business is increasingly recognized (Adler & Kwon, 2002; Ratten & Susano, 2006), it remains a poorly conceptualized, multidimensional construct (De Silva et al., 2006). However, the idea of social capital can still be a powerful explanatory tool, especially where other concepts of individual-based capital (human or financial) may fail to explain a phenomenon, such as alliance formation.

> *"Social capital is defined by its function. It is not a single entity but a variety of different entities, with two elements in common: they all consist of some aspect of social structures, and they facilitate certain actions of actors – whether persons or corporate actors – within the structure. Like other forms of capital, social capital is productive, making possible the achievement of certain ends that in its absence would not be possible." (Coleman, 1988, p. 98)*

Social capital thus has both individual and aggregate components (Walter, Lechner, & Kellermanns, 2007).

Nahapiet and Ghoshal (1998) propose that social capital can be divided into three dimensions: structural capital, relational capital and cognitive capital.

Structural capital considers the systems of networks in which an organization operates and refers to the frequency of contact and connectivity among actors in a particular network. This implies that structural capital has dimensions of network membership or ties (who you know) as well as patterns of configurations (how you are connected). Structural capital is important because it facilitates access to knowledge, financing and other important resources to members in the network, regardless of whether or not they participated in the creation. The potential structural capital of a network is one reason that organizations join one.

Ratten and Susano (2006) suggest that structural social capital can be a result of a built environment. While some CoPs may form spontaneously, many are designed especially as mechanisms for knowledge exchange and development, thus form the network configuration itself. The case study we discuss below is such an example of a designed environment.

CoPs build two types of structural social capital known as bonding capital and bridging capital. Bonding capital considers close horizontal ties among actors with similar backgrounds and principles (Lee & Jones, 2008). Bridging capital is associated with vertical ties among members of open networks and is linked to Granovetter's (1973) concept of weak ties. Core members of a CoP build bonding capital, while members on the periphery benefit from the bridging capital within CoPs (Lave & Wenger, 1991).

Relational social capital compliments structural social capital by providing the necessary capability for network members to access group information, knowledge and resources (Lee & Jones, 2008).
Much of the literature seems to point to trust as the underlying mechanism of relational capital. We follow Nahapiet and Ghoshal (1998) by understanding relational capital to have the following four overlapping constructs:

- Trust: Trust is perhaps the most important enabler of relational capital (Collins & Hitt, 2006). Trust is important for facilitating cooperation and collaboration; high levels of trust make for freer and more effective exchange of knowledge and enables creativity (Nahapiet & Ghoshal, 1998). Some level of trust is essential for collaboration to start (Vangen & Huxham, 2003) and it is relational trust that allows individuals to turn social ties into economic ones (Lee & Jones, 2008).
- Obligations: Obligations are the commitments, rights, and duties of the collective. An obligation is the act or course of action to which a person is morally or legally bound and thus relate to ideas of reciprocity (Borgatti & Cross, 2003). The adages "there is no such thing as a free lunch" or "one hand washes the other" illustrate this concept.
- Norms: Norms are standards of acceptable conduct that guide and regulate the life within a collective. Norms are socially – not individually – defined and held, and are crucial for a group to function. For example social norms such as openness to criticism and tolerance of failure are essential for innovative groups (Van den Bossche, Gijselaers, & Kirschner, 2006).
- Identification: Identification considers social cohesion – it is the fit between individual identity and the larger collective. Social cohesion motivates individuals to act out of concern for the group's well-being, rather than expected rewards (Olivera & Straus, 2004). People who identify strongly with the network are also more likely to ask for help as well as help others.

Relational capital is often conceptualized at the level of the individual (Collins & Hitt, 2006; Gulati, 1998). Regular interaction between individuals over time can form close personal relations. Trust and cooperation between individuals have a two-way interaction. In other words, trust facilitates cooperation and continued cooperation itself breeds trust (Nahapiet & Ghoshal, 1998; Vangen & Huxham, 2003). CoPs are based on long –term collaborative relationships that lead to close personal ties (Wenger et al., 2002) and identification of individuals with the group (Wenger, 1998).

While norms can be implicitly understood, sometimes they are explicitly discussed by members of the community, (Saint-Onge & Wallace, 2003) and form actual boundary objects that help define the community itself.

Finally, a CoP develops its own system of informal currency, which governs commitment and obligations (Akdere & Roberts, 2008). Community members feel morally obligated to both the collective and other individuals. Obligations and reciprocity are usually inherent in a CoP (Laathlean & Lemay, 2002).

Cognitive social capital is found in shared understandings and meanings, and is vital to inter-organizational knowledge exchange and learning (Inkpen & Tsang, 2005; Ratten & Susano, 2006). A major reason organizations join alliances is in order to gain new knowledge, but knowledge often has a tacit aspect and can be difficult to transfer. Cognitive social capital helps organizations with their capacity to absorb new knowledge via individuals participating in networks. Borgatti and Cross (2003) found that strong ties in closed networks are needed for cognitive social capital to form.

CoPs build cognitive social capital in several ways. Firstly, they are theme-based networks that focus on a specific domain and bring together actors who may already have a shared practice as well as a shared language. For example the group from the case study has a common background in the field of labor relations and members use a language specific to that field. Coming to a shared understanding means first an individual must externalize his thinking by objectifying it into tools that others can appropriate, adjust and refine (Baker, Hansen, Joiner, & Traum, 1999; Nonaka & Takeuchi, 1995). However, different discourses or thought patterns might impede these processes. In this sense, language forms the basis for interaction and learning in all cooperative environments (Palinscar, 1998). Through repeated interaction, a shared discourse is built up, allowing for shared meanings to be easier discovered and explored: once again, there seems to be a two-way relationship between shared language and shared meaning.

3. Research method and case study

We chose to investigate the relationship of knowledge alliances and CoPs through a case study of an inter-organizational community called the Labor Network (LN).

Data was collected in several ways. Firstly, a written quantitative survey developed as an assessment for communities of practice was given during the fifth meeting of the network, which at the time existed for about 11 months. Among other things, the survey looks at an individual's satisfaction with the three dimensions of social capital discussed earlier and compares this with his or her's perceived importance of that dimension. For example, respondents are asked to rate, on a six point Likert scale from low to high, their level of satisfaction with the personal relationships within the network and how important personal relationships are to them.

The survey also specifically asks if any new alliances have been made because of the CoP, and if not, was the possibility of finding an alliance partner an important motivation for joining it. Finally, questions are asked about whether new knowledge generated in the CoP and led to any innovations within the participant's organization. This was asked in order to understand knowledge transfer issues.

Observation was also used for data collection. The researchers attended each meeting and notes were taken using dimensions of the survey as a guide. The research notes of each LN meeting were later discussed among the seven organizers of the network and adjusted if needed.

Finally, semi-structured interviews were conducted with ten respondents as a follow-up to the survey in order to gain insight into the process of alliance formation in relation to the CoP. Specifically, CoP members who had indicated on the survey that they had started a new alliance due to the CoP were interviewed, as were members who indicated new alliance formation as an unachieved, yet important goal of the CoP.

3.1 Case study – The Labor Network

The Dutch government is taking a diminishing role in designing new labor laws for specific industries, transferring this responsibility to intermediary organizations that represent one sector within the industry. In the case of the LN, the Dutch government defined its policy in such a way that each sector is responsible for developing a concrete set of workplace labor regulations that apply only to that specific sector. The localized policy that results is developed into actual regulations in a so-called a 'labor catalog', which is required to be available to all employees at any given time. For example, in

the building industry, regulations concerning how much weight an individual can carry are explicitly given in the catalog. This translation of general government policy into concrete rules and regulations for a specific situation is extremely complex. In order to help the process the Dutch government organized several meetings where information was given to representatives of the intermediary organizations. It was during these meetings that the organizing members of the LN discussed starting a community of practice focused on dealing with the new labor laws.

The LN is an informal, inter-organizational CoP where participants can share their experiences and improve professional competences in the field of labor relations. There are no formal documents giving specific rights to any of the members, including the six members involved in the organizing team. The LN has had six meetings in total and will continue to meet at least five times per year for the coming year. Meetings last about three hours followed by an informal lunch. Between meetings there is some communication from the coordinating team, mostly the minutes from the previous meeting and an invitation to the next, which always includes an agenda. The agenda is decided upon by the organizing team based on a common learning agenda that was developed by the entire group.
In total there are more than fifty members representing forty organizations. However, not all the members are equally as active. There is a core group of about 15 members, not including the organizing team, who attend regularly.

4. Results

At the time of writing the final results of the data analysis are not available. However, we can make some preliminary conclusions from both the member survey and the observation notes. Of the approximately 50 members of the labor Network, 26 filled in the evaluation form. (Of these, 15 respondents can be considered as part of the core group of the CoP; these members have attended all or nearly all of the meetings over the last year.)

Most respondents gave only moderate importance to the desire for alliance forming as a motivation for entering the LN; only a few mentioned it as very important. Several (±5) mentioned they entered a new alliance, including one who had not expected too. New knowledge for solving organizational problems and developing innovations were given as important motivations for joining the LN, but occured only moderately.

4.1 The Labor Network and dimensions of social capital

Here we discuss some of the findings in regards to the three dimensions of social capital outlined above.

4.1.1 Structural capital

The dimension of structural capital was generally shown to be both important and fulfilled to a moderate level in the CoP. Members seem to be satisfied with aspects of facilitation and number and regularity of meetings and other contact moments. Informal feedback during CoP lunches also pointed this out.

4.1.2 Relational capital

Relational capital in general was reported to be relatively important to the members and personal relationships were rated as being very important. However, members reported that this aspect within the CoP was moderate to low, especially in regards to cohesion and an open culture.

Observational notes point towards more humor being used between the members as well as an overall comfortable atmosphere in which, during discussions, all members took equal part.

4.1.3 Cognitive capital

It seems that with the exception of reflection, this aspect of the CoP is perceived as being of lesser importance but fulfilled highly in the CoP. Members were satisfied with the level and types of interactivity, and thought there was a clear focus on the domain.

From the research notes on observation we increasingly noticed references to past experiences as well as a common language developing.

5. Discussion and conclusion

The LN was designed as a professional community of practice in the sense that the effort is coordinated and facilitated by a major research institute. Furthermore, the LN is the subject of a design-based research project (van Aken, 2004) looking at how CoPs can be cultivated. According to community of practice theory, designing for structural and cognitive capital is an important aspect of cultivating CoPs (Wenger, 1998; Wenger et al., 2002). Labor Network practices, shown in Table 1, have been designed with this in mind. However, relational capital cannot be designed as such, but is rather a product of long-term interaction. This might explain why relational capital items did not score higher. On the other hand, Vangen and Huxham (2003) found that not only time is an important factor for alliance formation, but that the ability to form realistic expectations also plays a crucial role. We also have little insight at this time into the role different constructs of relational capital play because the interview data has not been completely gathered.

Table 1: Social capital and Labor Network practices

Dimension of Social Capital	Example of LN Practice
Structural	Professionally coordinated meetings Professional facilitation
Relational	Regular (informal) contact Explicit avoidance of inter-group hierarchies
Cognitive	Different ways of working together on developing new ideas Openly sharing experiences in the group Focusing on issues from the common learning agenda

Unfortunately, at the time of this writing the interviews were not done with individual LN members who reported starting an alliance. However, what we found so far is that the LN seems to be a powerful forum for bringing members of competing organizations together, which is an important start to alliance formation. The research institute that coordinates and hosts the CoP meetings was actually a competitor with the organizing members' organizations and in the beginning stages of the LN created some friction; only through a regular discussion of the goals of each member was this mitigated. In fact, we see that members' networks are actually being opened up to the others. These types of weak ties are very important for alliance formation (Hoffmann & Schlosser, 2001).

Another question brought up from the results concerns the level of collaboration achieved by the CoP. From the literature we see that both networks and alliances may be mapped along a continuum, ranging from 'loose network' to 'shared governance structures' (Janasz & Forret, 2008; Oxley, 1997; Peterson, Wysocki, & Harsh, 2001). In the case of the Labor Network, we see that by virtue of coming together regularly, there is some type of cooperation. We consider cooperation to be a loose joint effort based on similar goals, such as exchanging experiences in order to gain new knowledge, but not having any longer-term working relationship. In this way, the LN might be a type of unstructured strategic network, such as an industrial district or a trade association (Inkpen & Tsang, 2005) because there is no governance structure. And maybe a CoP is facilitating at this stage within the continuum, but not at the stage of a strategic alliance. This also concerns problems with the conceptualization of the term 'knowledge alliance'.

This paper tried to understand how communities of practice might function as powerful social environments for knowledge alliance formation between competing firms by increasing levels of embeddedness through social capital. The theory clearly backs up our argument. From the case study we see that a CoP is a strong environment for stimulating the three dimensions of social capital and thus increases the potentiality for knowledge alliance formation.

There are some limitations to this study. First, the assessment survey was not specifically designed to measure social capital. In the future, this could be done using a validated instrument, such as proposed by De Silva, et al. (2006) or McAllister (1995).

Secondly, interviews were not held that would show stronger links between participation in the CoP and formation of an alliance. This makes it difficult to rule out other plausible rival explanations, such as member participation in other networks, existing alliances, etcetera. However, if one accepts that embeddedness in a social network is a determining factor for alliance formation, then joining a community of practice may be one way for organizations to find and forge new ones.

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Business Model Evolution in IA / IC Support Centres and the Role of Market-Making

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Abstract: This paper addresses some of the issues for 'migrating' the 'business model of IA / IC support centres depending upon the developing nature of their roles over time. It explores how centres may be sustained over a sufficient period of time to impact economically at a local, regional or national level. In state or project-funded centres it is sometimes difficult to maintain levels of funding over a sustained period of time due to the 'project' nature of many funding schemes. Indeed many of the initiatives in this field globally over the last 10-15 years have been noticeably transient. As a consequence the assets which might be created are not adequately transferred to more long-lasting bodies which might be able to exploit them further. To strategically manage a centre often means looking for business models which can sustain the work of the centre over a period of time longer than projects (in excess of five years) to create economic impacts. The paper therefore particularly reflects upon the role of such centres in market-making (or maybe more accurately market-proving) should such a role be envisaged for it. The rationale which may lead to the need to explore the making or proving of a market in IA / IC support is reviewed as well as the drivers for strategy adjustment which may lead to role changes for support centres. Roles which might bear market return as against those which are unlikely to have commercial returns are examined in the paper. The barriers to making changes in the business model are explored as well as the potential benefits for the users of such centres as well as their funders. The exit routes for the public sector are reviewed. The paper should assist in helping other centres with similar issues. The paper suggests further areas of research for scholars to help illuminate some of the issues which are highlighted in the paper.

Keywords: Commercialisation; market-making; Intangibles; Intellectual Assets; Intellectual Capital; Business Models

1. Introduction

This paper surfaces some potential issues regarding the role of particularly publicly-funded IC Centres. The author draws on his experiences working within the Scottish IA Centre (which are expressed as the author's personal views and are thus perceptual). These lead onto an exposition of the key learning points which might derive from an analysis of those issues and experiences. Finally there are some concluding thoughts as well as some areas for potential research exploration by scholars in the future.

It is to be emphasised that the reflections of the author offered in this paper are not to be taken as the evaluations of the company which runs the Scottish IA Centre (Scottish Intellectual Asset Management Limited) or its funder (the Scottish Government) or its' members (Scottish Enterprise and Highlands and Islands Enterprise). It is to be recognised that the author thus writes as a person skilled and embedded in the field however not impartial or necessarily objective. The research perspective may be typified therefore to be qualitative and maybe loosely phenomenological in approach.

Natanson (1973) describes George Herbert Mead's (1934) outlook (which it could be argued has lead to a phenomenological methodology) as having three major directions:

- 'the attempt to explore and describe experience within society, treating consciousness, language, communication, and meaning as emergents from the social process'
- 'the re-approach to the same phenomena in terms of subjectivity, treating the given in experience as arising epistemologically and experientially within what Mead terms "the Act"'
- "the attempt to describe what is given in experience by means of a radical theory of temporality, which takes the present as the locus of reality".

The reason for describing the approach to be "loosely phenomenological" is that the analysis here does not dwell too much on the essences of the experiences and clarifying the relationships between them but does take a perspective on such essences. The paper is much more descriptive of the experiences and the analysis of what researchers might learn from them, as opposed to deconstructing those experiences.

The potential value of this paper is possibly two-fold:

- For research into better and more effective public policy interventions for instruments to assist in the introduction of knowledge economy measures in the developing and less-developed nations
- For the guidance of those who may be tasked with the establishment of IC Centres in the future

2. The potential roles for IC Centres

There are a number of potential roles for IC Centres which include:

- Demand developer
- Sign-poster and Information Source
- Diagnostic Service Deliverer
- Product developer and / or deliverer
- Stimulator of Private and Public Sector delivery
- Policy adviser
- Learning & development deliverers in IC management
- Research centres

Where IC Centres are funded partially or wholly through public sector support the focus for that Centre must be driven by the focus of the particular country. Figure 1 below shows the focus for the Scottish Intellectual Assets Centre

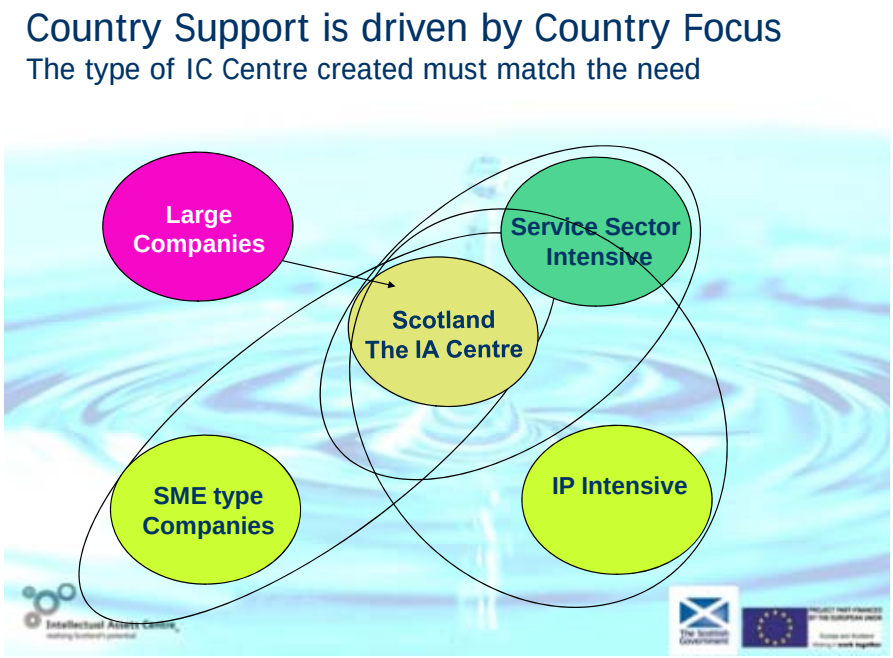

Figure 1: Type of Centre depends upon Country Focus

In Scotland the IA Centre has a focus on SMEs, many of these operating in the service sector but not being exclusive to that sector; many have registerable intangibles in the form of intellectual property. Whilst large companies are not the focus for the Scottish IA Centre there is still an interaction with them as they can often influence the behaviour of the SMEs through supply chains and procurement.

One of the potential roles for an IC Centre which was not outlined at 2.1 above is in attempting to intervene in market-making. Where there is very little market activity in terms of enterprises commissioning IC management interventions an IC centre might help to develop demand and encourage private sector suppliers to place offerings into the market. One of the issues which arises when this role is pursued, especially when the IC Centre is partially or fully funded from the public purse, is the degree to which the IC Centre itself should be a player in the market.

Winning support for public funding is a challenging task particularly as the concepts which lay behind IC are often, by the nature of the language and terminology used, difficult to simplify. Maintaining that funding over the period of time required being influential in bringing quite fundamental change in the target market is perhaps even more challenging. When the market failure is severe and the private sector slow to develop the IC Centre might contemplate not just market-making but being an active participant in the market. Some of the issues which this gives rise to form one of the subjects for this paper. I would venture that one of the questions to which those governing an IC Centre turn is the balance between the Centre being a market-maker versus being a market participant. Strategically this is a question which those individuals need to accommodate and plan for.

3. Strategic Issues in developing effective IC Centres

One of the principal issues for any macro-economic IC intervention is the period over which the funding will exist. Many public sector funding initiatives in IC have resulted in excellent research and guidance for companies to implement IC. Examples have been the Danish guidance (Mouritsen, J. et al 2003 a),PIP-Putting IC into Practice (2004 version 2), RICARDIS (June 2006),PRISM (Zambon, 2003), the Japanese IAbM (METI 2005), and Wissensbilanz (Alwert,K. Bornemann,M and Kivikas, M 2004). The difficult part is to make such projects (with defined funding periods) sustainable in the longer term. Most practitioners now believe that for fundamental changes in behaviour in the area of IC management there needs to be a fairly lengthy period of intervention. Relatively short-term funding (say 3 years or less) may result in very little sustainable economic impacts.

Thus if the public sector intends to run short-term programmes (or believes there is a significant risk that funding will only last 3-5 years say) its expectations of such programmes should be fairly modest. For instance the making available of guidance in ICM, the generation of case studies, the licensing of some development programmes, the creation of a web resource or database.

Medium-term or longer-term interventions are more likely to have desired economic impacts. An example in Scotland is the Intermediary Technology Institutes (ITIs) (website www.itiscotland.com). ITI Scotland Ltd. is a company set up in 2003 by Scottish Enterprise with the support of the Scottish Executive to drive Scotland's ambitious plans to identify and commercialise valuable technology-based intellectual assets across three global market sectors: digital media and communications; life sciences and energy. This was envisaged as a 10 year initiative commenced in 2003. Even when the intention is for a long term intervention there should be some notion of the possible public sector exit options and roughly an idea of what the indicators are that suggest exit should be contemplated or indeed whether the initiative is being successful.

The exit options for the public sector in any initiative vary from straight withdrawal of funding and closure, to a new form of organisation (such as a community enterprise or social enterprise) to some form of privatisation. For the latter to have any chance of success there needs to be assets to transfer and some indication that there is a market to serve. No one would appear to have transferred an IC Centre to the private sector from the public sector so there is no model on which to draw. If there is to be some demonstration of a market to serve there would need to be some history of trading and some value to be demonstrated in the intellectual assets of the Centre. It is this requirement where some significant issues start to surface for the publicly funded IC Centre.

The first significant issue is the fact that there would appear to be no market opportunities in some of the typical functions of an IC Centre as set out in 2.1 above. The fact that no market exists justifies the need for public funding for such a Centre in the first place. No amount of success for the IC Centre in these areas will create such a market. In respect to individual development work with enterprises, many countries now see the greatest growth potential and the greatest market failure for ICM among the small and medium-sized companies. Selling IC interventions unsubsidised into such businesses is extremely difficult. InCaS (www.incas-europe.org) is a new initiative which is one of the few that has been designed with the small business in mind. The project has as one of its key elements the reporting of corporate value in intangible assets to customers, partners, investors and creditors. The project is still ongoing but the fact that it is aimed at small companies in encouraging

Another significant issue for the 'trading' IC Centre is the degree to which it might be seen to be displacing suppliers for whom it may be relying for other forms of support (e.g referrals, sponsorship etc). If it is not displacing the private sector then it may be accused of using an unfair advantage

(public funds) to take away market opportunities for the private sector. Conversely an IC Centre which does not itself exploit its own IC is not acting upon its own advocacy. An IC Centre should be an exemplar of the kind of organisation it exhorts its users to be.

Negotiating the correct path between performing a public service, offering subsidised services and fully-costed commercial offerings without displacement or breaching fair competition rules is like navigating between the Scylla and the Charibdys. However this is exactly what a forward-looking IC Centre should be planning for. It should have in mind what will continue to be a fully-funded public service for enterprises in its geographical and / or possibly sectoral user group. However it is likely that this funding, if it is to be effective, needs to be carefully targeted. However even when targeted the universal free service usually results in fairly modest impacts as the market failure in the user groups is usually quite severe. To increase the potential for 'proving the concept' there needs to be a deeper level of intervention. It is at this point that public sector funds should be used to help lever other funds, preferably from the users themselves. To convince the user to share the risk of the intervention not bringing about a commercial benefit there needs to be a business case. For most commercial enterprises the business case would normally be monetary and it is here that there is a severe difficulty for ICM. ICM often cannot convert its effects into monetary values;, indeed ICM has severe problems with 'valuation'. Changing the mind-set or values of entrepreneurs so that they can appreciate such problems often takes longer than the funded services can sustain.

IC Centres also need to think about what might be offered on a full-cost basis. Such Centres (whether they be termed IC, IA, Future Centres or whatever) should be pioneering not only in the offerings they have but the funding models they employ. This is one other high-wire act that IC Centres need to perform. Whilst offering very simple benefits and features in straight-forward language they need to experiment with the innovative and risky, which no other organisation has yet tried. Inevitably there will be risk and failure along the way. However their own practice of IC management, particularly if they have the option of longer-term thinking, can allow the emergence of a sustainable model. This may involve some hand-to-mouth measures during part of the life of the Centre as it cobbles together funding packages, with some modest private income, and a lot of reciprocation and 'piggy-backing' to keep the show on the road. This is indeed the territory of the social entrepreneur and maverick. A mixed-funding business model for IC Centres is not just an option, it is probably a necessary condition for a vehicle of sustainable value to an economy.

What does the term risk-sharing really mean in the context of an IC Centre? In a very practical way the risks which are being shared are the following. From the public sector's perspective the risk is that its investment is 'deadweight' i.e there is no additionality from the investment – the enterprise would have performed or not performed in exactly the same way with or without the intervention. In the Scottish IA Centre the deadweight factor is about 23% of those interventions where data has been collected (which is regarded as statistically significant). From the users' perspective the risk is that the intervention is not effective or costs more than it generates in new business, costs-savings, risk reduction or value enhancement. What would happen in such a model is that the public sector would offer to stand most of the risk in the initial stage (say in identifying the potential benefits which the user might accrue from an intervention). The user would only risk wasting some time in providing information as an input to that intervention. The second stage is the offer of a menu of supported interventions which might have different potential effects (i.e risk-reduction, communication of value in intangibles, review of new exploitation routes) where there is an investment by the user as well as the IC Centre.

Could an IC Centre fully cover its costs from the market from the outset in today's economic climate and what would it have to do to achieve this? This may be possible if the offerings consist of one or a mix of the following:

- User-generated content
- Legal advice on intellectual properties and the exploitation of the same
- Valuation of intangibles
- Recovery of intangible value
- Brand consultancy
- IP and /or licensing consultancy

I would be extremely doubtful that straightforward IC consultancy advice alone would be able to cover its costs to sustain a private sector IC Centre in its early stages.

An issue which dominated a lot of the early thinking about the rationale for IC interventions revolved around the perceptions of asymmetrical information flows. Does this issue still hold so much sway and if so with whom? The continuing interest in Intellectual Capital Statements certainly suggests this interest is still there and that there is a need to address it. The accountancy perspective on IC would still appear to be influential (cf. the World IC Initiative –www.worldici.com)

The emphasis has moved however from influencing the accountancy profession and standards-setting to amend their long-standing rules relating to the treatment of intangibles to providing tools for more targeted communications. The use of new software innovation such as XBRL (extensible business reporting language) seems to offer the ability for such targeted and user-led pull information flows as opposed to the push information flow of Intellectual Capital Statements. This element of IC practice however takes a very long time to develop; it involves the large corporate sector more than SMEs and there is very little proof that this will affect SME practice. The issue of valuation is one that SMEs are interested in however there are very few solutions for them. There is a significant scepticism among the corporate community about IA valuation due to the fear that they will be asked to put IA on the balance sheet and thereby incur tax liabilities. However whilst ever the issue of IA valuation is ducked there will be a reluctance to grasp the importance of managing IA by small business.

4. Experiences

Having identified the kinds of issues regarding the role of IC Centres I will now relate some of the experiences which may help navigate an appropriate path for future IC Centres. Public sector interventions into enterprises which have proved the most durable and sustainable have also shown to be the most effective. To have sufficient impacts on the economy the intervention has to be sustainable over an extended period of time and command support from the civil administration as well as political support. The profile for the intervention has to be good however it has to be subtle and not been seen to be an extravagance or irrelevant.

Risk-sharing models seem able to be effective where the business case for further investment is made during the initial diagnostic phase. Given the degree of market failure, particularly in the key areas of awareness and understanding of what ICM entails (IA Centre Research 2004 and 2006), the initial diagnostic phase for publicly funded IC Centres would normally be free of charge to enterprises. The risk thus at this stage is being entirely borne by the public. To gain sufficient buy-in from the private-sector user to pay for further intervention requires a good understanding of what the cost-benefit equation looks like. Whilst normally in a business case the metrics on both sides of the cost: benefits equation are the same to enable pay-back to be calculated this may be far more difficult to create for IC interventions. The impetus to engage in the next and more involved stage is likely to be related to more complex motives. An experience of the risk-sharing model in the UK is SMAS, the Scottish Manufacturing Advisory Service (www.scottish-enterprise.com/manufacturing) which offers a one day free manufacturing review to manufacturing companies in Scotland free of charge with the offer of a further longer exercise which is partly subsidised for small to medium sized companies. The ratio of those taking up the more in-depth exercise to the number of first stage diagnostics is about 1:5 (data from SMAS at the Scottish IOD Conference 31st October 2009).

The experience in Scotland is that the growth of service and product provision in the IA/IC field among suppliers has shown fairly slow growth. There has been growth in the traditional areas of IP services but IA service/product growth has been principally related to the stimulation provided by the existence of the IA Centre and other public service related initiatives.

A relatively untapped exploitation route for the Scottish IA Centre has been the ability to leverage private sector resources to bring new or greater capacity to the offering of the IC Centre. It may be argued that the IC Centre has to build its own IA before it can successfully leverage such relationships with the private sector. The success of this exploitation route relies heavily on the excellence of the IC management by the Centre itself. However the principles of structuring solid and valued offers from the private sector to users with the IC Centre acting as broker and looking at reciprocation for the private–sector suppliers represent significant value. Examples of the kinds of

services which may be offered include pro-bono legal advice, free seminars and workshops, free Trademark searches, pro-bono accountancy advice, pro-bono branding advice. Issues which must be overcome include the extent to which such relationships between the IC Centre and private sector suppliers threaten the 'honest broker' role of the IC Centre, particularly when that Centre is funded by the public purse.

Once the IC Centre becomes skilled in exploiting its relationships it can possibly reduce its cost significantly without a marked diminution of its overall offering. Combined with some commercially paid-for services it might be possible to envisage the Centre continuing with a substantial service offering with a much reduced public subsidy. However at this stage the total removal of public subsidy would probably result in the demise of the Centre. There may be an irreducible minimum based upon the conventional model for funding such Centres, as they rely on an experienced and knowledgeable staff to be able to coordinate and quality assure its activities.

5. Learning points

There are six principal learning points which I might venture based upon an analysis of the issues and an exposition of the experiences. The first is to consider a phased development of the IC Centre with defined milestones to allow for a gradual transition from fully funded to mixed models of funding. Allow for an IC-building phase for the Centre itself with a defined exploitation strategy which could kick in at a defined milestone.

I would commend making it clear to early users that they will gain significantly from early engagement as they will access services which at a certain point may be charged for. Consideration about whether early users would be allowed to gain from guaranteed discounted services after others are charged should be given. This may depend upon whether the Centre wishes to retain long-term users or attract new users?

The Centre should focus on what will continue to be free of charge services and to whom these will be available, what may be accessed after time which may be provided by the private sector perhaps at discounted or preferential rates and what may be provided by the IC Centre on a risk-sharing basis. Thereafter what might be the areas of high-risk innovation which the IC Centre could explore in the expectation that a proportion of such projects will fail.

Experience suggests that high impact for users means high intervention which does not equate with affordability for small firms (who constitute the users experiencing the greatest market failure). Those services which may be subject to risk-sharing will probably have to display the following features:

- Be easy to explain
- Have recognizable impacts
- Might qualify for public sector support through existing programmes
- Are targeted at particular 'hot' sectors
- Are designed to be delivered by the private sector after the concept has been proved to be effective by the IC Centre with merchandising and case studies made available for private sector suppliers.

IC Centres should design tools not just for users of IC Management but for the suppliers of IC management advice to apply and make these available at an early stage. Additionally whilst the creation of a number of tools might be laudable the IC Centre should recognise that a proportion will not be effective and need to be dropped. The IC Centre should continue to sustain and develop a relatively small number of tools whilst continuing to create new ones for trial, based upon users' and suppliers' feedback.

IC Centres should be oriented around 'relevance' rather than 'commercialisation'. It is as important for the publicly funded IC Centre to make available information in an easily usable format for private sector users. This requires awareness as well as a skill to be able to envisage how users outside of the Centre might wish to manipulate data.

6. Conclusions

It is difficult to determine what social changes might take place outside the existence of an IC Centre which could influence its development. For examples the rise of importance of service innovation to western economies, the loss of confidence in the worldwide financial services sector, professional practice development or the lack of it in certain areas (such as accountancy practice), global economics (the demise of manufacturing in the west and the rise of the BRIC economies). As a result I would suggest that there be some arrangement of "simultaneous loose-tight properties" in the design of the IC Centre. By this I mean that there are certain core properties of the IC Centre which should be managed very tightly and everyone should be aware of what these are, how they are to be measured and managed and people held to account. There should then be very loose accountability outside of those activities which allow the flexibility to adapt. The governance structures for the IC Centre should have the capability of distinguishing between those activities which are tight and which remain loose to be explored, experimented with, and innovated around. At certain intervals in the development of the IC Centre there should be a review of what will remain to be tight and what should now be included as tightly managed and what will remain loose, what might be dropped and what might be new areas of loose interest. The loose areas are ones where no metrics should be adopted (they should remain goal-free areas until such time that they are adopted for tight control). Only tight areas should have clear metrics and be closely managed.

There should be a phased development of the IC Centre with deliberate IC building and an exploitation strategy mapped out with expected timelines when such exploitation might be achieved.

Exploitation should not just be measured by commercial revenue-raising but should include the importance of relevance, leverage and the commercial value of that leverage.

7. Areas for further research

More research should be conducted into what converts 'needs' into 'wants' by small business as this may help IC Centres to start delivering the necessary offerings which will constitute a sustainable business model.

Additionally research might be valuable into what business cases can be constructed to review IC intervention opportunities and particularly new models which look to pay-it forward principles rather than pay-back methods. One could envisage a public-sector intervention which proposed on the basis of a pay-it-forward basis which hopefully does not just create or enhance in value an intellectual asset within an enterprise but also an intellectual liability which at some stage the public sector provider expects the enterprise to redeem by paying it forward to another beneficiary. Research into how such a methodology could work could well have interesting public policy impacts.

Finally another possibly rich area of research could be into those aspects of activity which IC Centres regard as being required to be managed 'tightly' and those to which they would ascribe very loose management.

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www.worldici.com – (accessed Tuesday 23/12/08) The World IC Initiative involves The Enhanced Business Reporting Consortium, the American Institute of Certified Public Accountants, Grant Thornton LLP, Microsoft Corporation PricewaterhouseCoopers, European Federation of Financial Analysts Societies, Japanese Ministry of Economy, Trade and Industry, the Organization for Economic Cooperation and Development, the University of Ferrara and Waseda University in Japan.)

Developing Social Capital in a Regional Context

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Abstract: It is hard to find a country in the western world where the political driven strive for prosperity is not based on efforts to establish regional strategies "driven by knowledge" and "research driven clusters". In Norway a concerted effort is being made to take advantage of the EU's Regions of Knowledge initiative under the Seventh Framework Programme, the new Competitiveness and Innovation Framework Programme, and the structural fund. Propelled by funding from the Norwegian Ministry of Local Government and Regional Developement and wheeled by The Norwegian Research Council's "strategic role" key worlds for achieving most needed financial support for regional research are "strategic use of R&D", "establishing clusters", "trippel helix", "competing on the global marketplace"– or more recently "sparkling points", "hotspots" and – if up to date - "the localization of the Creative Class". Simplistic but convenient models of understanding substitute the beauty of well formulated theories supported by empiric findings.

- The focus of the paper is two projects addressing the conditions of regional innovation in Ostfold, Norway. Ostfold is one of Norway's 19 provinces, governed by a regional council, with five towns and a total population of nearly 250 000 inhabitants. The main core of the two projects is groups of actors defining their opportunities in a concrete context; the theoretical and methodological approach is action research and process theory.
- Establishing a regional strategy for Ostfold merge decision makers representing the interests of the regional governmental bodies, industry and working life, and the university and regional college on shared arenas, aiming at a learning process where the participants develops the ability to understand the different actors capacities and strategic goals – ultimately to test if there is a common ground for mutual collective action. The process is time consuming, depending on the actors themselves, the process within the group and how the work evolves.
- Establishing productive cooperation is building on the same premises although the focus is not regional strategies as such but concrete innovation in local businesses, sharing knowledge and resources across traditional business sectors.
- Using the two projects as cases, the paper argues that regional research aiming at regional innovations in Ostfold must be based on strategies growing from the developing understanding of Ostfold's specific opportunities, supported by the meticulous work of empirical research addressing the opportunities of the actors, the available assets and the historical context in an ongoing learning process developing the social capital of the actors.
- Rendering the regions innovative capacity in a narrative that envelopes and brings forward the collective strength of the regional government, the R&D institutions and the businesses acting together, is a basis for understanding the regions social and innovative capital and could be evaluated as *the IC of the region* if it meets the demands of management and reporting.

Keywords: Regional innovation strategies, regional innovation, social capital, action research, IC of regions

1. The Norwegian Funding Programme for Regional R&D and Innovation (VRI)

The VRI programme is a Research Council of Norway (RCN) initiative, targeted toward research and innovation at the regional level in Norway. The VRI programme offers professional and financial support to long-term, research-based development processes in the regions. The programme is designed to promote greater regional collaboration between trade and industry, R&D institutions and the government authorities, and to establish close ties to other national and international network and innovation measures. The VRI programme is a national programme with an initial time-frame of ten years (2007-2107). The Research Council hopes to achieve an overall commitment to the VRI programme of NOK 300 million (approximately EUR 34 million) per year beginning in 2009, financing 50 per cent over the Research Council's budget while the rest is coming from the regional councils or other regional sources.

1.1 The legitimacy of the founding programme

In the VRI programme's policy documents, the programme is described as designed to increase value creation in regional trade and industry by promoting R&D projects that both expand existing business

areas and create new ones. Norwegian companies compete in regional, national and global markets. To succeed in these competitive markets the companies must continually innovate and seek renewal. R&D activity can and should be given a more major role in these efforts. In Norway as well as in other parts of Europe, research, development and innovation are increasingly being recognised as crucial to the effort to create dynamic regions. Resilient R&D institutions that understand the challenges related to innovation and industrial development will play an important role in this context. If R&D institutions are to avoid becoming isolated, however, they must actively apply their local knowledge while at the same time viewing their own role in a national and international context.

The program is to take advantage of "new innovation research" and therefore it is emphasized that innovation is generated for the most part through dialogue and cooperation: "The VRI programme builds on a *system-oriented* perspective in which innovation is viewed as a collective, interactive process. It is collective because companies pick up new impulses and expertise from many different players. It is an interactive process because it involves reciprocal learning among the players. The expertise, technology and attitudes found in the individual company are crucial to whether it will be successful in developing a new product or service, for instance. At the same time, the ability of companies to find and utilise the expertise of others, i.e. their absorption capacity, is important for their ability to innovate. Thus, in innovation research, the quality of the companies' environment and their ability to exploit that environment comprise key factors for understanding the power of companies and organisations to innovate. The threat of lock-in if closed local networks prevent the incorporation of new ideas and expertise must also be given focus." (Translated from the VRI programme).

1.2 The familiarity of the VRI-programme

Looking both at the regionalization of innovation policy within the EU, and at the well known literature addressing the three partite relation of government, industry and universities put forward by Etzkowitz and Leydesdorff as *Tripple helix* (Etzkowitz & Leydesdorff, 1998), later elaborated by Etzkowitz (Etzkowitz 2002) the VRI program is well within the established boundaries of "modern innovation policy". As illustrated in figure 1, the Tripple helix can be represented as a balanced and mutual relation

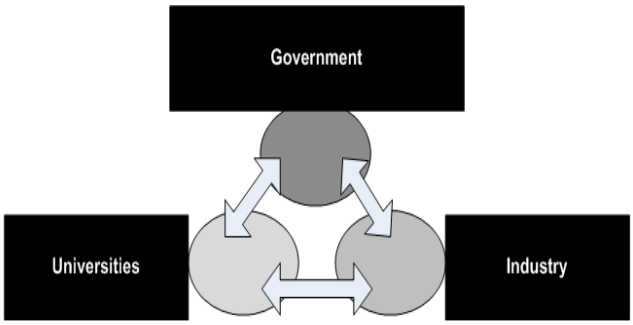

Figure 1: Tripple Helix of Government, Universities and Industry

between three groups of actors with different roles in society, but acting together to achieve mutual goals that's out of reach for both industry, government and universities - and for the society as a whole – if they are acting separately. Maybe inspired by the dynamic of the double helix DNA the cooperation between the partners *spirals off* – hence the tripple helix – as the cooperation accelerates.

That leaves the question of practise, of how the model works when it comes to live. As chemist knows, in real life the molecule structure of cellulose is a tripple helix – and although it is a saccharide it do not taste sweet. It is not even digestible.

2. Case 1: The VRI-programme at work

In this case we will look at some of the experiences from the first year of implementing the VRI programme in one of the counties of Norway. The VRI-programme has two distinctive parts – a research programme and a programme of mutual cooperation amongst social partners, and it is the second part that is up for scrutiny.

Looking at the triple helix as a setup for the VRI- program, a possible approach could have been gaining systematic insight and knowledge by focusing *empirical* research and analysis of the three partite cooperation, or elaboration of tripple helix as a *model of learning*. Neither of them gained much weight. In short, the tripple helix model surfaced in the county as a *prescription* for cooperation handled by the regional authorities.

2.1 VRI as an overall strategy for regional growth

The *raison d'être* of VRI at the county level for the regional governmental bodies is to use VRI as an instrument for economic growth. Looking at the division of roles either elaborated or embedded, the "regional partners" are given the role as *the driving force* at start up as illustrated in figure 2.

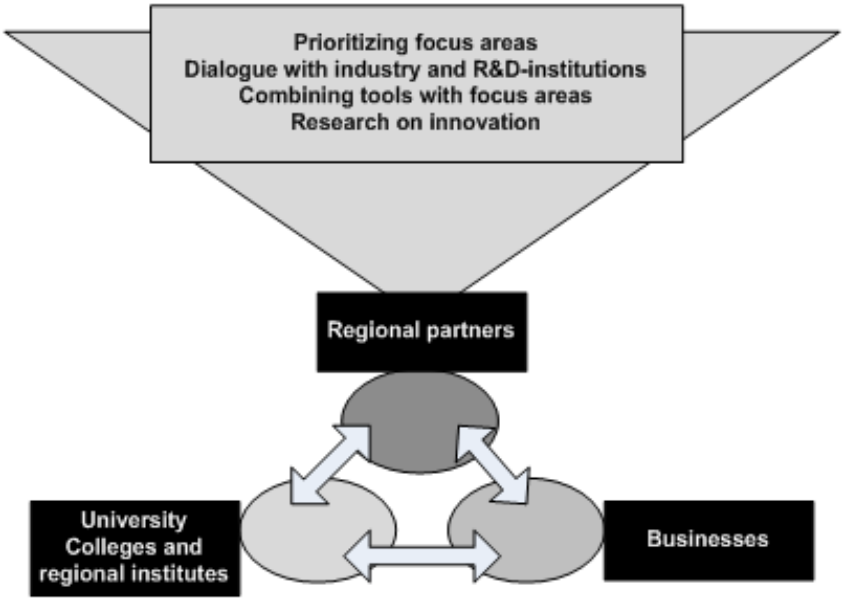

Figure 2: The role of the Regional partners as driving force at start up as described in VRI-policy paper.

The catch is that even if there are quite a few "regional partners" in the practical follow up of the day-to-day activities the governmental bodies are equal to none.

2.1.1 The County government and the power of the purse

An important basis for the regional governmental bodies' authority is the financing system of VRI. The regional government is the source of capital needed to set off national founding, matching the quantity of national capital from the RCN in numbers. While the RCN is acting at distance, and with the culture and habits of a research body, the regional governmental bodies are acting hands on – and as a provider of the *means* looking at themselves as *owners* of the project *ordering* results from other participants.

2.1.2 Legally valid planning and the traditional role of the county government

The county is a political and administrative territorial construction. The boundaries for the county is as well defined as the walls of the international space station – inside are everything worth mentioning outside nothing but space – with the needed lifelines to earth or central superior governmental bodies. The county is assigned to the responsibility of education (sixth form) and planning addressing the use of land. The obligations and routines are very specific, detailed and exact, *deeply rooted in law*: The tasks defined, the procedure specified, the final decisions safely seated inside the county's governmental institution itself. The relation between the county and other bodies and actors are by definition, habit and culture *instrumental* – they are to be heard but they are not to decide. A less distorted picture of the reality of the VRI-project based on practise is illustrated in figure 3.

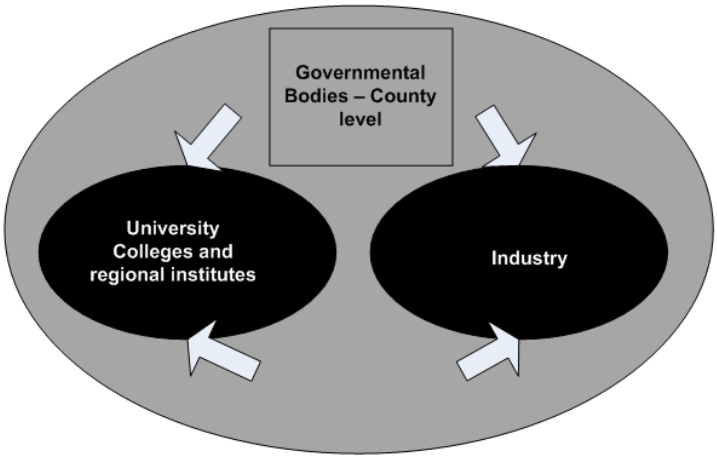

Figure 3: Regional governmental bodies framing University Colleges, regional R&D institutions and industry

2.1.3 The clash of researchers and policymakers at the regional level

Looking at the western hemisphere there is a widespread trend to move economic strategic thinking from the national to the regional level, in specific the *strategies for innovation* as a basis for economic growth and prosperity. In the specific Norwegian county we are referring to the concept of regional *clusters*, and more recently the notions of *The Creative Class,* are an integrated and substantial part in the governmental political vocabulary.

Looking at the theories and research of Michael E. Porter, (Porter, 1998) (Porter, 1998) (Porter, 2001) (Porter, 2002) (Porter 2002-1) (Porter, 2003) (Porter, Not dated), and applying the criterions on the region, there are no basis for describing any parts of the business sector in the region as a cluster. Even the notion of "aggregates" of businesses will be up for discussion based on the available empirical data sets. Frustating as it may be from a research point of view, the empirical datasets are in a peculiar way not relevant for policymaking – the concept of *clusters* is rather amusingly teared away from its origin becoming a general term for *whats needed* if the region is going to suceed. The question at large for the policy makers is what has to be done to establish and nurish clusters in the region.

Distinctly different from Mickael Porter, Richard Florida has from the beginning aimed at the policymakers in his works (Florida & Kennedy, 1990) (Florida, 2002) (Florida, 2007) (Florida, 2008). In his major work, "The Rise of the Creative Class" he gives an honest opinion on his major work: *"In retrospect, I probably could have written this book using no statistics at all"* (Florida 2002 page 327). The retoric of the three "T's" behind economic growth, the three "W's" of individual choice, the "Sparky points of the world" and the "40 regions of growth" based on meticuolus measuring Google Earth at night – are fare from meeting the demands of the research community entertaining as they may be.

The notion of "clusters" or the alleged terriotorial gravitation of members of "the creative class" could have been an intereseting arena for dialog and discussion. Instead there is a clash – the policymakers powerfull position are not challanged by the arguments from research, instead they take the position of customers, ordering what thay think is needed for the policy to come true.

2.1.4 The paralysis of inequality

Summing up, the model of triple helix seems to be insufficient to capture the difference in authority, role and culture in the relation between the regional governmental bodies, the R&D sector and the industry. The inequality of the institutions and bodies involved is – and we stress that this is by us understood as a stage in the early days of the project and is very unlikely to be the end result – for the time being paralysing parts of the project like driving with the brakes on.

3. Case 2: The business and enterprise network

The business and enterprise network started as an initiative in the business sector. A director in one of the business contacted a member of the research team in VRI asking for support trying to get into a working relation with a nearby competing business. The idea behind the contact was that the researcher could act as a neutral "go-between" with no intention of influencing the competition in the market. Very soon the businesses agreed on a dialogue including nearby businesses, and started a lengthy work to specify tasks that could be dealt with in common, and to specified resources that could be shared among the participants.

3.1 Establishing trust and deciding on assignments

At the start it was only the top management in the two businesses and the researcher from VRI who was involved dealing with the growing intentions of acting together. The two managers knew each other from earlier contacts; they knew their different personal and business networks and had an impression of the ethics and moral values involved. They felt that they could trust each other from the very start of the process. The VRI researcher contributed to the confident ambiance reassuring the managers that there were no secret agendas in the discussion. At the start the two managers were discussing loosely about different assignments. It was agreed upon that the further exention of the network should be based on businesses where managers were known from earlier cooperation. It was further decided that the networking process should be developed naturally and slowly as a bottom – up process, with focus on building trust between the partners. The idea of the network was described as an integrated knowledge network, based on exchange of knowledge and services between the involved partners.

The network was extended with three more businesses. The meetings in the network were held at the different businesses locations to get more knowledge about the difference in products, services, organisation and so forth. Assignments were openly discussed on these meetings. An excursion was arranged to another existing regional network in the southern part of Norway.

3.2 Status – participating businesses and defined tasks

A representation of businesses involved, and tasks addressed, is given in figure 4.

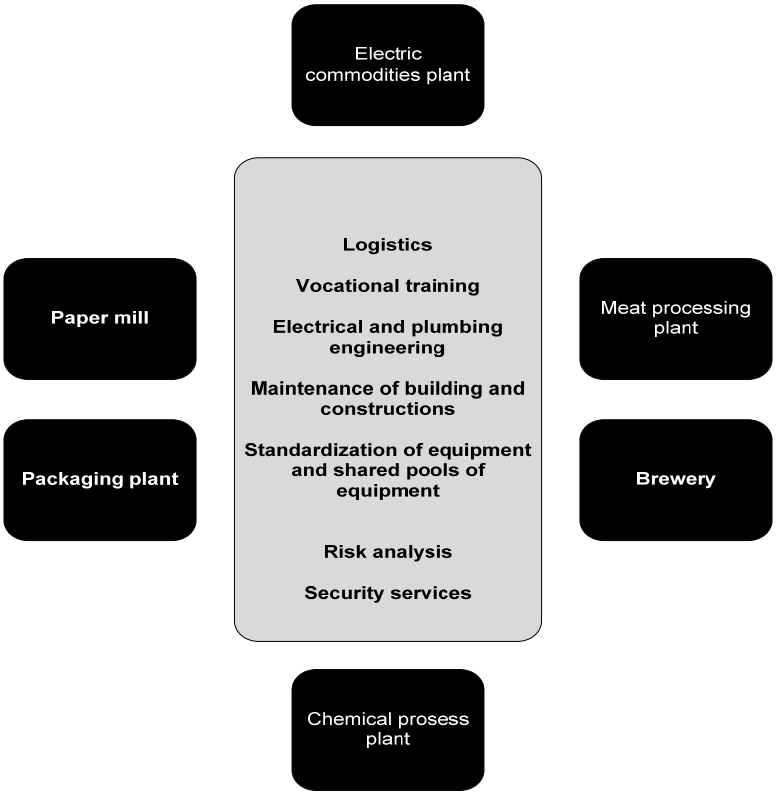

Figure 4: Cooperation across line of business and industry

Working groups are established within the different areas. Initiatives are taken to anchor the network cooperation within the strategies of each involved business. Plans are established to recruit new businesses into two new networks in the region to be integrated with the existing one when they are mature and within a time schedule decided by the existing partners focusing on the importance of a slowly trust building bottom – up process.

4. Top down and bottom up strategies

Case 1 illustrates a typical top down strategy, trying to join the forces of the regional governmental bodies, the R&D institutions and the business community. The lessons to be learned are that the three partite process in specific challenge the regional governmental bodies in a way that they are not able or confident to cope with; hence the withdrawal into exercising the safety of the governmental role of solitary authority.

Case 2 is an example of a bottom up strategy, following the pace and need of the involved businesses and the external competence acquired from the R&D sector is moored in the bottom of the involved businesses agreed needs and demands.

Both the top-down and bottom-up strategies are legitimate and needed if the region is to succeed – and yet it is the business networks that appear to be the vital building blocks in the strategy for innovation in the region. Regional research aiming at regional innovations must be based on strategies growing from the developing understanding of the regions specific opportunities, supported by the meticulous work of empirical research addressing the opportunities of the actors, the available assets and the historical context in an ongoing learning process developing the IC of the actors.

5. Intellectual Capital (IC) in the context of regional innovation policy processes

When the concept of IC was coined, it focused the management of knowledge within a company. It referred to the company's efforts to obtain, develop, share and anchor the knowledge resources needed to ensure future results. The IC statement was a statement that IC contributed to the company by creating values by improving the basis for new products, for innovation and flexibility and so on. In short: IC established a broader perspective for growth.

5.1 Elements of IC

Setting aside the terminology that's dependent of the business environment, it is possible to identify elements embedded in the concept of IC that makes IC tenable as a concept for the understanding and development of a knowledge based regional strategy. Using the R&D-project "*Guideline for intellectual Capital Statements"* based on contributions from 17 Danish businesses as a template (Danish Agency for Trade and Industry, 2000) the three key elements are:

- Story telling*, presenting a narrative defining "what's it all about". The narrative is the hub and centre around which the whole strategy circulates and evolves.* Narratives contain a plot - an idea involving a whole chain of events, in which many interdependent individuals and problem situations are put together and ultimately become resolved in some acceptable solution.
- Management challenges i.e. the series of challenges within knowledge management that has to be mastered in order to implement the knowledge narrative. Translating the knowledge narrative into management challenges is a creative exercise in which the strategies for the creation of use value are defined.
- Reporting the intellectual capital internal and external as a means of communication with all stakeholders. The reporting is a way of advising all actors involved how to exert their motivated interest and this is how the intellectual capital statements create value.

Using the concept of IC and adapting it to the collective process of establishing a knowledgebase for the tripartite groups identified in the triple helix, the concept of IC could be used as a model for creating, nourishing and developing social capital needed to be able to understand, formulate and implement regional strategies of innovation.

6. Assessing the potential for innovation and growth in a specific region

Dominant strategies for the study of regional innovation are focusing structural elements on the system level, framing the research in a way that undermine focus on actors and the need to build social competence and shared knowledge for cooperation and strategic action.

Using the concept of IC, the social competence of the actors and partners in the region could be reported as the regions IC for innovation and chance and thus be a substantial part of the assessment of a regions business climate. Using the three key elements of IC identified in paragraph 5.1, the tasks is

- to render the regions innovative capacity in a narrative that envelopes and brings forward the collective strength of the regional government, the R&D institutions and the businesses acting together,
- to manage the substance of the narrative, and
- to report the narrative in a way that creates a basis for understanding the regions social and innovative capital.

A substantial challenge to be met is to give the report the content and form that achieves the needed accept from insiders and outsiders. Furthermore, it is an obvious prospect for additional research to examine the potential for *formalizing the requirements of reporting the IC of a region*, thus broadening the basis for understanding and creating common grounds for comparative regional IC analyzes.

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Mapping Intellectual Capital Dynamics to Identify Company's Value Drivers

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Abstract: Nowadays knowledge assets are widely recognised as organisational resources which play a pivotal role in company's value creation. However the mechanisms through which these assets take part in value creation are not yet well understood. In particular, more actionable approaches and tools, able to disentangle the complex dynamics through which knowledge assets contribute to create value need to be addressed. This paper draws upon this need and proposes a model for identifying company's knowledge assets which significantly contribute to create value and for analysing how these assets, through cause-and-effect mechanisms, create value over time. The model is designed basically as a cognitive map and draws upon the combination of insights gathered from the strategic management literature, regarding the use of strategy and success maps, with the adoption of the Analytic Hierarchy Process and the Systems Thinking. The paper describes a practical application of the model in a construction firm.

Keywords: Knowledge assets, mapping, value creation, AHP, systems thinking, case example

1. Introduction

Nowadays knowledge assets are recognised from companies as fundamental resources to asses and manage for enhancing the competitive strength and value creation capability. In particular, companies are more and more aware that their sustainable competitive advantage results both from the possession of resources that are hard to transfer and accumulate, inimitable, not substitutable, tacit in nature, synergistic, not consumable because of their use and the ways of combining and developing them. Moreover the companies' attention towards an effective management of knowledge assets is progressively increasing. The wide acknowledgment of the strategic relevance of knowledge assets has led to the generation of new concepts, approaches and models for identifying, assessing and managing these distinctive company's resources. In particular, the notion of Intellectual Capital (IC) has emerged as one of the key concept to understand and evaluate the intangible dimension of an organisation (e.g. Hall, 1993; Harrison and Sullivan, 2000; Roos et al., 1997). This concept has been popularised especially by practitioners looking for a conceptualisation to handle the difficult and, somewhat, evasive notion of intangibles. In the last decade, the notion of IC has been further investigated by several academics and practitioners, who have proposed complementary interpretations.

From the analysis of these interpretations, it is possible to underline a common central assumption: the IC is an umbrella concept, which embraces all those organisational knowledge resources that are particularly valuable for company's competitiveness (Carlucci and Schiuma, 2007). It defines the whole of knowledge assets that most significantly drive organisational value creation mechanisms for targeted key stakeholders. Despite the wide acknowledgment of the central role of knowledge assets in determining a better level of performance in a company, the mechanisms through which these assets take part in value creation are not yet well understood (Daum, 2002; OECD, 2008).

Certainly, understanding in depth how knowledge assets create value is quite challenging. However, it is highly important both for strategic and managerial purposes. A better understanding of how knowledge assets convert into value indeed helps to overcome causal ambiguity of how value is created and helps to direct resource allocation and management. Recently, several scholars have investigated the interrelationships between intangible resources and organisational performance, by focusing on different questions and adopting specific point of views (e.g. Carmeli and Tishler; 2004; Kaplan and Norton, 2004; Kianto, 2007; Roos et al., 2005; Teece, 2007). The academic and practitioner interest about knowledge resources as performance drivers is indeed growing and the research on this emergent subject appears still widely open to new theoretical and practical contributions.

Especially, more actionable approaches and tools, able to disentangle the complex dynamics through which knowledge assets take part to company's value creation need to be addressed (Adams, 2008; Carmeli and Tishler, 2004; Daum, 2002). This paper draws upon this need and attempts to provide some useful insights concerning both the identification of company's knowledge assets which significantly contribute to create value; i.e. the key knowledge assets value drivers, and the understanding of the ways through which these assets are dynamically involved, according to cause-and-effect mechanisms, in company's value creation over time.

For this purpose, the paper introduces a model for identifying key knowledge assets value drivers and for analysing how these assets, through linkages and circle of causality occurring in value creation, contribute to improve organisational performance and, as a result of this, to generate value.

The model is conceived as a map and develops in line with the logic underpinning the strategy maps (Kaplan and Norton, 2004) and the success maps (Neely, 2002). However, unlike the strategy and success maps, the model does not provide merely a visualisation of the causal links between knowledge assets and organisational performance outcomes, but it offers insights related both to the relative importance of knowledge assets in value creation process and the dynamics through which knowledge assets convert into value over time. The model draws on two methods, i.e. the Analytic Hierarchy Process (AHP) and the Systems Thinking.

The paper is organised as follows. In the second section, the role of knowledge assets in company's value creation is briefly addressed. In the third section, it is argued about the mapping as a powerful approach to visualize how a company creates value. Then, in the fourth section, the model is presented. In the fifth section, a case example of the application of the model is described. Finally, in the last section, conclusions and suggestions for future research are provided.

2. Knowledge assets and company's value creation

Nowadays knowledge assets are widely recognised as organisational resources which play a pivotal role in company's value creation (e.g. Daum, 2002; Grant, 1996; Harrison and Sullivan, 2000). Their role in value creation can be analysed by referring to the cause –effect relationships which link these assets to the achievement of strategic company's objectives and to the delivery of company's value propositions (Carlucci et al., 2004; Kaplan and Norton, 2004; Roos et al., 1997; Roos et al., 2005).

For a company, value creation means, first and foremost, to define and deliver the value propositions aimed to satisfy its key stakeholders. For this purpose, company must identify and effectively manage the few internal processes that are most critical for creating and delivering the differentiating stakeholders value propositions. On the other hand, the effective management of the key business processes depends on the appropriate development, exploitation and deployment of organisational competencies (Grant, 1996; Prahalad and Hamel, 1990; Teece et al., 1997). Organisational competencies, in turn, are closely related to knowledge assets. In this regard, several authors argued that competencies result from a set of knowledge resources coordinated in a way that provides a particular level of performance in a firm (Andriessen, 2004; Mills et al., 2002; Sanchez, 2001).

Therefore, the development, combination and exploitation of knowledge assets affect the growth of organizational competencies. This, in turn, influences the effectiveness and efficiency of organisational processes and, consequently, the company's ability to generate value.

The model that we propose, the Knowledge Assets Value Creation Map (KAVCM), is based on this statement. It is designed basically as a cognitive map aimed at disclosing the involvement of knowledge assets in value creation.

3. Mapping company's value creation

The map is one of the oldest forms of nonverbal communication characterised by a high power to provide a rich description of the reality. Obviously maps don't just reflect "reality," they help to create it. Maps can be simply "factual" but they must also be read carefully as contextualized documents. Maps are made at a particular moment in time by people who are embedded within a social and personal context that can and do influence the map. This is an important aspect to consider with regard to the nature of contents embedded in a map.

As valuable visual representation of an “area”, which highlights relationships between elements of that space, real or virtual, map has been exploited in various fields, e.g. psychology, education, planning, and management. Especially, mapping has attracted attention for reasons connected to ontological and epistemological questions about the nature, the fabrication, communication and authentication of knowledge. For example, in the last decades, closely connected to the map concept, many notions embracing mental processing, methods for structuring, storing and representing knowledge and approaches and tools for opening "mind's eye", have been introduced. Among them, cognitive map (Tolman, 1948), concept map (Novak, 1998) and mind map (Buzan, 1995). These latter are tools essentially designed to structure knowledge and to generate new knowledge. In particular, cognitive and concept maps have mainly a descriptive function since they allow to represent and to handle knowledge components and their links. While mind maps are evocative methods as they are mainly applied to stimulate the generation of ideas, aid creativity and encourage brainstorming approach.

Briefly a map accomplishes two main functions. The first function is descriptive. A map provides a visual representation that can help individuals to elaborate a problem statement, to transform its ambiguous status into an explicit condition, to constrain unnecessary cognitive work, and, eventually to create possible solutions (Scaife and Rogers, 1996; Vekiri, 2002). The second function is related to a map as a “thinking tool”, which supports the processes of generation and elaboration of ideas, not necessarily connected to an explicit focus question or context frame. As powerful descriptive and thinking tool, map has been used to deal with many strategic and managerial subjects, e.g. innovation, project/knowledge/change/process management, training, quality, as well as specific issues, e.g. strategy elaboration, activities planning.

Referring to strategic management purposes, the use of maps is relatively new. In particular Kaplan and Norton (2004) have proposed the strategy map as a visual framework of the cause-and-effect relationships among the components of an organization’s strategy, and as a means to integrate the four perspectives of the Balance Scorecard. Neely et al. (2002) have introduced the Success Map as a useful technique to help managers to align company’s strategy, processes and capabilities with the delivery of stakeholders’ satisfaction and contribution. Both the strategy map and the success map provide a visual representation of organization's strategy and elucidate how an organization intends to achieve its strategic outcomes. Moreover they provide both managers and employees with a platform for understanding the strategy, its components and the related links, and the management actions at the basis of the achievement of strategic objectives.

The visual representation of a strategy obtained by mapping can then support managers in their critical thinking and decision making processes regarding the company’s strategy formulation, implementation and evaluation.

The advantages connected to the use of a map as a powerful descriptive and thinking tool for facing strategic issues, suggest its exploitation also for investigating the knowledge dimensions of value creation pathways.

4. The model

The KAVCM can be applied in those companies in which competencies connected to the achievement of the key business processes performances have been identified and whose managers are interested in the disclosure and assessment of knowledge assets to manage for nurturing the targeted competencies. The main building blocks of the map are organizational competencies, knowledge assets and the related relationships. Knowledge assets and organizational competencies are represented by nodes, while arrows describe the links among nodes. These elements can be identified by using two matrices, i.e. the matrix of the direct dependencies and the matrix of the indirect dependencies.

The matrix of direct dependencies supports the identification of company’s knowledge assets which contribute to delineate organizational competencies. The columns of the matrix contain organizational competencies while the rows display the whole of company’s knowledge assets. By using the matrix, managers can judge, adopting a binomial approach, if a knowledge asset significantly contributes or not, to generate competence shown on the column. While, the matrix of indirect dependencies allows to identify the interactions among knowledge assets as well as among competencies.

The matrix has both on the rows and the columns either knowledge assets or competencies. In the cells of the matrix a judgment, regarding the existence or not of interdependence among knowledge assets or among competencies is expressed. Competencies with related knowledge assets and relationships, as resulting from the matrices, can be arranged in a frame (see Figure 1). The frame, so built, merely describes but does not evaluate the mechanisms underpinning value creation. For this purpose, we propose the application of the AHP (Saaty, 1980) and of the Systems Thinking methodology. In particular, the use of the AHP allows to asses the relative importance of company's knowledge assets against organizational competencies at a given point in time, in accordance with a view that we might call "static view". This assessment mainly allows identifying company's key knowledge assets value drivers. Identifying the most important knowledge assets to develop and exploit for creating value is very important. In fact, it allows managers to plan initiatives focused on the effective management of knowledge assets estimated as the most valuable.

However, both for strategic and managerial purposes, it is likewise important to understand how these assets, properly managed, convert into value over time. The application of the Systems Thinking allows to explore, represent and analyse the dynamics which link key knowledge assets value drivers to the development of organizational competencies, in accordance with a view that we might call "dynamic view". In the following paragraphs the KAVCM, conceived according to the two views, i.e. static and dynamic, is discussed.

4.1 The KAVCM for disclosing key knowledge assets value drivers

The KAVCM, conceived according to the "static" view, mainly provides an evaluation of the relevance of knowledge assets against organizational competencies. For this purpose the AHP methodology is adopted. The AHP is a multicriteria decision method which uses a system of pairwise comparisons to measure the weights of the elements of a decision problem, and finally to rank the alternatives in a decision. It involves structuring multiple choice criteria into a hierarchy, assessing the relative importance of these criteria, comparing alternatives for each criterion, and determining an overall ranking of the alternatives. In our case the decision elements of the hierarchy are knowledge assets, as alternatives, and competencies, as criteria. The main outcome of the AHP application is the evaluation of the relative importance of each knowledge asset against the general goal, i.e. improvement of key processes performance. This importance is captured in the KAVCM through the size of the nodes of the map. While, the width of an arrow stands for the importance of a knowledge asset for the achievement of the competence in which the arrow ends (see Figure 1).

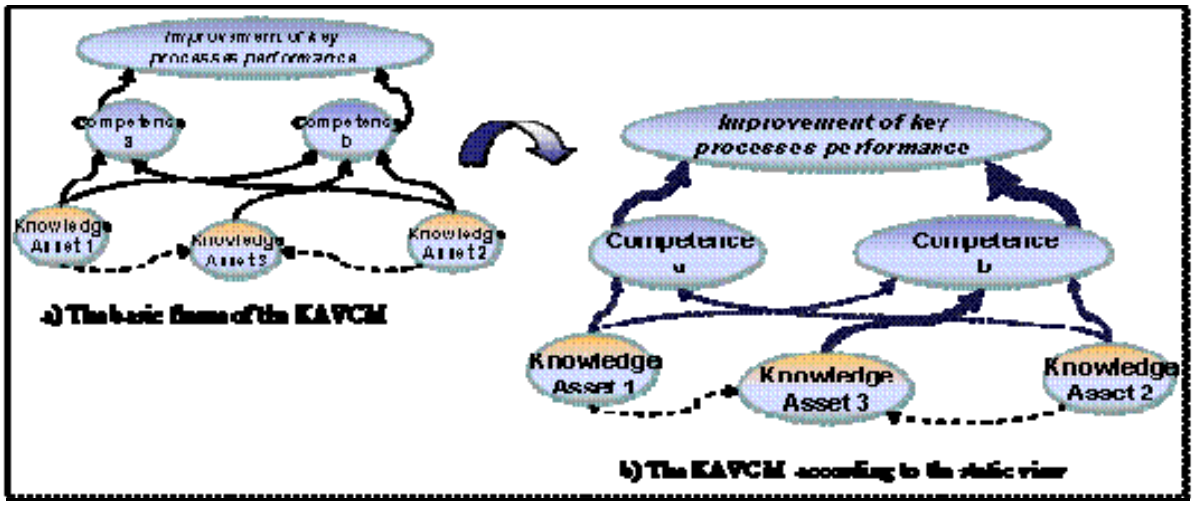

Figure 1: The KAVCM: the basic frame and its static version

From an operational point of view, the AHP can be performed by collecting managers' judgments regarding the importance of each decision element, i.e. competencies against the general goal; knowledge assets against connected competencies. The collection can be carried out through several methods e.g. interviews, questionnaires, workshops and focus groups. Especially, for determining the relative importance of elements, the managers have to be asked to respond through a series of pairwise comparisons with Saaty's nine-point scale (Saaty, 1980). Saaty's scale requires to the decision maker to assign relative ratings, by expressing his/her preference between each pair of elements verbally as equally important, moderately more important, strongly more important, very

strongly more important, and extremely more important. Collected judgments have to be then properly handled in order to obtain the priority weights for each decision element. For this purpose, the software ExpertChoice can be effortlessly applied.

The KAVCM, built in this way, provides:

- a visualization of the links between knowledge assets and competencies;
- an evaluation of the relative weight of knowledge assets against competencies;
- a disclosure of those knowledge assets that, due their high weight, significantly support strategy execution and value creation, i.e. *key knowledge assets value drivers*.

The assessment of the relative importance of each knowledge asset against organizational competencies, through the AHP, allows managers to clarify and test their assumptions about the relevance of knowledge assets for the achievement of strategic outcomes. In fact, managers might intuitively realise that some knowledge assets are more important than others; however the application of a rigorous approach such as the AHP can help them to revise or, eventually to confirm, their assumptions. The identification of the key knowledge assets value drivers has great relevance.

In fact, knowing these assets, managers can design knowledge assets management initiatives which might have a great impact on company's performance.

As previously stated, once designed initiatives aimed at management of key knowledge assets, it is extremely important for managers to understand how these assets, properly managed, convert into value over time. The application of the Systems Thinking allows to deal with this need.

4.2 The KAVCM for disentangling the value creation dynamics of key knowledge assets

The KAVCM, conceived according to the "dynamic" view, provides a detailed visualization and analysis of mechanisms through which knowledge assets are engaged in value creation. It develops as a cognitive map built according the Systems Thinking principles.

The Systems Thinking allows to describe the behaviour of closed systems by using causal loops diagrams. These diagrams consist of causal links connecting variables in a way that shows how one variable affects another. Each arrow in a causal loop diagram is labelled with a "+" or "-." The sign "+" means that when the first variable changes, the second one changes in the same direction. The sign "-." means that the first variables cause a change in the opposite direction in the second variable. From the combination of the signs associated to the links, we can establish the behaviour of a single closed loop, i.e. positive (or self-reinforcing) and negative (or self-correcting) loops.

The assumption at the basis of the model is the following: in order to achieve the key process performances targets it is necessary to improve the key organizational competences which impact on the performances. In turn, the improvement of the key organizational competences is a consequence of the improvement both of the key knowledge assets which make up the competence and of their impact on the key process performances (see Figure 2).

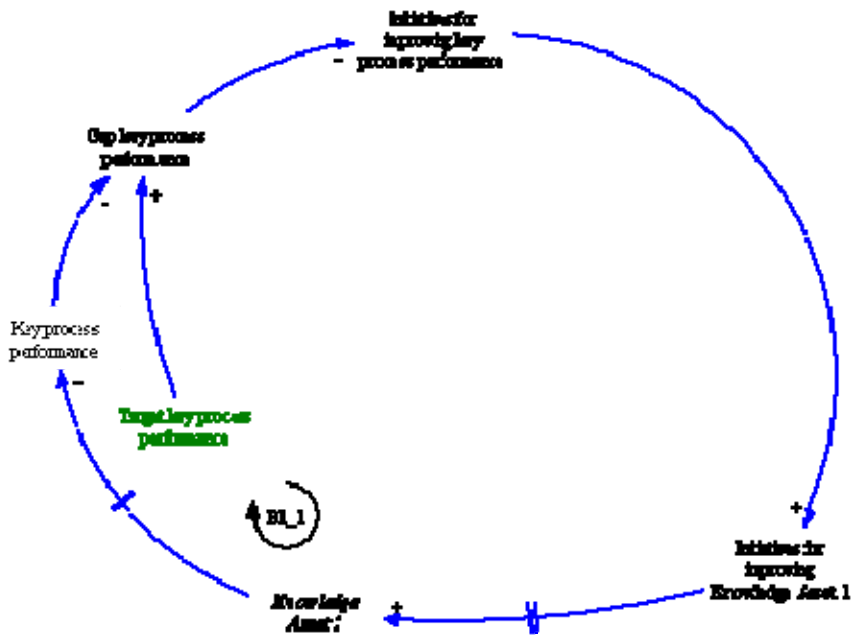

Figure 2: Example of a B1_1 loop

More in particular the Figure 2 shows how through the implementation of specific knowledge management initiatives could be obtained an improvement of key knowledge assets and as a consequence an improvement of the key process performances. This process will end when the key process performance will reach its target. This process can be described by using a balancing loop. The achievement of the equilibrium point leads to stop the implementation of further knowledge management initiatives. If there are several key process performances or key knowledge assets within the same map, it is necessary to differentiate the loops, in order to better understand the dynamics within the map. In particular, with regard to the balancing loop of Figure 2, the name "B1_1" means that it is a balancing loop (letter "B") which involves the most important key process performance (first number = 1) and the most important key knowledge assets (second number = 1). As previously mentioned, the level of importance is one of the results obtained by using the AHP approach. Since it is important to understand what are the key knowledge assets that require an improvement against the target associated with, a further balancing loop has to be introduced within the map (see Figure 3). This loop highlights that all the key knowledge assets which have a gap, need an improvement. Also in this case, there is an equilibrium point and it is reached when the level of the knowledge asset achieves the fixed target. It leads to stop the implementation of further knowledge management initiatives aimed to improve the above mentioned knowledge asset. In particular, with regard to the balancing loop of the Figure 3, the name "B1" means that it is a balancing loop (letter "B") which describes the dynamics aimed to fill the gap of the most important key knowledge assets (number = 1) against the target associated with.

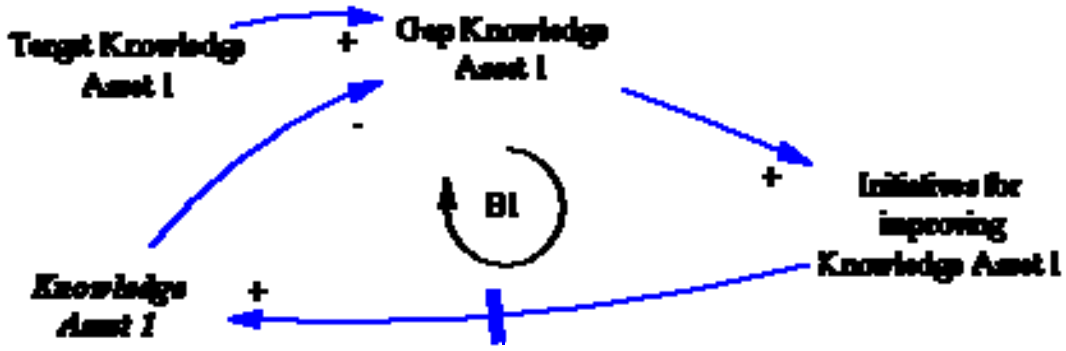

Figure 3: Example of a B1 loop

Furthermore, in order to address and implement the knowledge management initiatives it is necessary to consider their impact on the available budget. For this purpose a further balancing loop has to be introduced within the map (see Figure 4).

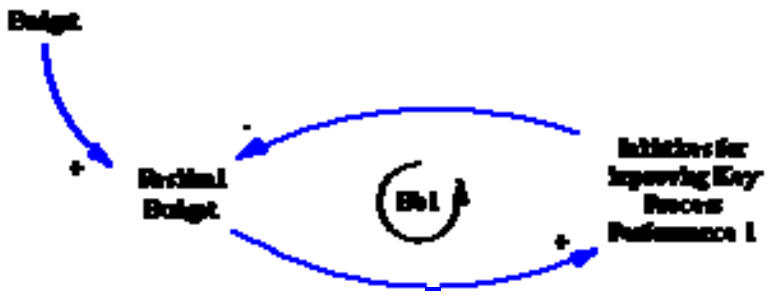

Figure 4: Example of a Bb1 loop

This loop shows that the implementation process of new knowledge management initiatives will stop when the residual budget will be equal to zero. The main aim of this loop is to stress the importance of the alignment between budgeting and the knowledge management process. In particular, with regard to the balancing loop of the Figure 4, the name "Bb1" means that it is a balancing loop (letter "B") which describes the dynamics of the budget (letter "b") available for improving the most important key process performance (number = 1) against the target associated with. Finally, by including the above described loops within the same model, we obtain the following final dynamic map (see Figure 5). The example is related to the "competence a" of Figure 1, characterized by the presence of one key process performance and two key knowledge assets.

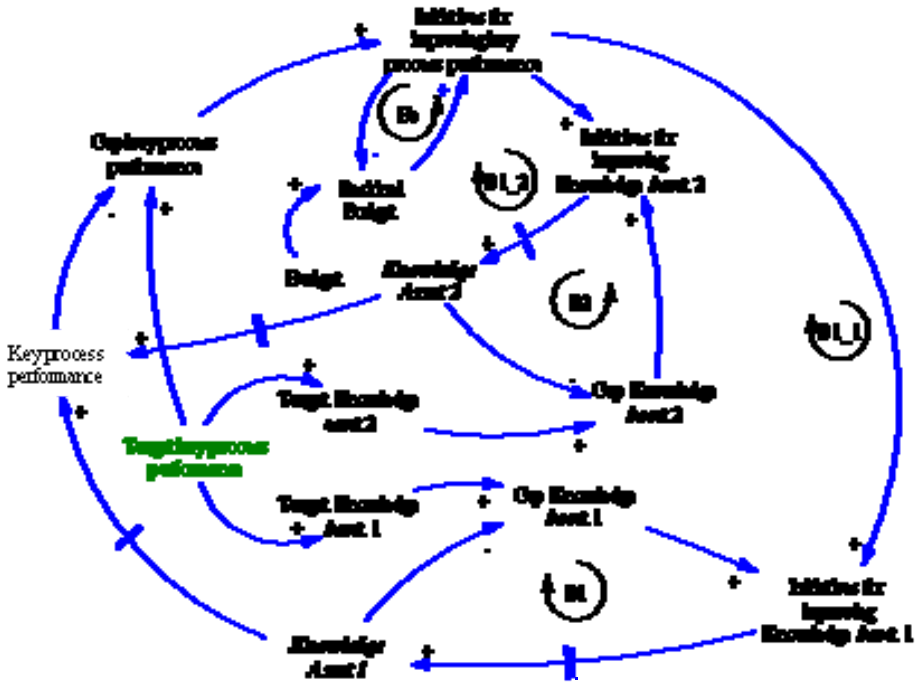

Figure 5: Example of a KAVCM according to the dynamic view

As it can be seen in Figure 5, there are two narrow lines in the middle of some arrows. These lines highlight that the effect of the previous variable on the following one is characterized by a time delay. In particular, we can distinguish two main typologies of delay:

- action delay = time between the start of the knowledge management initiatives implementation and the real improvement of the key knowledge asset.
- impact delay = time between the improvement of the key knowledge asset and the positive impact on the key process performance.

With regard to the effective use of the map, it is necessary to stress that some operational tools must be associated with the map, such as the tables shown in Figure 6.

Key process performance	KPIs	Target	GAP	LOOP	Impact Weight KA	Action Delay	Impact Delay	Budget
Key process performance 1	-	-	-	B1_1	-	-	-	-
				B1_2	-	-	-	-
				TOT.	-	-	-	-

Knowledge Asset	Actual Level	Target	GAP	LOOP	Initiatives	Starting data	Action Delay	Budget
KA1	-	-	-	B1	i	-	-	-
					ii	-	-	-
					iii	-	-	-
					TOT.	-	-	-
KA2	-	-	-	B2	i	-	-	-
					ii	-	-	-
					iii	-	-	-
					TOT.	-	-	-

Figure 6: Example of tools aimed to operationalize the KAVCM

In fact, these tools enable to translate, in quantitative data, the qualitative information supplied from the map and therefore encourage the managers' decision-making process and critical thinking.
Basically the proposed model allows to understand how knowledge assets contribute to company's competencies development, on the basis of the managers' mental models.
In particular it provides:

- a qualitative description of the dynamics which involve knowledge assets and key process performances;
- a clear picture of "stretching" variables, i.e. the knowledge assets gaps and the key process performances gaps;
- a preview of how some knowledge management initiatives can affect the development of knowledge assets and, as a result, contribute to the achievement of targeted performances.

5. Empirical research

In the following section, an application of the KAVCM within a construction company is described. At the time of the application the company was engaged in a significant re-examination and codification of its strategy. Especially the application of the model has been required for assessing and selecting the most valuable knowledge assets against the company's key competencies and defining proper knowledge assets management initiatives. The company's name is not mentioned for confidential reasons.

5.1 Company's description

Founded in 2002, today the company is a small business which acts essentially at regional level. Its core business concerns the design and selling of residential buildings. The construction activities are managed in outsourcing. Due to the commitment to quality and excellence, nowadays the company is one of the most recognized firms operating in the sector at local level.

5.2 The application of the model

The model has been developed during the last year. As a result some knowledge assets management initiatives were planned. The initiatives have started in September and are ongoing.
The model has been implemented through the following main phases:

- *phase 1)* the identification of knowledge assets founding the company's key competencies and of relationships among the identified knowledge assets and among competencies.
- *phase 2)* identification of the key knowledge assets value drivers;
- *phase 3)* definition of management initiatives for exploiting and developing the key knowledge assets value drivers;
- *phase 4)* identification of proxies – expressed in terms of key processes performances - for evaluating the key competencies and definition of the targets related both to key process performances and key knowledge assets;

- *phase 5)* analysis of dynamics linking key knowledge assets value drivers and the related management initiatives to key process performances.

Phase 1) During this phase two main activities have been carried out:

i) the identification and characterization of the knowledge assets founding the company's key competencies;
ii) the identification of relationships among knowledge assets as well as among competencies.

Regarding the company's key competencies, top managers, with the support of researchers, have identified the following competencies as particularly relevant for successfully performing operational processes: "competence in designing buildings in an integrated way" and "competence in managing relationships and external communication". In particular, "competence in designing in an integrated way" regards the ability to manage, in tightened coordination, all the various elements related to buildings designing (e.g. architectural features, technical choices, rules, customers' and community well-being), making attention to the effective possibility about placing what imagined during plan phase in work.

Then knowledge assets related to the key competencies have been identified and analysed during a targeted focus group which has involved top managers and researchers. The researchers acted as facilitators. Especially the "Knoware Tree" (Schiuma et al., 2005) has been adopted for disclosing and examining the company's knowledge assets. Then company's knowledge assets have been examined with reference to the targeted key competencies. In particular, through the matrix of direct dependencies the knowledge assets founding the key competencies have been identified. Then, through the matrix of indirect dependencies, the interactions among knowledge assets as well as among competencies have been determined.

Phase 2) During this phase the key knowledge assets value drivers have been identified. For this purpose the KAVCM, conceived according the static view, has been built. The managers' judgments concerning the relative importance of knowledge assets against competencies have been collected during a focus group, through a series of pairwise comparisons with Saaty's scale. Then the geometric mean has been used to aggregate their assessments. The AHP has been applied by using ExpertChoice. From the AHP application, the relative importance of knowledge assets is resulted. The importance has been captured in the nodes and arrows of the KAVCM (see Figure 7). The KAVCM, built in this way, has allowed to identify the most important knowledge assets to develop and manage for maintaining and developing targeted competencies. Especially, based on the discussions with the researchers about contents shown in the KAVCM, managers have identified the following key knowledge assets value drivers related to "competence in designing buildings in an integrated way": organisational values; capability to placing what conceived during concept and design phases in work; capability in designing with a special focus on community and customers' well-being; while with reference to "competence in managing relationships and external communication" the following key knowledge assets value drivers have been identified: Website, Relationships between employees and customers.

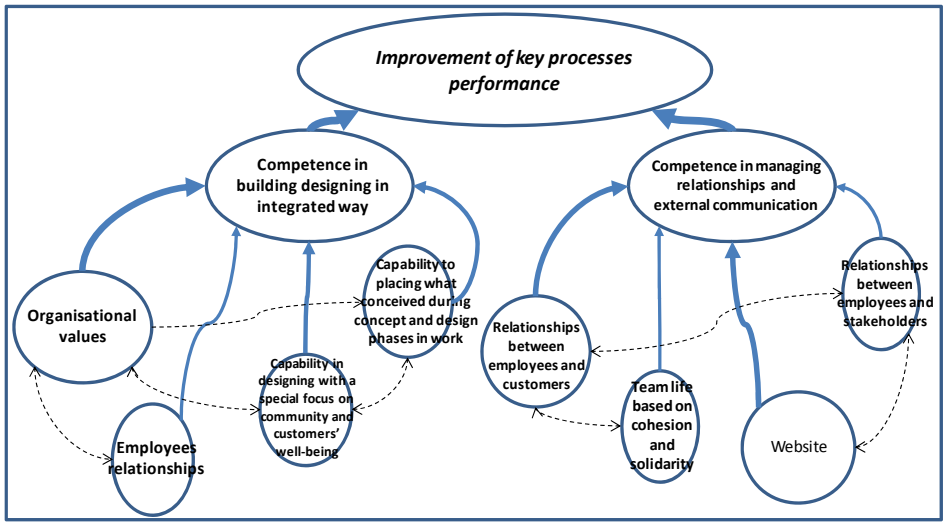

Figure 7: The tailored KAVCM according to the static view

Phase 3) For developing the key knowledge assets value drivers and, as a result, the related competencies, managers with the support of researchers have planned the knowledge assets management initiatives shown in Table 1.

Table 1: The knowledge assets management initiatives

Competencies	***Key Knowledge Assets Value Drivers***	***Knowledge Assets Management initiatives***
Competence in designing buildings in an integrated way	Organisational values	Meeting on organizational culture; training on self -expression; initiatives promoting socialisation
	Capability of designing with a special focus on community and customers well-being	Meeting and trips aimed to promote knowledge sharing and knowledge creation; Market survey
	Capability to placing what conceived during concept and design phases in work	Training on software for Building Information Modelling; Training on project management; Training on rules regarding design
Competence in managing relationships and external communication	Website	Design and implementation of the company's web site
	Relationships between employees and customers	Knowledge transfer of targeted information about company to the key company's stakeholders; Reorganizing sales area for enhancing customers' relationships

Despite at first both competencies were estimated as equally important for achieving an improvement of key processes, during the focus group managers have expressed their intention to prioritise the enhancement of the "competence in designing buildings in an integrated way".

Phase 4) During this phase, the performances of the key organizational processes which are affected by the key knowledge assets value drivers and, as a consequence, by the competencies, have been identified. Especially, during a focus group, managers with researchers, have defined some proxies for measuring the contribution of the key knowledge assets to the above mentioned performances (see Table 2). Moreover the targets related both to key process performances and key knowledge assets have been identified. However for confidential reasons, we cannot show them.

Table 2: Key knowledge assets value drivers and proxies of the competence in designing buildings in an integrated way

Competence	Key Knowledge Assets Value Drivers (numbered according to their relative importance)	Key Process Performances (numbered according to their relative importance)
Competence in designing buildings in an integrated way	1) Organisational values	designing time selling time; number of revisions;
	2) Capability of designing with a special focus on community and customers well-being	designing time; selling time;
	3) Capability to placing what conceived during concept and design phases in work	designing time; number of revisions;

Phase 5) During this phase a detailed analysis of mechanisms through which the key knowledge assets are engaged in the value creation, has been carried out. For this purpose, researchers and managers have further analyzed according to the Systems Thinking approach, the elements and the links previously mapped (see Figure 7). Particularly, an assessment of the potential impact, action delays and impact delays, with regard to the selected knowledge management initiatives, has been carried out.

Figure 8 shows the KAVCM built for the company's key competence "designing buildings in an integrated way". In particular, the map is designed for the main key process performance connected to the above mentioned competence. Due to the space limitations we cannot report all the maps built for every key process performance.

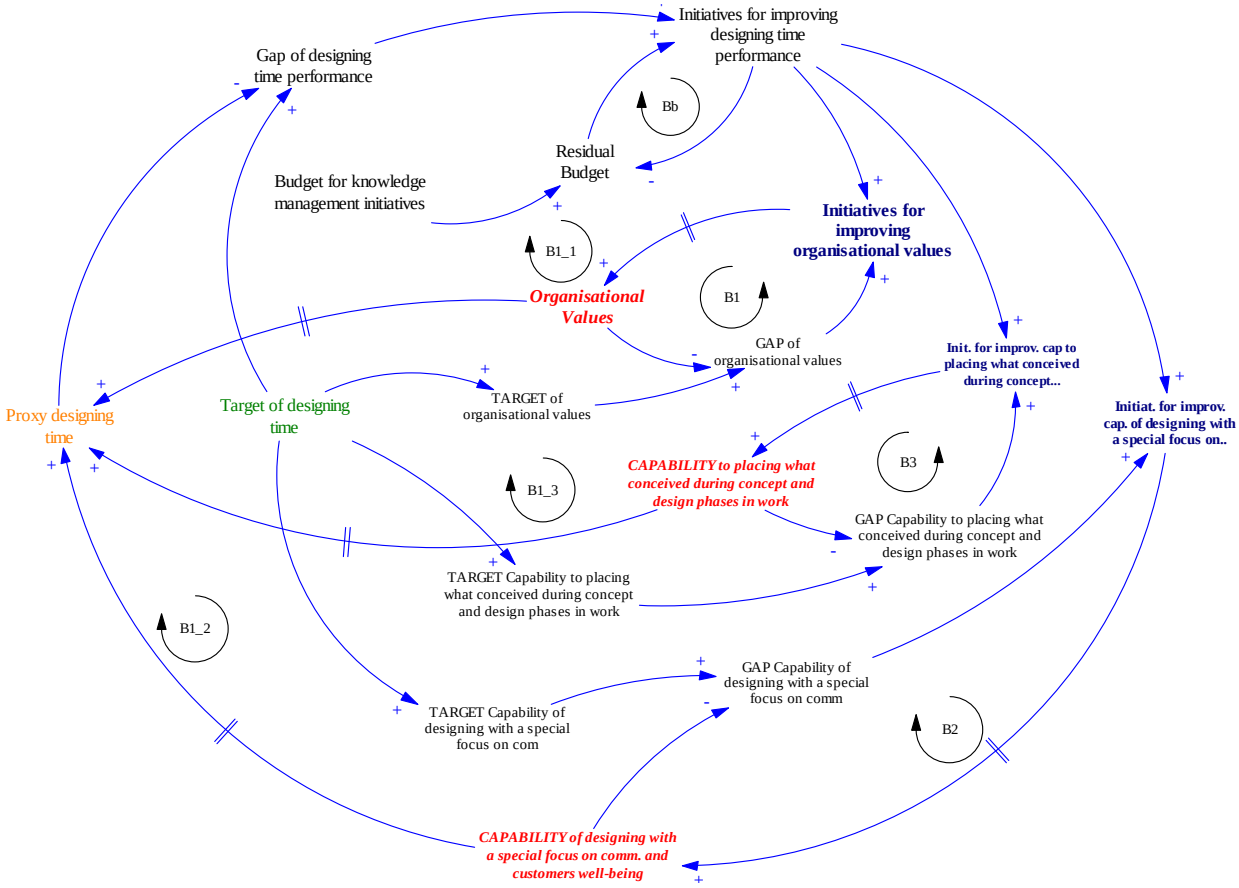

Figure 8: The tailored KAVCM according to the dynamic view

6. Conclusions

This paper addresses the mapping as a valuable method for disclosing and assessing how organizational knowledge assets, separately and as a cluster, take part in company's value creation. In particular, the study proposes a model, the KAVCM, for analysing and evaluating the involvement of these assets, in terms of role, relative importance and reciprocal relationships, in company's value creation pathways. The proposed model can be adopted as a standalone approach or as an integrated and complementary methodology of the strategy map to drive the definition and implementation of a company's strategy. Building the KAVCM allows managers to elucidate and test their hypothesis about the knowledge-based foundations of company's business model and provides information useful for designing effective knowledge assets management initiatives and avoiding misallocation of resources and other inappropriate decisions by managers. In the examined case, the application of the model has mainly contributed to create at managerial and organisational level:

- an increased understanding of the company's knowledge assets and their relation to strategic objectives;
- an augmented managerial attention to the company's knowledge assets development;
- a valuable knowledge platform for making better informed decisions about the design, implementation and assessment of proper knowledge assets management initiatives.

More specifically, the application of the KAVCM, according to the static view, has allowed managers to identify key knowledge assets value drivers, through an accurate and participated approach, and to plan management initiatives aimed at their development. The application of the KAVCM, according to the dynamic view, has required some efforts and a close collaboration between researchers and managers. In spite of this, currently the tailored maps represent useful tools that managers intend to use for monitoring and evaluating the success of the planned knowledge assets management initiatives. The proposed model is seen as open for future extension and development. Especially we call for further research on a more widespread investigation of the relevance and impact of the

KAVCM in strategy planning and execution as well as in the design and implementation of strategic knowledge management initiatives aimed to support company's value creation dynamics.

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Knowledge and the Ageing Employee: A Research Agenda

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Abstract: Our ageing population is the result of two demographic trends: decreasing fertility levels and higher life expectancy. As a corollary to these demographic trends, the working population is ageing and shrinking at the same time. This development will affect the performance of organizations in the next decades. As today's economy and the performance of organizations is mainly based on knowledge, the ageing workforce will mainly affect the organizations ability to be knowledge productive.As current knowledge management (KM) and intellectual capital (IC) literature hardly addresses the issue of ageing, the aim of this paper is to explore this topic in order to formulate an agenda for further KM/IC research. Combining the temporary consequences of ageing (brain drain and talent gap) and the false assumptions about the capabilities of older workers (older workers contribute negatively to a firm's performance), the current ageing of the working population reveals two main risks for organizations and management: underutilization of older employees, and loss of knowledge. Based on the exploration of these two risks in this paper, several issues are proposed for further research. These issues focus on the specific competences of the older knowledge worker, the implications for talent development programs, the benefits of inter-generational learning, and effectiveness of knowledge retention strategies.Today, the main fear is that large scale retirement will lead to a shortage of skills, talents, knowledge. Although acknowlegding the risks and threats of this brain drain, the current temporary ageing of our workforce might also contribute to a structural better valuation of the potential of the older knowledge worker and its specific contribution to the process of knowledge creation. In an ageing knowledge economy, increased understanding about the abilities and distinct qualities of older workers will provide opportunities for organizations to enhance knowledge productivity and thus gain competitiveness.

Keywords: Ageing, ageing working population, ageing employee, older workers, knowledge productivity, knowledge management

1. Introduction

> *'People in their late 50s, 60s and 70s have now become the largest under-utilized pool of human resources in the economy'*
>
> *(Business Week)*

Populations all over the world are ageing. The ageing population is mainly the result of two demographic trends: decreasing fertility levels and higher life expectancy. These demographic trends have social and economic consequences. A related development of the ageing population is that the share of older people within the working population (>15 years) grows. Moreover, the increase of the share of older persons in the working population is now accellerating, as the post-war baby-boom generation (1946-1965) approaches retirement (OECD, Eurostat). To illustrate this accelleration, between 2000 and 2006 the number of 55-65 years old in the Dutch working population increased with more than 400.000, while the number of 25-35 years old decreased with 370.000 (CBS). This change in the ratio between older and younger employees has consequences for organizations and management.

The main consequence for organizations and management is that the labor force is ageing and shrinking at the same time (DeLong, 2004). This ageing and shrinking work force will affect the performance of organizations in the next decades. As today's economy and the performance of organizations is mainly based on knowledge (Drucker, 1993; Nonaka & Takeuchi, 1995), the ageing workforce will mainly affect the organizations ability to be knowledge productive (Stam, 2007). However, despite the certainty of the demographic trend of ageing, management does not (yet) consider the coming brain drain to be a significant issue (Brandel, 2008; Drucker, 2001). Managers do not seem to have a sense of urgency that they need to anticipate and act on this development (Slagter, 2007).

The starting point of this paper is that ageing will mainly affect the organizations ability to be knowledge productive. This issue has hardly been addressed in knowledge management (KM) or intellectual capital (IC) literature. In the top 20 KM/IC academic journals (Serenko & Bontis, 2009) I only found six articles that explicitly addressed the issue of ageing. "The practical implications for management of a rapidly aging workforce and a shrinking pool of highly skilled younger workers has not been fully explored" (Streb, Voelpel, & Leibold, 2008). Therefore, the aim of this paper is to

explore the issues related to ageing of the workforce from a knowledge management perspective, in order to formulate an agenda for further research.

In this paper I will first focus on the consequences of ageing from an economic perspective. Next I will elaborate on (the assumptions about) the potential contribution of older workers to the process of knowledge creation. Then I will elaborate on ageing from a KM perspective. Finally I formulate a series of questions for further research.

2. Structural and temporary economic consequences of ageing

As we have seen above, ageing refers to at least two different demographic trends. First, the *structural* trend that people live longer. Second, the *temporary* increase of the number of elderly people as a result of past fluctuations in the fertility rate.

The main economic consequences of ageing seem to be of a structural nature. It is expected that the next decades the number of elderly people will rise significantly relative to the number of working age (dependency rate). By 2050, there will be only two people of working age (15-64) to support one person of 65 or more in the OECD area. These trends are evident in all OECD countries, however some countries (like Italy and Germany) are afflicted more than others. A considerable decline of the share of people at work will probably result in a decline of GDP per capita, implying a loss of welfare. For instance, in January 2007 The Netherlands counted 10 million people of working age (20-65). It is expected that this number will decline to 9 million in 2040 (CBS). Worldwide productivity and growth are predicted to decrease as workforces decline (Joe & Yoong, 2006). A related threat to economic growth and welfare is that age-related expenditures (e.g. to support pension systems and health care systems) could rise considerably, because increased financial pressures on pension systems may force governments to increase taxes on labour, which will further lower GDP per capita, implying a further loss of welfare (Cotis, 2005; Ewijk, De Gier, Henkens, Hielkema, Van Imhoff, & Van Wissen, 2003).

The main temporary economic consequence of ageing seems to be a loss of productivity as a consequence of a loss of capabilities related to the large scale retirement of the baby-boomers combined with a shortage of younger workers to fill the void (Kaye & Cohen, 2008). This temporary consequence of ageing is often referred to as *brain drain* or *talent gap* (Arnone, 2006). Whereas brain drain mainly refers to the large scale retirements of the baby boomers, talent gap mainly refers to the shortage of younger workers that follows the large scale retirements. As these issues refer to the organization's ability to make knowledge productive, this paper focuses on these two issues.

3. Assumptions about older workers' contribution to (knowledge) productivity

From an organizational perspective, the main problem seems to be that organizations do not know how to make sense of the potential of the older employee. Based on prejudices, myths and presumptions organizations have lost sight of the capabilities of older workers. According to the majority of managers, ageing will predominantly have negative consequences (Ebrahimi, Saives, & Holford, 2008; Remery, Henkens, Schippers, Van Doorne-Huiskes, & Ekamper, 2001): costs will increase, willingness to change will decrease, absenteeism will increase and productivity will decrease. In today's workplace, older workers are often considered inflexible and uncreative and thus less capable of doing their jobs than their younger counterparts. (Coy, 2005). "Such illusions perpetuate because of misconceptions about the abilities of older workers, such as beliefs that midlifers are slower with technology, less interested in their work, unwilling to learn or change, fearful, accident-prone, less efficient, less capable, and just 'counting days' until retirement" (Kaye et al., 2008, p.32). Many people assume that the natural process of deterioration of the human brain results in limited intellectual capacity of older workers. According to an Economist Special Report about the ageing workforce, it is often assumed that older employees are less motivated, take more sick leave and cost more (Turning boomers into boomerangs, 2006). According to Ebrahimi (2008), "The majority of employers question their productivity, as well as their capacity to adapt and learn"(p.125). Although more and more evidence shows that these assumptions are false (Engelenburg, 2008; Inma & Drury, 2007; Kaye et al., 2008; Koopman-Boyden & MacDonald, 2003; Slagter, 2007; Turning boomers into boomerangs, 2006), the problem of the faulty logic is that it can become a self-fulfilling prophecy because what follows is disengagement, disappointment, disgruntled workers, low staff morale, leading to decreased productivity (Kaye et al., 2008; Slagter, 2007). Furthermore, these prejudices also lead to age discrimination, which restrains organizations from hiring or retaining older people (Kaye et al., 2008). According to the Society for Human Resource Management, 59% of its

members do not actively recruit older workers, and 65% of its members don't do anything special to retain them (Coy, 2005).

A persistant assumption in the workplace is that older employees are less productive. However, based on an analysis of the relationship between age and productivity, Groot et al. (2004) conclude that a negative age effect is compensated by a positive experience effect. On balance, older employees are more productive than their younger counterparts. Based on the same analysis it is also concluded that there is a positive relationship between (corporate) education of the older employee and productivity. Based on this relationship, educating the older worker becomes increasingly relevant (Kaye et al., 2008). However, as a consequence of the assumption that older employees are less productive, managers also assume that training older workers yields a poor return-on-investment (Kaye et al., 2008) and therefore mainly focus on the further development of their young potentials. "Age negatively affects the variables that lead towards participation in training and development" (Streb et al., 2008). Similar conclusions can be found in (Dorhout, Maassen van den Brink, & Groot, 2002). According to Inma and Drury (2007) "this negative view of ageing workers stems largely from an earlier era when the standard of healthcare and the quality of life of populations were still poor and when life expectancies were relatively moderate" (p.3). These assumptions seriously threaten the organizations ability to make knowledge productive.

The next decades, the organization's ability to make knowledge productive will become more and more dependent on the capabilities of older employees (Coy, 2005; DeLong, 2004; Kaye et al., 2008). Therefore, next to the temporary consequences of the brain drain and talent gap, this paper will also focus on the potential of older workers.

4. The risks of ageing from a KM perspective

When we combine the temporary consequences of ageing and the false assumptions about the capabilities of older workers, the current demographic developments result in two main risks for organizations and management: underutilization of older employees, and loss of knowledge. Strack et al. (2008) refer to these two types of risk as 'productivity risk' and 'capacity risk'. The consequence of both risks is deterioration of the organization's ability to make knowledge productive.

- **Underutilization of older employees**. The first issue is related to the ageing of the working population. As we have seen above, the coming decades the average age of the working population will significantly rise. As we have also seen above, the current attitude towards older employees is mainly based on false (or at least questionnable) assumptions with regard to their abilities. As a result "people in their late 50s, 60s and 70s have now become the largest under-utilized pool of human resources in the economy" (Coy, 2005, p.81). Ignoring the potential of older workers deprives the company of an important source of knowledge necessary for its continuous development and its competitive position (Ebrahimi et al., 2008). However, recognizing the full potential of older employees requires a fundamental reconsideration of the capabilities of older workers. Recognition and better utilization of this potential might lead to a relative advantage to those organizations that do not recognize this hidden potential.
- **Loss of knowledge**. The second issue is related to the looming retirement wave and the decline in the supply of labour. Together these two trends result in a loss of knowledge. "Lost knowledge means the decreased capacity for effective action or decision making in a specific organizational context" (DeLong, 2004, p.21). The coming years, large numbers of our most experienced workers are going to retire. At the same time, it will be increasingly difficult to compensate this loss of knowledge because of a sharp decline in the supply of labour. "As older employees retire over the next several years, potential replacements will be increasingly difficult to find and hire out of this smaller pool of talent" (Casher & Lesser, 2004, p.2). "As employees get older and retire, businesses can face significant losses of critical knowledge and skills, as well as decreased productivity" (Strack et al., 2008, p.120). Together these two developments will lead to a 'talent gap' or a 'brain drain' (Arnone, 2006) which threatens the organization's ability to make knowledge productive (Slagter, 2007) and thus threatens competitiveness (Turning boomers into boomerangs, 2006).

Both underutilization of older employees and loss of knowledge will affect the organization's ability to make knowledge productive. Some even argue that the key to competitive advantage in the near future is in the issue of the ageing workforce (Coy, 2005; DeLong, 2004; Ebrahimi et al., 2008; Kaye et al., 2008; Strack et al., 2008). "Actively addressing demographic risk to retain the skills and know-how needed to ensure future viability can give companies a competitive advantage over rivals" (Strack

et al., 2008, p.128). In order to better understand these risks from a KM perspective, the next sections further elaborate on these two issues.

5. Underutilization of older employees

As we have seen above, the perception about older employees is to a large extent based on false assumptions about the effects of ageing. However, this does not imply that ageing does not affect the effectiveness of older workers. In general, older employees have more experience. Therefore, it can be argued that older employees are more valuable to a company than their younger counterparts (Kanfer & Ackerman, 2004). At least, as long as more experience means that they are better capable of making knowledge productive.

In the literature we find many references to specific knowledge capabilities related to older workers. According to Ebrahimi et al. (2008), ageing workers play an important role in the knowledge household of an organization. “Their life experience, their in-depth knowledge of different professional environments (network of contacts, who knows what?), and their knowledge of the culture of these environments (collection of codes, symbols, shared significance, etc., permitting to know how to deal with who?) bestows them differentiated aptitudes to understand issues, interpret information, connect various information and data, integrate knowledge, and finally, connect and coordinate knowledge carriers” (p.129). Older workers distinguish themselves by having practical intelligence or “the ability to solve ill-defined business problems using rules of thumb that can’t be put down on paper” (Coy, 2005, p.79). Older employees are also referred to as ‘flexible and open to change’, ‘interested in learning new tasks’ (Slagter, 2007), committed to quality, posessing strong work ethics and functioning as a corporate memory (Inma et al., 2007), possessing well-developed communication skills, a sense of loyalty, creative and responding well in a crisis (Joe et al., 2006), attracted to teaching (Ebrahimi et al., 2008). Based on these qualifications, older workers seem to possess valuable knowledge, skills and attitudes, which are necessary to make knowledge productive.

According to an article in Business Week (Coy, 2005, p.79), the innovation profile of older employees differs from the innovation profile of their younger colleagues. Whereas older employees are predominantly experimental (incremental: new ideas build on a lifetime of observation, trial and error), their younger counterparts are predominantly conceptual (radical: a bolt from the blue). The Economist (Turning boomers into boomerangs, 2006) adds to this “at what point does an ageing mind become a liability and not an asset? The answer depends on what that mind is asked to do. If the task requires a wealth of knowledge and experience, then the elders have it. If the job needs sharp and fast thinking, youth triumphs” (p.53). This implies that the effectiveness of older employees is situational and requires awareness about the specific knowledge competences of older workers and the different situations in which these competences are needed. “A systematic review of current HR-policies and processes will reveal adjustments you can make in a variety of areas to turn age-related risks into competitive opportunities. The key is to tailor these measures to each job (…), keeping in mind that the experience that comes with age may increase productivity in certain jobs” (Strack et al., 2008, p.127). A similar conclusion is drawn by Arnone (2006), when he concludes that “employers need to assess the attributes of certain older workers that translate into unique contributions to their enterprise, and that complement, rather than compete with what younger workers offer” (p.10).

Another aspect that is related to the underutilization of the potential of older workers is the aspect of inter-generational learning (Gendron, 2007; Inma et al., 2007). In this sense, Ebrahimi et al. (2008) refer to the potential of an inter-generational dynamic. “The younger workers are for their part translators of up-to-date scientific and technical knowledge that awakens the curiosity and motivation towards new technological projects by ageing workers. The ageing workers are the translators of past situations and history of the registered information within the firm, and are also transmitters of tacit how-to’s. Hence, as knowledge strategists, they participate in the acceleration and the efficiency of practices by their colleagues, and in the reduction in organizational errors” (p.135). This dynamic view of inter-generational learning implies that combining the knowledge of older and younger employees might serve as a catalyst in making knowledge productive.

Productivity in the knowledge economy requires continuous learning (Van Dalen, Henkens, & Schippers, 2008). As learning is an individual activity, training young employees exclusively will not help to make the older more productive. In this sense, the concept of *talent development* gets a new meaning. Talent development in the ageing knowledge economy refers to the utilization of the specific capabilities of all employees, both young and old. In other words, learning becomes more important

than age. This implies a fundamental reconsideration of (implicit) underlying assumptions of corporate carreer development policies. “The goal is to avoid any age limits, or similar age-related hurdles, and to offer training that is suitable for the targeted age group” (Streb et al., 2008, p.4).

A better understanding of the general age effects and the specific competences of older workers, in relation to the demands of knowledge intensive work, will help us to better value the potential of older employees. In addition, better understanding will help organizations to better position their older workers and make better use of their abilities. This will enhance knowledge productivity, strengthen the relative competitive position and eventually organizational performance. Better understanding will also help organizations to better align their career development programs to the specific needs of older workers. Organizations that recognize the (hidden) potential of older employees will have a competitive advantage to those who don’t.

6. Loss of knowledge

This second issue refers to the possible consequences of the looming retirement wave and the decline in the supply of labour. Core of this reasoning is that the retirement of the baby boomers will result in a deterioration of the organizational ability to make knowledge productive. The knowledge that leaves the organization is not compensated, neither qualitatively (because younger employees are less experienced) nor quantitatively (because the new generation is considerably smaller). Given the coming retirement of the baby-boom generation “companies have a looming problem of knowledge management, of making sure that the boomers do not leave before they have handed over their expertise along with the office keys and their e-mail address” (Turning boomers into boomerangs, 2006, p. 52). Organizations are facing a ‘knowledge retention crisis’ and corporate knowledge is ‘at risk’ (Casher et al., 2004). In this respect, knowledge management becomes risk management in the sense that it aims for reducing the risk of losing crical knowledge.

The ageing of the working population gives a new dimension to knowledge management (Kannan & Madden-Hallet, 2006) and knowledge retention is considered to be the main knowledge management challenge. “In managerial practice, the important issue in respect of knowledge management and learning is the retention and intergenerational transfer of important know-how and skills” (Streb et al., 2008, p.4). If knowledge is not transferred from the older to the younger generation, knowledge will disappear which can have disastrous consequences. “The costs can be tremendous when the impacts of lost knowledge are unanticipated” (DeLong, 2004, p.27). Therefore, we should try to reduce the risk of losing critical knowledge. “A well-planned and effective knowledge transfer between the different generations of the workforce is of great importance” (Slagter, 2007, p.82). One of the main challenges is to determine what critical knowledge the employee has and thus what knowledge should be retained (Joe et al., 2006).According to some sources, the ageing work force is mainly a leadership problem (Casher et al., 2004; Fisher, 2005; Michaelson & Rittenhouse, 2006; Schwartz, 2006) because the management and senior professionals are relatively old and will therefore lose relatively much knowledge. As most organizations do not have leadership succession plans (Schwartz, 2006) or sound processes to transfer leadership experience to the next generation (Michaelson et al., 2006), younger managers are going to find themselves thrown into positions that they are unprepared for (Fisher, 2005).

In the knowledge economy, more and more of the critical knowledge resides with the employee. “The knowledge of ageing workers is essentially tacit, embedded in their ‘memory’ and their knowledge of the professional environment and in their relational knowledge instituted in networks of contacts” (Ebrahimi et al., 2008, p.136). “More than ever, critical knowledge is about pattern recognition, social norms and relationships, which can be difficult to learn due to their tacit nature” (Casher et al., 2004). Tacit knowledge is per deffinition related to the carrier and thus difficult to transfer or retain. Recognizing the tacit dimension of critical knowledge makes knowledge retention difficult. The retention strategy of many organizations is to reduce their dependency towards older workers by capturing as much critical knowledge as possible. In other words, to make tacit (personal) knowledge explicit (codified) (Nonaka et al., 1995). As tacit knowledge is difficult to articulate by means of formal languages, it can be questionned whether this codification strategy (Hansen, Nohria, & Tierney, 1999) can be effective.

According to DeLong (2004), the loss of knowledge as a consequence of large scale retirements will be strengthened because the nature of knowledge has become more complex. “Knowledge-intensive work today is much more interdisciplinary, often requiring the integration of expertise across a wide

range of subjects" (p.16). As knowledge has become more complex, it is also more difficult to transfer and replicate. Therefore, organizations might face a serious knowledge shortage which will threaten the organizations ability to make knowledge productive. In addition, as it is about critical expertise, "focusing on the threat of lost knowledge instead of staffing shortages provides a more accurate perspective on the real impact of turnover in the knowledge economy" (p.19).Another suggested retention strategy is to delay retirement (DeLong, 2004; Joe et al., 2006) or at least keep older workers as long in business as possible. However, (as a consequence of past economic developments) many governments actively stimulate early retirement programs and early retirement is institutionalized in many businesses, in order to create opportunities for younger employees. As a consequence, particularly in Europe, people aged over 55 years are basically absent from the labour market which strengthens the effect of ageing, stimulates the loss of knowledge and thus contributes to the deterioration of the ability of organizations to make knowledge productive.

As demographic patterns differ per country, region, industry and company, the (potential) loss of knowledge also differs. Ageing will be more intense in countries like Germany, Italy and Japan (DeLong, 2004). According to Inma and Drury (2007), the demographic impact will be more intense in regional organizations (compared to organizations in urban areas). Distinction can also be made between different industries. Industries that are struck relatively hard by ageing are the government, oil and gas industry (Casher et al., 2004), aerospace and defence industry (Turning boomers into boomerangs, 2006), electric power industry (Ashworth, 2006), nuclear power industry (Chung, 2006; Chung & Kim, 2006; Rintala & Kuronen, 2006), and higher education (Koopman-Boyden et al., 2003). Finally, organizations within industries have different ageing patterns, and thus different risk profiles. According to DeLong (2004), companies most at risk are those with established traditional cultures where people have spent 20 years or more. Many of these companies have downsized and cut out the middle, so you now have these bifurcated organizations: old white guys nearing retirement, a lot of people in their 20s and 30s, and not enough people in between.

7. Conclusion/research agenda

The working population is ageing and shrinking at the same time. This development will affect the performance of organizations in the next decades. As today's economy and the performance of organizations is mainly based on knowledge, the ageing workforce will mainly affect the organizations ability to be knowledge productive.Combining the temporary consequences of ageing (brain drain and talent gap) and the false assumptions about the capabilities of older workers (older workers contribute negatively to a firm's performance), the current demographic development results in two main risks for organizations and management: underutilization of older employees, and loss of knowledge. Based on the exploration of these two risks in this paper, the following issues should be considered for further research:

- What are the differences between the contributions of older and younger employees to the process of knowledge production? What are the specific competences of the older knowledge worker?
- What are the implications of recognizing the specific competences of older workers for HR policies and career/talent development programs?
- How can we benefit from the dynamics between generations in the process of knowledge creation (innovation) and how can we stimulate inter-generational learning?
- How to stimulate knowledge transfer from older to younger employees? What are effective methods for retaining complex tacit knowledge?

In this paper I have tried to give an overview of the main issues related to the ageing of the workforce from a knowledge management perspective. Today, the main fear is that large scale retirement will lead to a shortage of skills, talents, knowledge. Although acknowlegding the risks and threats of this brain drain, the current *temporary* ageing of our workforce might also contribute to a *structural* better valuation of the potential of the older knowledge worker and its specific contribution to the process of knowledge creation. In an ageing knowledge economy, increased understanding about the abilities and distinct qualities of older workers will provide opportunities for organizations to enhance knowledge productivity and thus gain competitiveness.

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Intellectual Capital of the European Union 2008

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Abstract: In 2004 the report *Intellectual capital of the European Union* was published (Andriessen and Stam, 2004). This report provided insight in the value of the intellectual capital of the 15 countries of the European Union, in relationship to the goals set by the European Council in March 2000. Since this report, the EU grew from 15 to 27 countries and the Lisbon goals were reformulated in 2005. The aim of this paper is to repeat the measurement of the intellectual capital (IC) of the *enlarged* European Union (EU) in relationship to the *new* Lisbon goals.In order to become the most competitive and dynamic knowledge-based economy, the EU decided to focus on "delivering stronger, lasting growth and creating more and better jobs" (CEC, 2005d, p.7). In this paper we translate this overall goal in 38 indicators. As the data was not available for all the new member states, we decided to limit our paper to the so-called EU-19.Based on our measurements we conclude that the EU-19 is still behind Japan and far behind the USA, however the EU is catching up as both Japan and the USA have considerably lower growth figures than the EU-19. From an IC perspective, the EU is geographically divided. The Nordic countries are still the best performing countries. The southern European countries and the new member states stay behind. However, as the new member states invest more in their IC, it might be expected that their positions will improve in the future. The aim of our paper was to measure the progress of the Lisbon Agenda for growth and jobs. Based on our measurements we conclude that the EU-19 is successful in terms of creating more and better jobs, but not successful in terms of delivering stronger, lasting growth.

Keywords: Intellectual capital, intellectual capital of nations, European Union, Lisbon strategy, measurement

1. Introduction

In 2004 Andriessen and Stam published the report *Intellectual Capital of the European Union* (2004). In this report they provided insight into the value of the intellectual capital of the 15 countries of the European Union, in relation to the goals set by the European Council in Lisbon in March 2000. The main goal of this so called 'Lisbon strategy' was to become the most competitive and dynamic knowledge-based economy in the world in 2010 (EP, 2000). Since this report in 2004, the situation has changed radically. First, the European Union grew from 15 to 27 member states. Second, as the achievements with regard to the Lisbon Goals were disappointing, the Lisbon goals were reformulated in 2005. Based on a mid-term review (CEC, 2004) the European Commission proposed to refocus the Lisbon agenda on growth and jobs (EU-Council, 2005).

Considering these two important developments, we think it is time to repeat the measurement of the intellectual capital of the *enlarged* European Union, in order to assess the progress with regard to the *new* Lisbon Goals. In this paper we first briefly introduce the concepts of intellectual capital and intellectual capital of nations. Next we describe the methodology used. Then we explore the new Lisbon goals and translate them in indicators that can be measured. Finally, we present the findings of our measurements and draw conclusions about the progress with regard to the Lisbon goals.

2. Intellectual capital of nations

We have entered an economy in which the competitive advantage has shifted from material and financial assets to intangible and non-financial assets. Within this paper, these assets are referred to as intellectual capital (IC). In this section we briefly introduce the concepts of intellectual capital and intellectual capital of nations. The concept of IC refers to strategic (important) intangible resources and can be defined as *all intangible resources that are available to an organization, that give a relative advantage, and which in combination are able to produce future benefits*. Intellectual capital measurement refers to the discipline of identifying, measuring and managing strategic intangible resources. The aim of measuring IC is to gain insight in the strength of the strategic resources in order to be better able to manage these resources. Intellectual Capital of Nations is the concept that applies the principles of intellectual capital measurement on a macro-economic level. Based on the international developments in this field and our own interpretation of intellectual capital, we would define IC of nations as *all intangible resources available to a country or region, that give relative advantage, and which in combination are able to produce future benefits*. The main motivation for measuring the IC of nations is to get insight into the relative advantage of countries or regions. This insight should help to develop policy in order to give direction to future economic developments. In

this paper we apply the concept of IC of nations to the European Union. IC measurements, in order to make sense, should be related to strategic objectives. In this paper we measure the IC of the EU related to the Lisbon agenda on growth and jobs (EU-Council, 2005). In the next paragraph we describe our methodology for measuring the IC of the EU.

3. Methodology

Based on Bontis' (Bontis, 2002; 2004) proposed conceptualization of IC we make a distinction between human capital, structural capital and relational capital. When applied to a macroeconomic level, the above three types of intellectual capital should be interpreted as follows:

- Human capital represents anything related to people: knowledge, education and competencies of individuals in realizing national tasks and goals. Education is the basic building block of human capital.
- Structural capital represents the non-human storehouses of knowledge, which are embedded in its technological, information and communications systems as represented by its hardware, software, databases, laboratories and organizational structures.
- Relational capital represents the intellectual capital embedded in national intra-relationships. It represents a country's capability in providing an attractive, competitive environment.

Based on this taxonomy of three we developed a monitor for the measurement of IC. Within this monitor we added a second layer of classification. Each of the three types of IC is monitored from three different perspectives in order to stress the importance and differences between past, present and future developments:

- Assets (present). This perspective gives an indication of the present power of a nation. It provides an overview of the current main assets.
- Investments (future). This perspective gives insight into the future power of a nation. To maintain or strengthen its present power, organizations should invest in their potential continuously.
- Effects (past). This perspective shows the extent to which the nation has made its intangibles productive during the past period.

The windows and perspectives are combined in a 3 by 3 matrix (Table 1). Implementation of this monitor means filling the fields with appropriate performance indicators. A well-defined Intellectual Capital Monitor consists of a combination of indicators from all three classes and all three perspectives.

Table 1: Intellectual Capital Monitor

	Human capital	Structural capital	Relational capital
Investments			
Assets			
Effects			

Value is in the eye of the beholder. In this paper we measure the value of intellectual capital through the eyes of the Lisbon agenda for growth and jobs (EU-Council, 2005). The calculation of the value of the (different types of) intellectual capital is based on multidimensional value measurement (Pike and Roos, 2000; M'Pherson and Pike, 2001), in which several indicators are combined into one value. In total we used 38 indicators.Then we identified minimum and target values. As minimum value we used the value of the lowest country. As target value we were only able to identify clear targets for a limited number of variables. For the other variables we used the highest value as the target. We used these minimum and maximum values to normalize all indicators by subtracting the minimum value and dividing it by the total length of the scale. The indicators were combined by using the additive combinatory rule in order to develop 16 separate indicators (Table 2).

Table 2: Combined intellectual capital indicators

	Human capital	Structural capital	Relational capital	Intellectual capital
Investments	HCI	SCI	RCI	ICI
Assets	HCA	SCA	RCA	ICA
Effects	HCE	SCE	RCE	ICE
Total	HC	SC	RC	IC

The previous report focused on 15 countries. Today the EU consists of 27 countries. As it was difficult to find the necessary data for many of the indicators of the new member states, we decided to limit our paper to the so-called EU-19: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Luxemburg, Netherlands, Poland, Portugal, Slovakia, Spain, Sweden, United kingdom. The EU member states that were excluded in this report are Bulgaria, Cyprus, Estonia, Letland, Lithuania, Malta, Romania, Slovenia.

4. Indicators for the renewed Lisbon Strategy

On 23-24 March 2000, the European Council held a special meeting to agree on a new strategic goal for the Union in order to strengthen its knowledge-based economy. The goal was set "to become the most competitive and dynamic knowledge-based economy in the world, capable of sustainable economic growth with more and better jobs and greater social cohesion" (EP, 2000). In 2005, five years after the launch of the Lisbon Strategy, the European Commission concluded that the results were disappointing (CEC, 2005d). Since 2000, Europe's performance has worsened compared to the US. Although some suggested to abandon the Lisbon ambitions, the Commission argued that the Lisbon challenges were even more urgent in the face of an ageing population and global competition (CEC, 2004, p.6). Therefore, the Commission concurs with the conclusion of the report of the High Level Expert Group chaired by Wim Kok (CEC, 2004) to renew the Lisbon Strategy and focus on "delivering stronger, lasting growth and creating more and better jobs" (CEC, 2005d, p.7). In order to do so, the Commission formulated a renewed Lisbon Action Programme, which consists of four priority areas (CEC, 2005d; EU-Council, 2006) and 15 key policy areas (CEC, 2005b). Improvement in these 15 key policy areas should contribute to the overall objective of stronger, lasting growth and more and better jobs.

- ***Priority area 1****. Making Europe a more attractive place to invest and work* This first priority area is divided in five key policy areas: encourage entrepreneurship (SME's); complete the internal market; remove obstacles to competition; reduce administrative costs; and more efficient allocation of capital. The only concrete target in this area is to reduce administrative costs by 25%.
- ***Priority area 2****. Knowledge and innovation for growth T*his second priority area is divided in five key policy areas: invest more in research and development; stimulate research in biotechnology; increase the use of information and communication technologies; improve transport, energy and telecommunications infrastructure; and encourage innovation. The only concrete target in this area is that by 2010 the EU as a whole should invest 3% of its GDP in R&D.
- ***Priority area 3****. Creating more and better jobs* This third priority area is divided in two main policy area's: increase employment rate (more and better jobs); and continuous investment in human capital (lifelong learning). Concrete target in this area is an employment rate (proportion of people aged 15-64 in work) of 70% by 2010 (60% for women and 50% for older workers (55-64)). Other targets for 2010 are: average rate of school leavers of no more than 10%; participation in lifelong learning at least 12.5% of the adult working-age population (25-64 age group); and 85% of 22-year-olds should have completed upper secondary education.
- ***Priority area 4****. Moving towards an efficient and integrated energy policy* This fourth priority area is divided in three key policy areas: reduce greenhouse gas emissions and stimulate energy from renewable sources; promote eco-innovation; and stimulate energy efficiency through better technologies. Concrete targets set in this area are a 20% reduction of greenhouse gas emissions compared to 1990 by 2020 and a 20% share of energy from renewable sources in the EU energy mix by 2020.

The overall aim of the 2000-strategy was to become the most competitive knowledge-based economy in the world by 2010. The new Lisbon Strategy is less clear in this respect. "The key aim is getting into a rhythm of high sustainable annual growth and low unemployment by 2010. If, for example, the US does even better that will not mean the EU strategy has failed. Rather, it will be good news for us all. Nevertheless, it is crucial that Europe closes the competitiveness gap with the US" (CEC, 2005b). So, closing the gap with the US is more important than achieving the overall goal by 2010. This means that the growth figures have become relatively more important in assessing the progress of the Lisbon Strategy.

Following the launch of the new Lisbon Strategy in March 2005 the European commission formulated a common strategy (CEC, 2005a), which covers all the actions to be undertaken at Community level, and a set of integrated guidelines for growth and jobs (2005-2008) (CEC, 2005c), which gives

direction to the actions to be taken by the member states. These documents provide valuable information for measuring the renewed Lisbon Strategy.

The four priority areas and their key policy areas reflect what the European Commission considers valuable. As the Lisbon Agenda is about the most competitive and dynamic knowledge-based economy this can be used as a proxy for what the European Commission considers valuable intellectual capital in the EU. Closer inspection shows that priority areas one (Making Europe a more attractive place to invest and work) and two (Knowledge and innovation for growth) focus primarily on strengthening the structural capital of the EU, while priority area 3 (Creating more and better jobs) focuses on strengthening the human capital of the EU. Priority area 4 (Moving towards an efficient and integrated energy policy) has no direct relationship with the value of the IC of the EU and we therefore did not use it to construct our IC monitor. What is interesting is that the renewed strategy does not explicitly aim at developing relational capital. We therefore have no indication what the Commission considers valuable in this area. As we think that high quality RC is a necessary precondition for a dynamic and competitive knowledge-based economy, we decided to add an extra priority area: creating sustainable knowledge relationships. This priority area aims at stimulating (international) collaboration between science and business, and stimulating cross funding (public-private) of innovation.

We found 38 indicators that reflect the renewed Lisbon Strategy and our relational capital objective. Data for all indicators were taken from public sources (Eurostat, OECD). We arranged them according to the different types of intellectual capital (HC, SC, RC) and different perspectives (Investments, Assets, Effects). Appendix II provides a complete overview of all indicators. To calculate the correlations we used data from three different years: 1995, 2001 and 2007.

5. Measuring the IC of the EU 2007

In this paragraph we present the findings of the IC Monitor for the EU-19. First we present the total value of the IC of the EU-19 compared to Japan and the USA and the growth figures between 1995 and 2007. Next we provide an overview of the value of the IC of the EU-19 from three different perspectives: investments, assets and effects.

5.1 IC of the EU: Total value and growth

The value of the IC of 19 European countries, Japan and the USA is shown in Figure 1. The EU-19 is still behind Japan and far behind the USA, however the EU is catching up as both Japan and the USA have considerably lower growth figures than the EU-19 (Table 3). Between 1995 and 2007 the value of IC in USA grew with 11% and in Japan 18%, while in the EU-19 the average growth figure was 40%. So, despite the lower value of IC, the EU-19 seems to be successful in closing the competitiveness gap with the USA and Japan.

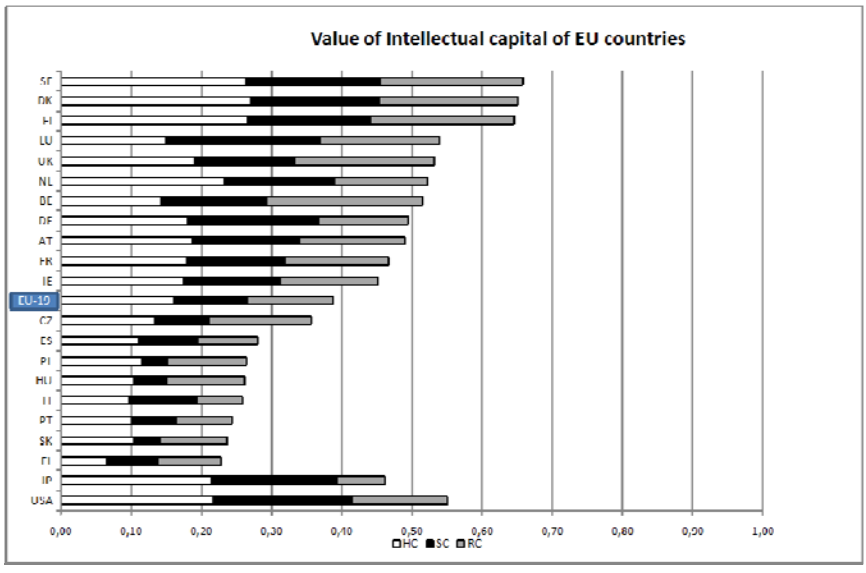

Figure 1: The value of the IC of the EU in 2007 by type of capital

Like the 2004 monitor the results show a strong geographical division. The leading group consists of the Nordic countries above 54 degrees latitude (Denmark, Finland, Sweden). The group of followers consists of Western European countries between 45 – 54 degrees latitude. The laggards are all South European countries (below 45 degrees latitude) and the new European members states (Czech Republic, Poland, Hungary, and Slovak Republic). So, as a result of the enlargement of the EU, we now do not only see a north-south division in the EU, but also an east-west division.

With regard to the value of IC, all new member states perform below average. What is striking is that the Czech Republic is by far the best performing new member state with relatively high scores on human capital (especially human capital assets and effects) and relational capital. A similarity between all new members states is that they score relatively low on SC. They score particularly low on SC assets (especially patents) and SC effects (labour productivity and GDP per capita).

The aim of our paper is to measure the value of the IC of the EU as seen through the eyes of the European Commission. As we have seen, the growth ambition of the Lisbon agenda is closely related to the structural capital of the EU. The best performing countries in terms of structural capital are Luxembourg, Sweden, Germany, Denmark and Finland. The high ranking of Luxembourg is in part the result of its small population and its high scores on labour productivity and GDP per capita. The worst performing countries are Poland, Slovak Republic, and Hungary. The jobs ambition of the Lisbon agenda is closely related to the human capital of the EU. Here the best performing countries are Denmark, Finland, Sweden and the Netherlands. The worst performing countries are Greece, Italy, Portugal, Hungary, Slovak Republic, Spain and Poland.

Table 3: Growth of the value of the IC of the EU between 1995 and 2007

Country	Growth IC 1995 - 2007
USA	11%
JP	18%
EL	18%
SE	19%
BE	22%
UK	22%
AT	25%
DE	26%
DK	26%
IE	29%
CZ	29%
FR	30%
FI	32%
IT	32%
PL	36%
NL	36%
EU-19	40%
LU	47%
ES	50%
PT	51%
SK	54%
HU	56%

With regard to the growth of the value of the IC in the EU between 1995 and 2007, the fastest growers are Hungary and the Slovak Republic, followed by Portugal and Spain. If these growth figures are indicative for future growth it seems quite likely that the relative position of these countries will improve. The slowest growers of the EU-19 are Greece and Sweden. If these figures are indicative for future growth it seems likely that Greece will further weaken its position and that Sweden might fall back to a followers position.

5.2 IC of the EU: Investments, assets and effects

In our IC monitor we make a distinction between investments, assets and effects. In this section we provide an overview of the value of the IC of the EU in 2007 from these three perspectives. The measurements are presented in three graphs (Figure 2, 3 and 4).

First, the investments perspective (Figure 2) gives insight in the future power of a nation. What is striking in these measurements is that the Nordic countries have similar patterns with relatively high levels of investments in HC. As continuous investments in IC are a necessary precondition to maintain or strengthen the current position, it might be expected that the Nordic countries will strengthen their top positions. In line with this reasoning, it seems likely that Austria, the first of the followers, will also strengthen its position.

Another striking observation from this perspective is that almost all new member states perform better than the south European countries. In particular Greece stays far behind as a result of a low level of investments in HC. It seems likely that these countries strengthen their positions as laggards.

Compared to Japan and the USA, the EU-19 as a whole invests relatively much in RC. In order to close the competitiveness gap, the EU should invest more in HC (particularly in education) and SC (particularly in R&D and IT).

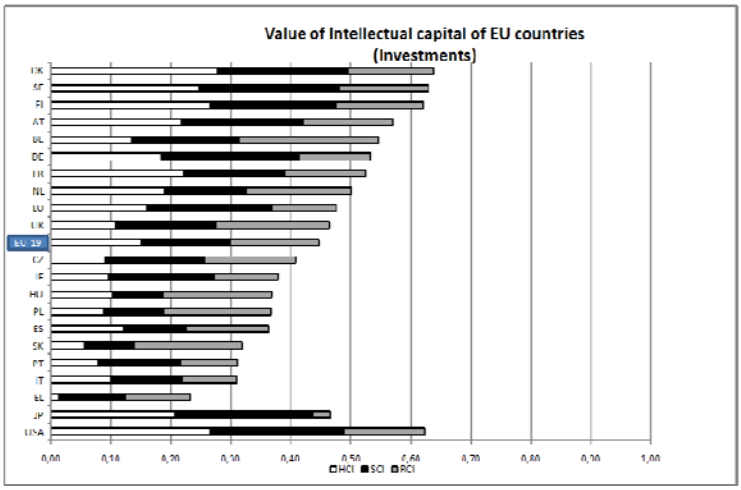

Figure 2: Value of IC investments of the EU-19 in 2007

Second, the assets perspective (Figure 3) is an indicator of the current strength of a nation and provides an overview of the current intellectual capital. Striking is the firm top position of Finland, followed by Denmark and Sweden. Again the Nordic countries hold the three top positions, which is not a surprise as these countries have a long history of high levels of investments in IC (Andriessen and Stam, 2004).

From an assets perspective, the relative positions of countries within the EU are not determined by its HC, but by its SC and RC. This supports the idea that SC and RC serves as a multiplier for HC (Edvinsson, 2002). From an assets perspective, the EU-19 is successful in terms of HC (employment), however stays behind in terms of SC (in particular patents and patent applications). Translated to the Lisbon agenda for growth and jobs, the EU-19 is successful in terms of creating more and better jobs, but not successful in terms of delivering stronger, lasting growth.

Third, the effects perspective (Figure 4) is an indicator of the extent to which the nations have made their IC productive. In terms of effects Sweden and Denmark have the highest scores, followed by Luxembourg. The high score of Luxembourg can be explained by its small population and therefore its high score on labour productivity and GDP per capita. The Fins score lower in this category then in other categories because of their average scores on these two indicators, which illustrates that high scores on IC assets (see Figure 3) do not automatically lead to high scores on IC effects.

Labour productivity and GDP per capita are the main reasons why the new member states (Poland, Slovak Republic and Hungary) score relatively low from this perspective. In addition, the Slovak Republic also scores low on RC effects (foreign students and international researchers). The low score of Italy is caused by low scores on HC effects (especially employment rate of female persons) and RC effects (foreign students).

Compared to Japan and the USA, the EU-19 score low on HC. In order to close the gap with Japan and the USA, the EU should improve the employment rate of older workers and women. Compared to

the USA, the EU-19 scores low on SC. In order to close this gap, the EU should both increase GDP per capita and labour productivity.

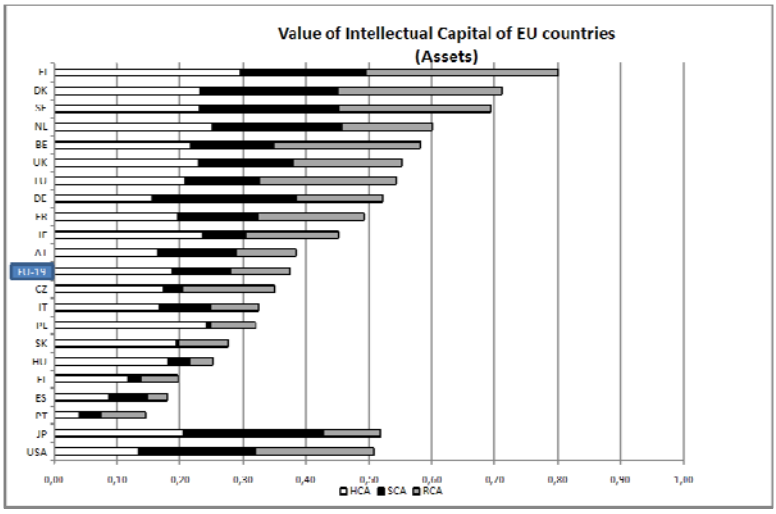

Figure 3: Value of IC assets of the EU-19 in 2007

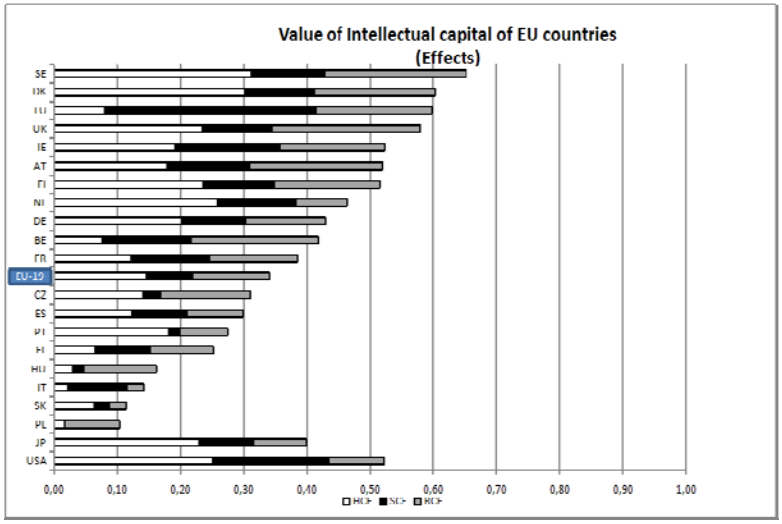

Figure 4: Value of IC effects of the EU-19 in 2007

In the 2004 monitor Andriessen and Stam (2004) concluded that the EU was better in leveraging IC (making IC productive) than Japan and the USA. For 2007 the ratio between assets and effects for the EU-19 is 0.91, for Japan 0.77, and for the USA 1.03. This means that the USA is now better in leveraging IC because one value unit of IC assets leads to 1.03 value unit of IC effects, while in the EU as a whole, one value unit of IC effects leads to 0.91 value unit of IC effects. This changed position is caused by the increase of labor productivity in the USA on the one hand and a weakening of the EU position on the other (mainly as a consequence of the weak positions of the new member states). In order to close the competitiveness gap with the USA, the EU should primarily focus on increasing labor productivity and GDP per capita in the new member states.

6. Testing hypotheses

In the 2004 monitor, Andriessen and Stam (2004) came to three conclusions with regard to the correlations between the different types of IC. First they concluded that “investments in IC pay off”, second they concluded that “high value of IC is no guarantee for high productivity”, and third they concluded that “HC and SC go together”. In this section we test these three hypotheses by using data from three different years: 1995, 2001 and 2007.The first hypothesis was that “investments in IC pay off” because a strong and significant correlation was found between HCI and HCA, and also between SCI and SCA. So countries that have a high value of IC investments also have a high value of IC assets. In this year’s report we found a similar pattern of relationships. In addition, we also found strong correlations between investments in HC and SC and effects of HC and SC (Figure 5). We did

not find similar correlations for RC. Therefore, based on these findings, we think we can further specify this hypothesis: *investments in HC and SC pay off*.The second hypothesis was that "high value of IC is no guarantee for high productivity", because it was noticed that high values of IC assets were no guarantee for high values of IC effects. In this year's report, the correlation between assets and effects is present, but less strong than the correlation between investments and assets and between investments and effects (Figure 5). The correlation between HCA and HCE is ,408, between SCA and SCE is ,413 and between RCA and RCE ,470. These weaker correlations might support the conclusion in the previous report that IC assets are necessary, but not sufficient to make IC productive.

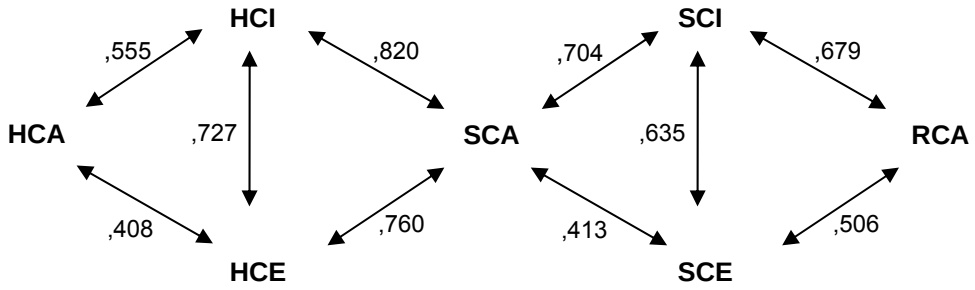

Figure 5: Correlations between investments, assets and effects

The third hypothesis was that "HC and SC go together" because leading countries had considerably higher values of both HC and SC and laggards had considerably lower values of both HC and SC. This observation supported the idea that HC and SC are interdependent and mutual enhancing factors. This is what Edvinsson (2002) calls the multiplier effect. In this year's report we found strong and significant correlations between HC and SC (Figure 5), which could indeed refer to a multiplier effect (SC as a multiplier for HC). To illustrate this multiplier effect we can compare Austria and Italy. Both score around average on human capital assets (,49 vs. ,50). However, Austria scores much higher on structural capital assets (,37 vs. ,24). As a result the human capital effects of Austria are considerably higher (,54 vs. ,06).In addition, we also found correlations between SC and RC, which could refer to a second multiplier effect (RC as a multiplier for SC). For example, when we compare Ireland to Italy we see that they both score quite low on structural capital assets (,20 vs. ,24). However, Ireland scores twice as high on relational capital assets (,45 vs. ,23). As a result Ireland scores much higher on structural capital effects (,50 vs. ,28). So, in addition to the previous report, it seems as if *SC and RC go together too*.

7. Conclusions

In order to become the most competitive and dynamic knowledge-based economy (compared to Japan and the USA), the EU decided to focus on "delivering stronger, lasting growth and creating more and better jobs" (CEC, 2005d, p.7). Based on our measurements we can conclude that the EU-19 is still behind Japan and far behind the USA, however the EU is catching up as both Japan and the USA have considerably lower growth figures than the EU-19. From an IC perspective, the EU is geographically divided. An important effect of the recent enlargement of the EU is that we do not only see a north-south division in the EU, but also an east-west division. The Nordic countries are still the best performing countries. The southern European countries and the new member states stay behind. However, as the new member states invest more in their IC, it might be expected that their positions will improve in the future (compared to the south European countries). Of all the new member states the Czech Republic has the best potential.

The aim of our paper was to measure the progress of the Lisbon Agenda for growth and jobs. Based on our measurements we can conclude that the EU-19 is successful in terms of creating more and better jobs, but not successful in terms of delivering stronger, lasting growth. In order to further close the competitiveness gap, the EU should primarily focus on strengthening its SC and RC, in particular increasing labour productivity and GDP per capita in the new member states.

Based on our measurements we were also able to further specify the hypotheses that were formulated in the 2004 monitor. First we found that investments in HC and SC pay off. Second, based on the relative weak (though significant) correlations between IC assets and effects, we concluded that high values of IC assets are no guarantee for high values of IC effects. Finally, we found evidence that HC and SC go together in the sense that they are interrelated. In addition we also found

that SC and RC go together. The latter would suggest a second multiplier effect. In order to gain more insight into the causal relationships between the different types of IC as presented in this section and in Figure 5, structural equation modelling is needed.

8. Appendix I List of abbreviations

List of countries included in this report (EU-19, Japan and USA)

AT Austria
BE Belgium
CZ Czech Republic
DE Germany
DK Denmark
EL Greece
ES Spain
FI Finland
FR France
HU Hungary
IE Ireland
IT Italy
JP Japan
LU Luxembourg
NL Netherlands
PL Poland
PT Portugal
SE Sweden
SK Slovakia
UK United Kingdom
USA United States of America

9. Appendix II IC Monitor 2008

	Human capital	Structural capital	Relational capital
Investments	HCI_1: investment in knowledge HCI_2: expenditure on education per student HCI_3: expenditure on education as percentage of GDP HCI_4: participation in life-long learning HCI_5:adult training	SCI_1: Gross domestic expenditure on R&D SCI_2: public investment in R&D SCI_3: private investment in R&D SCI_5: SME's innovating in house SCI_6: ICT expenditures SCI_7: SME's using organizational innovation SCI_8: non-technological innovation	RCI_1: government financed business R&D RCI_2: foreign funding of R&D RCI_3: foreign business investments RCI_4: Business-funded R&D in the higher education and government sectors RCI_5: private investment in education
Assets	HCA-1: youth educational attainment (20-24) HCA_2: population with tertiairy education HCA_3: occupations and skills in the information economy HCA_4: PISA scores HCA_6: drop outs	SCA_1: Broadband penetration SCA_3: scientific publications SCA_4: patent applications SCA_5: patents in environment-related technologies	RCA_1: Innovative SME's co-operating with others RCA_2: collaboration with public research organizations by innovating firms RCA_3: international collaboration in science RCA_4: foreign collaboration on innovation
Effects	HCE_2: employment rate HCE_3: employment rate of older workers HCE_4: employment rate of women	HCE_1: GDP per capita SCE_1: Labour productivity	RCE_1: number of foreign students RCE_3: number of international researchers RCE_5: % patents with foreign co-inventors

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Social Trust in Bilingual Communities in Finland

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Abstract: In Finland, members of the Swedish-speaking minority (5.6% of the population), intermingle with the Finnish-speaking majority. Although the two language communities are quite similar to each other in socio-economic status (SES), education and health-services, Swedish speakers have significantly better health and survival. Social trust has been pointed out as one of the most important dimensions of social capital that has been suggested to predict various population health outcomes. Recent studies have shown that the Swedish-speaking community owns more social capital than the Finnish-speaking community. Social trust is variably considered as source, mediating mechanism or outcome of social capital. This paper investigates the associations between social trust, social mistrust, language group, gender, age, family income, education and physical activity in Finland. The participants in the randomly selected samples of Swedish speakers (n=1100) and Finnish speakers (n=1075), aged from 25 to 75 years, were asked about their friendship network, trust and mistrust. Also, e.g. income, education, citizen activities were assessed.The MCA (Multiple Classification Analysis) analysis revealed a significant positive association between social trust and the language group (MCA 3.20 for Swedish speakers and 3.06 for Finnish speakers), adjusted for all above-mentioned variables. We found significant associations between social trust/mistrust and family income status/education, and frequently exercising subjects had more social trust (and less mistrust) than inactive subjects. Multiple logistic regression analysis showed, that after controlling for the above-mentioned factors (confounders), Swedish-speakers (odds ratio 0,39) had 2,5 times less mistrust than Finnish-speakers (odds ratio 1,0). In Finland, the Swedish-speaking minority seems to have more social trust and less mistrust than the Finnish-speaking majority. Further studies on assumed links between social trust and health in the Swedish- and Finnish-speaking populations are in progress.

Keywords: Bilingual, Finnish-speaking, language, social capital, social trust, Swedish-speaking

1. Introduction

Trust facilitates social interaction and contributes to the more effective operation of communities and societies. Robert D. Putnam (1993, 2000) describes trust as a lubricant of co-operation; the greater the trust the greater the co-operation. Generalized or social trust is shown both to people you know and to strangers. According to Putnam (2000), it increases the likelihood of engagement and volunteering in common tasks. Putnam sees trust in less general terms as one element of social capital; one of those 'features of social organization', along with norms and networks. According to Putnam (1993), trust can improve the efficiency of society by facilitating coordinated action.

Also, for Fukuyama (1995) trust is both the condition and the effect of the forms of social capital, including collective values and social networks which increases social cohesion. Social capital is a resource that arises from the prevalence of trust in a society. To clarify the presumed relationship between social capital and health, Abbott and Freeth (2008) reviewed the relevant literature about trust.

Particularised trust is shown to smaller groups of people; to other people with similar norms and values. Trust is based on change; if there is no change or trade between partners, it raises mistrust and strengthens it. The objects of trade are knowledge, thoughts and emotions, so trust not only relies on facts, it also requires open-mindedness and emotions, experiences and intuitions. To build up trust is a process in which knowledge and understanding increases within reciprocal interaction and experience (Blois 1999).

Trust offers some sort of answer to the question of how individuals manage to get their collective acts together for mutual ends. Fukuyama distinguishes 'high-trust' from 'low-trust' societies based on people's general readiness to form associations outside the obligations of family or the compulsion of the State. Consequently, the United States and Japan are 'high-trust' societies, given their propensity for forms of voluntary association, including private businesses.

Scandinavian countries are also 'high-trust' societies but, simultaneously, egalitarian Welfare States (World Value Survey, 2002). Trust and confidence is relatively strong and widespread in Finland. In international comparisons, Finland has shown high levels of trust and social capital. According the Leisure Survey, 81 per cent of people in Finland feel that other people can generally be trusted, compared with the international World Value Survey (2002) where only 58 per cent felt that other people can generally be trusted. This could partly be explained by the findings of Zak and Knack (2001), who reported that countries with small income differences and racial homogeneity are good soil for the development of trust.

A British survey showed that respondents are more likely to say they trust their own general practitioner or a schoolteacher than the health service or teachers in general (Tonkiss and Passey 1999) - that is, the questions of trust turn on the relationships between individuals. While friendship provides the ideal, this concept of trust can be applied more broadly to interactions between individuals that are not secured by contract or enforced by law, from those who are closest to us to those who are strangest. Put simply, we rely on trust in situations of uncertainty with others: trust is a means of mediating the risks of social interaction (Luhmann1988, Letki, 2006, Abbott and Freeth 2008).

Finland has a Swedish-speaking minority that meets the four major criteria for ethnicity: self-identification of ethnicity, language, social structure and ancestry (Allardt and Stark 1981, Mc Rae 1997). In Finland, members of the Swedish-speaking minority (5.6% of the total population), many of whom live in the Western (Ostrobothnia) and Southern (Uusimaa and Turunmaa) provinces, intermingle with the Finnish-speaking majority. Although the Swedish-speaking and Finnish-speaking communities are quite similar to each other in socio-economic status, education and health-services, the Swedish speakers have significantly better self-rated health (Suominen et al., 2000, Nyqvist and Martelin, 2007, Nyqvist et al., 2008) and longer disability-free life expectancy (Hyyppä and Mäki, 2001a) than the Finnish-speakers. Significant disparities have been established in the annual suicide rates, violent and accidental death rates and cardiovascular mortality, as well as in survival (Hyyppä and Mäki 2001a, Koskinen and Martelin, 2003). The common denominator for the results of the above-mentioned studies is the inadequacy of the conventional health-risk factors, including socio-economic status (SES), to explain the significant inequality in health between the language groups.

We have suggested that the observed disparities in active life and survival or mortality depend on differences between the language groups to the extent of social capital (Hyyppä, 1994, 2002, Hyyppä and Mäki, 2001a). To test the assumption of social capital as a potential explanation for the health and well-being advantage of the Swedish-speaking minority in Finland, comparative studies on individual-level social capital and self-reported health have been carried out in bilingual Ostrobothnian communities (Hyyppä and Mäki, 2001b, 2003) and in the nationally representative samples of the language groups (Nyqvist et al., 2008). These studies confirmed that, in Finland, the Swedish-speaking minority owns more social capital than the Finnish-speaking majority.

Social (or generalized) trust is considered a source, mediating mechanism or outcome of social capital (e..g. Kawachi et al., 2008). To show the importance of trust vs. mistrust for the individual-level social capital of the language minority and to prove the hypothesis of the linkage between trust and well-being, we investigated associations between social trust, social mistrust, language group, gender, age, family income, education, social networks, visiting church, medication, physical activity and fatigue in the bilingual provinces of Ostrobothnia and East-Uusimaa in Finland.

2. Methods

To conduct the survey, we chose a postal questionnaire, because it is an efficient way of reaching people. The survey was done through a structured questionnaire, because we wanted measurable numerical data that is suitable for quantitative analysis and making comparisons regarding specific questions.

The population of the citizen activity survey consisted of a total sample of 4,800 randomised subjects aged from 25 to 75 years, 50% Finnish-speaking and 50% Swedish-speaking, in four different municipalities, (Loviisa: 7,400 inhabitants, 58% Finnish speakers, 39% Swedish speakers; Porvoo: 48,000 inhabitants, 64% Finnish speakers, 33% Swedish speakers; Mustasaari: 18,000 inhabitants, 29% Finnish speakers, 71% Swedish speakers; and Pietarsaari: 19,800 inhabitants, 42% Finnish speakers, 55% Swedish speakers).

A total of 1,200 subjects received the questionnaire in each municipality. The subjects received a 132-item postal questionnaire in their own mother language, with questions about citizen activities, work, political activities, health, motion, sleep, leisure activities and ICT activities, and they were asked about their friendship network. The trust questions were the following: 'How many close friends do you have?' (scaled from1 to 5) and 'How many persons do you know who are so close to you that you can talk about most matters in life?' (1-5). Social trust and mistrust were assessed by two questions: 'Generally speaking, would you say most people can be trusted?'(1-4) and 'Do you think most people would try to take advantage of you if they got a chance?'(yes/no) (World Value Survey, 2002). Also, family income, education, medication, physical activity and fatigue were assessed. The questionnaires were analysed by the MCA (Multiple Classification Analysis) and multiple logistic regression analysis. MCA examines the relationships between several category-independent variables and a single dependent variable (social trust), and determines the effects of each predictor before and after adjustment for its inter-correlations with other predictors in the analysis. Thus the dependent variable is generalized social trust, whose range is 1−4 with a mean of 3.13 and standard deviation of 0.53.

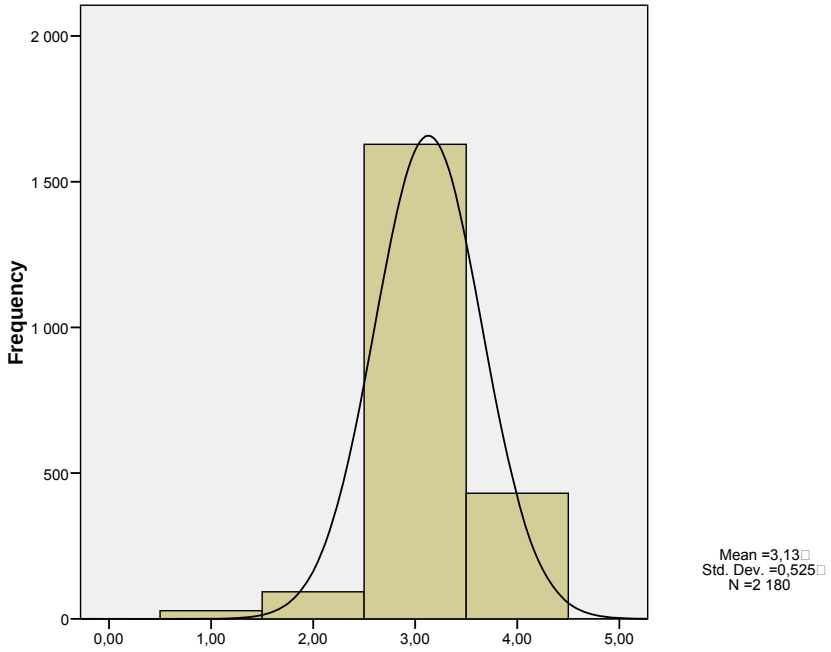

Figure 1: Histogram and normal curve of generalized social trust

3. Results

The total answer frequency was 46%, N=2,175 subjects. This was distributed quite equally between the four different municipalities: Loviisa (24%), Porvoo (26%), Mustasaari (25%) and Pietarsaari (25%). Women were more active in answering the questionnaire: 57% vs. 43% in men, the most active subjects being Swedish-speaking women at 59%. The youngest respondent was 20 years old and oldest was 76 years, the mean age being 52 years. The mean age was relatively high, which reflects the age structure of the four municipalities. The answer frequency for questions about trust was slightly lower than the number of received questionnaires. The complete data for the analysis concerning trust was 46% (n=1,100) in Swedish-speaking subjects and 45% (n=1,075) in Finnish-speaking subjects.

The MCA (Multiple Classification Analysis) analysis revealed a significant difference in the associations between social trust and the language group (MCA 3.20 for Swedish speakers and 3.06 for Finnish speakers), adjusted for all the above-mentioned variables, as well as family income (MCA 3.26 for the highest vs. 2.98 for the lowest income), education (MCA 3.28 for the highest education vs. 2.69 for the lowest education) and physical activity (MCA 3.15 for training several times a week). Swedish speakers had significantly more close friends (MCA 3.15 for the most active vs. 3.08 for the inactive). The multiple logistic regression analysis showed that Swedish speakers (odds ratio 0.39) had 2.5 times less mistrust than Finnish speakers (odds ratio 1.0).

The regression analysis revealed that three variables predict generalized social trust very significantly in this population: family income after tax (beta= .152), Swedish language (beta= .115), visiting church (beta= .091) and, to some extent, visiting friends in their homes (beta= .072) predicted high generalized trust (Table 1).

Table 1: Social trust regressed on various demographic and health-related factors (linear regression analyses)

Question	Non-standardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std.Error			
(constant)	2,260	,106		21,249	,000
Gender	-,023	,023	-,022	-,971	,331
Age	-,001	,001	-,039	-1,637	,102
Family income after tax	,107	,016	,152*	6,733	,000
Participation in voluntary work	,039	,025	,037	1,591	,112
Donating money to charity	,065	,027	,057	2,425	,015
Language	,119	,023	,115*	5,172	,000
Visiting church	,057	,014	,091*	4,006	,000
Visiting friends in their homes	,047	,016	,072*	2,928	,003
Friends visiting your home	,017	,015	,026	1,066	,287
Playing social leisure games	-,006	,010	-,014	-,603	,546
Visiting public library	,028	,012	,050	2,235	,026

*predicts significant social trust

4. Discussion

We found more social trust and less social mistrust in the Swedish-speaking minority than in the Finnish-speaking majority in Finland. The disparities were independent of several demographic and health-related factors we controlled for in several MCA and multiple regression models. As one can expect, social trust was positively related to the frequency of visiting friends, church attendance and visiting the public library. These associations were independent of language group and other factors in the models. Also, the association of social trust with family income was independent of other factors.

Social trust (and mistrust) is regarded as one of the most important dimensions of social capital (Putnam, 1993, 2000, Fukuyama, 1995). It has been suggested that social trust is a possible mechanism linking individual-level social capital with health and well-being (e.g. Kawachi et al., 2008). In Scandinavian countries, social trust has been shown to be associated with population well-being, including self-rated health (Rostila, 2007, Nummela, 2008) and survival (Hyyppä et al., 2007a). We have shown a modest inverse association between social mistrust and self-rated health in a cross-sectional study of the Ostrobothnian population (Hyyppä and Mäki, 2001b). Recently, a similar cross-sectional study showed that interpersonal mistrust was associated with unhappiness among Japanese people, thus proving the negative effect of mistrust on health (Tokuda and Inoguchi, 2008). Also, social mistrust was associated with enhanced mortality rates in both men and women in a cross-sectional study of sub-regions in Hungary (Skrabski et al., 2004).

Associations between social trust/mistrust and family income status/education may be explained by material security at the individual and neighbourhood levels. Previous studies have shown that people with a higher level of SES have more social capital than those with a lower level when measured in terms of trust (e.g. Kawachi et al., 2008). In several studies, associations between social capital and population health seem to be independent of SES (see, Kawachi et al., 2008).

In our study, frequently exercising subjects seemed to have more social trust (and less mistrust) than inactive subjects. One explanation could be that good fitness is associated with higher self-confidence, which, in our study, was assessed in terms of trust (Letki, 2006). Recent studies have shown that low social capital is associated with physical inactivity, and social participation and leisure physical activity go hand in hand (Mummery et al. 2007). However, it is not known which comes first, physical activity or individual-level social capital (McNeill et al., 2006, Lindström 2008), since cross-

sectional studies on the relationship between trust and physical activity cannot solve the problem of causality.

There are some obvious limitations in this study. First, as previously mentioned, cross-sectional data cannot show causality, so we cannot say that trust leads to well-being and health. There is always the possibility of counteracting causality. Future longitudinal studies can better elucidate socio-cultural origins of trust and consequences of high social trust/mistrust. Accordingly, we have reported observations on the significant and independent effects of social or inter-individual trust on all-cause and cardiovascular mortality in a large nationwide survey (Hyyppä et al., 2007). Second, social trust and social mistrust may not be antipodes (Omodei and McLennan, 2000). Therefore, it is important to separate social trust and social mistrust. Third, our measures of social trust/mistrust do not tell about the civic or political trust that is also supposed to be a part of social capital and important for well-being (Putnam, 2000, Uslaner, 2002). Fourth, our questions on trust assess respondents' views of how other people behave, rather than trust their own capacity to be trusted. Finally, although we controlled for several confounders, there is always the possibility of an unknown residual that could intervene in our findings.

As for higher social or generalized trust among the Swedish speakers, our findings are in line with the previous reports on the language minority and majority in Finland (Hyyppä and Mäki, 2001b, 2003, Nyqvist et al. 2008). Social trust is usually regarded as the cognitive aspect of social capital. The Swedish speakers also seem to possess more social capital in terms of the structural side of social capital - namely, they are living in tighter social networks compared to Finnish-speaking communities (Hyyppä and Mäki, 2003). For historical reasons, the Swedish-speaking ethnic minority is supported by constitutionally guaranteed rights and comprehensive networks of institutions, organizations and educational systems (McRae, 1999). Furthermore, the good amount of social capital in the Swedish-speaking minority may have sources in the underlying network-related culture that is deeply rooted in the private norms and values socialized in early childhood (Uslaner, 1999, Letki 2006). Children's interpersonal mistrust orientations are believed to lead to a permanent mistrustful orientation and poorer mental and physical health (Omodei and McLennan, 2000, Abbott and Freeth 2008). We assume that the experience of trustful interaction during early childhood, based on attachment and reciprocal trust, has socialized Swedish speakers into trustworthy interpersonal relationships. The Swedish-speaking minority in Finland may have more mutual experience in these matters since their residential movement has been less active, they have had the same type of experiences for a long time, they know each other well, family traditions are well known and followed, etc. (McRae 1997). If the culture theory of early childhood roots is correct, opportunities to promote social trust among EU minorities may lay in the ability to guarantee loving and affiliation-rich circumstances for newborns.

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Towards Learning Assets Management Systems for Support of Novel Methods for Corporate Intangibles Assets Accounting

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Abstract: Our paper is about a Learning Assets Management system which aims to support novel methods for corporate Intangibles Assets Accounting. Within a company (like in all human settings), learning happens all the time. By definition, all business processes increase the knowledge of the people who are involved in them (at least, involvement increases "experience"). What any company would like to achieve is to understand (and exploit) how business processes create learning outcomes that become permanent and valuable knowledge assets both for the employees and for the company. To put it simply: Employees learn all the time. But how can we measure this learning?. Problem: Employees do learn in their organizations. Their motivation to learn largely depends on the rewards they expect to receive from their improved skills, as these result from their learning. Today these rewards are qualitatively assessed, based on human resource management principles, and not reflected in the financial statements (value) of the organizations. But if the outcome of learning processes could be quantified, and this quantification could result in increased benefits for the employee (salary or otherwise), then the employee would be more motivated to learn, and would also target its learning towards the acquisition of skills that would ensure value to the company. Furthermore, employee payments would be based on quantified indicators, and become more efficient. Therefore a need to quantitatively assess the outcome of inter-organizational learning processes is apparent. We propose an ICT environment that will register, monitor, and quantify the outcome of inter-organizational learning processes. The proposed system will be linked to the ERP / accounting systems of the organizations, so that the outcomes of the learning processes are reflected firstly in the balance sheets / book value and the total value of the entire organization.

Keywords: Learning assets, knowledge assets, ERP systems, corporate accounting for intangibles

1. Introduction

Our research aims are:

- To understand and classify inter-organizational learning processes.
- To assess the outcomes of these processes and develop a matrix of processes / outcomes
- To assess the value of companies based on the outcomes of learning processes and develop a matrix of learning outcomes (processes) / company value
- To create a learning environment that is employee based (the employee in the center) which monitors, follows the progress, and assesses the outcomes of the learning process of the employee
- To link this environment to the ERP / accounting systems of the companies
- To mainstream the project results into international accounting standards

In the paper we build on our experiences from the field of research and development projects, while taking into account suboptimalities that emerge as part of the currently existing practices in the corporate world in Europe.

As the modern economy depends more and more on information and communication technologies (ICTs), interest in the economic impacts of these technologies is growing. The combination of economic fundamentals triggered a lively public debate on the underlying causes and consequences. The introduction of the World Wide Web and browsers fuelled the growth of the Internet – reaching millions of users worldwide. Paralleling the growth in the number of users was a growth in the number of enterprises wishing to serve this new “online” population. New ideas and new business models were introduced and investors were happy to pour money into them irrespective of actual profit

figures. Many of the new firms went public and prices in the high tech segments of the stock markets soared. Moreover, companies related to Internet infrastructure, computers and software became all the more important.

According to (Coman and Diaconu, 2006) and (Diaconu, 2008) globalization is a historical process, which has been created as a need of improving the resource allocation and to develop bigger markets for the global economy. Ideas about going global can be found in Adam Smith's and David Ricardo's works, going through Marx vision about the phenomena until our ages. We can consider it as one of the biggest social processes which the humanity has facing since ever. That's why its impact in the global economy is huge and the accounting sector which is playing a vital role in the information process of the society is very important. That is why one of the main international accounting processes on the actual period is the harmonization of the national accounting systems. The harmonization process is influenced by several factors like culture, politics, economy and also sociological behaviors.

Furthermore, in an increasingly competitive, knowledge-based economy, intangible assets, such as brand awareness, innovation, and employee productivity, have become the key determinants of corporate success. And given that the investments companies make to build those intangible assets - such things as advertising, employee training, and R&D - are flushed through the income statement, balance sheets are increasingly a poor reflection of the value of companies' businesses. And in contrast to the traditional accounting system that is focused on isolated transactions and historical costs, to determine the future value of a company, one should not only look at past history, but need to employ new measures to project forward. In our paper we present some ideas that aim to leverage research efforts in the area of Accounting Information Systems. We position our ideas with respect to ongoing developments in the research fields of accounting, business and computing. The increase of the corporate knowledge capital and the sustainable support of the agility potential of companies is not only a matter of how much intelligence a company shall exhibit in organizing its business related activities but also in the way it shall exploit its accounting infrastructure to respond to existing challenges of the globalised and networked economy.

2. Role of learning

What is it about many companies that make them worth fifty times the value of their recorded assets? What is the nature of additional value that is perceived by the market but not recorded by the company as recognized by (Skyrme, 1999) and (Ward, 2002)? Why do some companies have a higher market to book ratio than the others? Or, to be specific, why are some companies perceived to be more valuable than others?

Stock analysts, the most influential arbiters of corporate value, state that the reason for champion companies' consistently high market-to-book ratio on account of their profitability lies in the quality of investment in talent of their people, accompanied with the necessary corporate organizational and business process infrastructures to exploit their people as a whole (Huplic, 2002).

Companies do not trade their intangible assets. So their value cannot be deduced from routine market transactions (Bovet, 2000). The value emerges in the form of goodwill, and this fluctuates day to day, and measures the company's future earning potential. These assets are invisible because they are not accounted for. They are intangible since they are neither brick nor mortar nor money.

Intellectual Capital is derived from the organization's personnel. All assets and structures are the result of human actions and ultimately depend on their people (or talent) for their continued existence as much as the quality of their leadership depends on the internal corporate structure and employee knowledge.

What is the role of learning assets management in enhancing the value of intangible assets? Identification, investment in, and management of the right learning assets can play a pivotal role in the sustainability of any organized entity.

Learning assets management can be considered both as a science as well as an art-form held together in a harmonious blend. The practice of learning assets management is the conscious effort towards 'injecting' the right person in the right learner's role and at the right time, thus achieving

break-through performance while also increasing both the individual's and the company intellectual capital assets and knowledge reserves (Tynjälä, 2005)).

Though many European research efforts try to copy or imitate North American innovations, in our research we rather follow the Indian tradition of knowledge sharing through word of mouth that goes back to the sharing of scriptures.

The focus was always on the holder of knowledge as the source of power. Traditional organizations operated on the tenet of a collective and uniform distribution of rewards, which led to a compromise on the performance ethics of transparency differential distribution of wealth. The learning assets management approach addresses this very need in organizations to identify and make their investments on the right learning assets and realize their complete potential.

The core idea in our approach is that employees are related with specific job assignments which will ultimately lead to the capture of certain knowledge assets (or competence assets). *Learning assets are derived from a measure of difference between knowledge assets states, to follow the development of the knowledge capital of employees*, as this is quantified with respect to various products, services or processes that a particular employee is assigned to as (co-)owner.

(Co-)Ownership may refer to a corporate product, service, process, practice or policy, and may build either on a de novo design or on a previous corporate product, service, process, practice or policy for which background and / or foreground IPR may have been documented or assigned in the same (co-)owner or not.

In this respect, it does not deal with issues of value theory as such addressed by the works of researchers like M'Pherson and Pike (2001), Pike and Roos (2000), and Roos, Pike, and Fernstrom (2006), but on how the any particular approach that is employed by an organisation or company can be related with learning processes so that the latter can be feeding the knowledge capital and its related functions.

In the following section we present the sequential steps taken from the problem to the research and then to the solution and the expected end products of our research.

3. Research approach and steps

3.1 The problem

Companies are investing in their people, by means of motivating the latter to participate in training programs or re-education projects or special seminars, as part of their other core business activities (Edmans, 2007).

Independently on the motivation (in many cases it is simply because expenses for such activities are subsidised by the national authorities), companies are aware that they have to invest in their human resources to improve their business cycles and increase their capacities.

However, they are not able to exhibit the existence of a traceable process for managing their investments for learning. Furthermore, it is widely accepted that competition is focused not only in the prices or the location of production of a product or a service but in the intellectual capital that a company possesses and the means it has organised to deploy it appropriately.

Individual workers, on the other hand, are aware that in order to ensure that the value (and the utility) that they carry for their company is not fixed but continuously under negotiation. Therefore, in order to remain attractive they have to invest in themselves and increase their learning and knowledge capital, so that they are able to keep on selling their services to their employer or seek for a new one that can better reward them for their value (and utility).

Last but not least, an important reason for lagging behind in this area of soft infrastructures has been the fact that till today the workflows of learning and knowledge management related projects have been kept apart from the corporate heart which is the corporate accounting system.

3.2 The proposed research

Our research agenda includes the following topics:

- Corporate Intellectual Capital vs Individual (worker) knowledge assets

  How can the company document as (licensed or leased) assets the knowledge assets of its workers? How can synergetic ways be developed that shall guide (not only at the transactional / trade level but also at the cultural one) the interactions between what the two parts offer to each other? And how can amortization of learning investments and knowledge assets be organised within the real-word market environment as part of corporate implementation of the relevant International Acoounting Standards?

- Corporate Human Resources, ERP and accounting systems vs Corporate Intangible Assets Accounting

  Corporate accounting of intangibles has been mainly treated as a set of activities related more (or solely) with patents, copyrights, trademarks and licensing agreements and not about the people and the knowledge they carry which they can document into patents, protect with a copyright or express as a tradable entity or brand identity by means of a trademark. Our research aspires to provide an integrated approach (methodology + accompanying practices + application platform) to account for learning and knowledge assets.

- Interaction and interface of the Learning Assets Management system with the users and positioning within the corporate business process grid and culture.

  Though this part of the research does not involve technology risks from its implementation perspective, it is at a central position for the success of the research and the exploitation potential of the research outcomes. Of interest are here the approaches taken for documenting a learning asset, for configuring a learning portfolio for an individual or for a corporate business unit, etc.

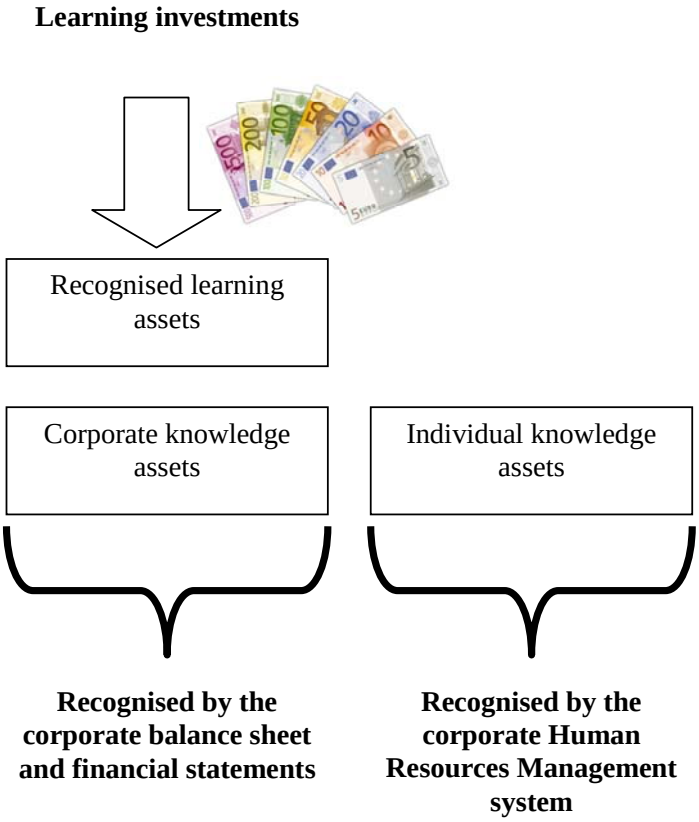

Figure 1: Setting the path from the learning discipline to the claim of intellectual capital assets

- Bridging the gaps amongst the different edges of the research topics star visualisation.

  This last item of our research agenda is going beyond the medium-term nature of the research project. More specifically, it aims to put the foundations for new research in the areas that are depicted at each of the five separate star's edges in the figure below. In the context of the research, we shall provide as output a showcase demonstrator (i.e. fully functional for demonstration purposes but not capable for operational use) for a futuristic Learning Assets Management system.

Figure 2: Star view of the research agenda, linking all five areas related to the addressed field

3.3 The envisaged solution

We propose a system that provides the corporate Management with a continuous access to the formation of learning assets and the ability to transform them into corporate knowledge assets, which – with the use of International Accounting Standards – can become an extension of existing ERP, HRM and LMS systems.

Since 1980, the average ratio of market capitalization to book value for companies has swelled from just over 1 to more than 5 - even after the recent fall in stock prices. In this respect, differences in market and book value are rough estimates of the value of intangibles. But, on average, intangible assets now represent about 80 percent of the market value of public companies. One possible explanation for the growth, is that irrational exuberance has inflated corporate stock prices far beyond the value of the assets that the shares have claim to. The more likely explanation, however, is that financial statements prepared according to the particular accounting practices that exist, fail to reflect the true value of a company's assets and operating performance. It is exactly at this point where the unique contribution of our research can fill the knowledge and asset gaps.

A growing number of academics, consultants, and regulators see the absence of most intangible assets from the books as a major deficiency in the existing accounting 'regime'. They argue that those assets increasingly drive the value of corporations, and yet currently receive next to no recognition in financial disclosures. In an increasingly competitive, knowledge-based economy, intangible assets, such as brand awareness, innovation, and employee productivity, have become the key determinants of corporate success. Given that the investments companies make to build those intangible assets – such things as corporate infrastructures for Knowledge Management, employee training, and R&D – have real costs and real impacts, the fact that they are 'flushed' through the balance sheets means

the financial statements increasingly become a poor reflection of the true value of companies' businesses.

Corporate executives, however, see more to lose than gain from increased transparency. Intangible assets essentially represent the secrets of a business enterprise - the key resources and factors that enable it to compete effectively in the marketplace. If the company shares those secrets with investors (and with competitors), it could hasten the erosion of the value of those very intangibles. Furthermore, the added transparency could open up a whole new avenue of attack for plaintiff's lawyers. If corporate disclosures of intangible values prove wrong - and it is easy to be wrong about intangible values - shareholders will have plenty of ammunition for lawsuits.

R&D work to date has mainly focused on analyzing the impact of information exchange on information "supply-chain dynamics". One interesting outcome of our preliminary study of the area under consideration in the intended research was a characterization of situations where individual corporate information suppliers must share information to remain competitive.

The major problems of managing heterogeneous corporate information sources in organisations in which a solution like the one we envisage is implemented, can be summarised as:

- *Insufficient modelling and understanding* of the source data located in various sites across the organisation, due to lack of a common terminology and documentation, differing implementations of reporting infrastructures, and source data not being placed in the context of the dynamic aspects of the organisation.
- *Difficulty in organising ad hoc processing of such information*, making users (corporate management, shareholders, internal and external auditors, etc.) dependent for their information needs on e.g., information resource management departments with the usual shortcomings of this approach (relatively limited reliability of the provided information, need for authentication, etc.).
- *Lack of facilities for maintaining these resources*, thus making more difficult the task of keeping the various systems in step with the ever increasing rate of change in modern business organisations.

These problems are particulary difficult in small and medium sized enterprises, which have variable access to distinct and heterogeneous information suppliers. However, we understand this marketplace well and are well placed to address it in a complementary partnership.

The bigger barrier to sharing information about intangibles, however, is the lack of workable reporting standards. The internal metrics currently used to evaluate intangible assets and capabilities fall far short of fitting the overall accounting practices and frameworks currently under use. Part of the problem derives from confusion in distinguishing between the investments made to develop intangible assets and the value resulting from those investments. The same difficulties apply to accounting for internally developed intangibles. In fact, attempting to isolate and directly value the intangible assets of companies may be counterproductive; the value of an intangible asset comes from its interplay with other assets - both physical and intangible - and attempting to value it on a stand-alone basis is pointless.

It should be noted that depending on the particular goal that is aimed one can employ the appropriate means and tools. So, in case our aim is the communication of information to stakeholders and the public we will make use of a different tool than when we aim to identify the value of our intangible assets when aiming to the improvement of internal procedures and management practices. For determining value, if we make use of a non-monetary criterion for the calculation of value, that can be ‘translated’ into measurable events or quantifiable evidence, then we face the case of measuring value. Pike and Roos suggest a model for a Holistic Value Approach for value measurement operations aiming to improve the internal corporate management processes (see & Roos, 2000). M'Pherson and Pike (2001) offer a different method for Value Measurement, namely IVM - Inclusive Value Methodology, which provides a bottom-up measurement from primary value sources using multiple criteria that combine value sources.

3.4 3.4. The expected end products

The *major end product* is **a Learning Assets Management system** (LAM) interoperable with best breed of the following:

- Human Resources Management systems like HRnet by HRnet Software Systems and Employee Performance & Talent Management Suite by Halogen Software
- ERP systems and accounting engines (both free / open source and proprietary such as ERP5, GNU Enterprise, WebERP and PeopleSoft from Oracle, mySAP from SAP and ATLANTIS from ALTEC)
- Learning Management Systems (both Open Source as moodle and ATutor and commercial as Saba Software and SAP Enterprise Learning).

In addition to this, we shall deliver **a fully functional methodology** for organising the codification and recording of learning assets in the financial, accounting and bookkeeping operations of the companies in compliance with the participating countries legislative frameworks and the International Accounting Standards (IAS).

Third end product of is **a showcase demonstrator** (i.e. fully functional for demonstration purposes but not capable for operational use) **for a futuristic Learning Assets Management system**.

Fourth end product is a model for integrating pedagogical and organisational approaches by means of a lifelong learning module as part of the operating corporate organisational development. This model shall build on two drivers:

- Firstly, that lifelong learning is used by employees to improve their current, or future, employment prospects (i.e. how attractive they are for their employers and for the market in general).
- Secondly that lifelong learning is used by employers as a way of improving their organisational performance.

The focus of this model is the perspectives of people, both employers and employees, who are engaged in lifelong learning, within the European Union economy. Following the above analysis it shall puts forward two submodels (Simmons, 2006):

- One of which reflects employees' approaches to their own learning and self development, the employee model.
- The other model reflects the motivations of employers in promoting lifelong learning opportunities, by way of engagement in learning related activities and learning relevant situation, to their staff in order to improve the organisation's effectiveness, namely the employer model.

4. Conclusions: assets on the net. The case of open book accounting

Almost all users of the Internet and the World Wide Web are familiar with the term of open source software. Though it began as a marketing campaign for free software, open source software is the most prominent example of open source development and often compared to user generated content. Furthermore, open source software allows users to use, change, and improve the software, and to redistribute it in modified or unmodified form and is very often developed in a public, collaborative manner.

Similar to this well-known term, there is a – (yet) less-known – movement for open-book accounting. This is regarded as an extension of the principles of open-book management to include all stakeholders in an organisation, not merely its employees, and specifically its shareholders (including those whose shareholding is managed indirectly, for example through a mutual fund. This effectively means all members of the public. Since almost all accounting records are now kept in electronic form, and since the computers on which they are held are universally-connected, it should be possible for accounting records to be world-readable.

This is an aspiration: at present, organisations run their accounts on systems secured behind firewalls and the release of financial information by publicly-quoted companies is carefully choreographed to ensure that it reaches all participants in the market equally. Nevertheless, price movements before publication of market-sensitive information strongly indicate that insider trading, which is unlawful in most major jurisdictions, had taken place.

Advocates of open-book accounting argue that full transparency in accounting will lead to greater accountability and will help rebuild the trust in financial capitalism that has been so badly damaged by recent events such as the collapse of Lehman Brothers, the federal rescues of AIG, Fannie Mae and Freddie Mac, and the fire-sale of Merrill Lynch to Bank of America (Lowenstein; Bebchuk; Claessens et al; Mads; Bardhan; Jenkinson – all in 2008), not to mention earlier scandals such as the collapse of Enron and Worldcom.

According to (Walker, 2005), the phrase "open book accounting" does not have a specific meaning. It is rather an expression of intent. That intent is to demonstrate the commitment and confidence of partners in a contractual relationship to share information on income and expenditure.

The commitment between commissioners and providers to enter into this way of working needs to be made early in the relationship. This will enable them to describe the type and depth of information to be made available for discussion. The arrangements will depend largely on the nature of the service and length of contract.
Arrangement to access accounts should be clear as vagueness could lead to misinterpretation or confusion. For instance the process may be annual and use independently audited accounts or be more frequent using working figures to identify changes to assumptions in order that joint considerations can be given to these. An exception clause could leave the possibility of more frequent dialogue where circumstances can be described (such as legislative changes) that require this from one side or the other.

It is a very common finding that virtual organisations can always succeed if both providers and commissioners find their way to a win-win situation. Open book accounting can help provide that. Furthermore, open book accounting also helps develop clarity with commissioners about the differences between independent providers, especially the differences between public authorities and private businesses.

New educational and pedagogic paradigms are proposed and investigated for use in the European companies, stressing the importance of "learning how to learn" instead of merely learning intangible assets valuation / reporting / management domain facts and rules of application as these may be instantiated in real-life scenarios by means of *codes of practice*. Adaptations of existing pedagogic theories as well as the invention of new ones are steadily accompanying this shift. At the same time innovative use of information technology is being recommended.

On the one hand, we believe that "Education" in the domain of European companies, is not, at the present time, suitably equipped with those precise theories that will make it capable of supporting companies in their transition to new models of operation that are expected to provide increased efficiencies to either the B2B or the B2C context (Regini, 1997)(Coulson-Thomas, 2003). This is due to the fact that it deals (or at least has been doing so up until recently) mainly with the study of how people learn in groups and, furthermore, is not well-prepared to exploit technology optimally in the service of learning.

On the other hand, this increase in computer usage brings to the fore in European corporate Education questions of how to design IT-based learning resources that are effective, while retaining allegiance to Education's rich conceptualizations of learning. Thus, it becomes obvious that these two research domains (IT and education) require the pursuit of ways in which their efforts can be combined.

We believe that the area that our research efforts are targeting shall concentrate the interest of a growing community of practitioners, professionals and academics and researchers in the following years and shall act as a catalyst for the creation of new sources of value both for the Accounting discipline and the IS discipline.

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The Impact of Welfare State Development on Social Trust Formation: An Empirical Investigation

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Abstract: Social trust is shaped by many society-level as well as individual-level factors. One of the determinants highly debated in literature is the welfare state which reflects the level of state intervention in organizing individuals' welfare. Theoretical as well as empirical studies are in their vast majority controversial with respect to the kind of effects welfare state may have on social trust formation. However, all of them have one element in common – they measure welfare state development through social spending. The main objective of this research consists of demonstrating that in order to precisely estimate this impact, it is necessary to introduce a new operationalization for welfare state development which would reflect the outcomes rather than the process of the state intervention into individuals' arrangements. The latter can be obtained by decomposing Esping-Andersen's welfare regime typology and directly evaluating the effects of decommodification and stratification on social trust indexes. This hypothesis is checked based on a cross-sectional analysis for a set of 18 OECD countries while using multi-level modelling as the main research method. The individual-level analysis demonstrates that decommodification enhances trust formation. The aggregated-level analysis allows for explaining that this positive effect of decommodification on social trust mainly goes through reduction of income inequality which is the key aim of social policies. Moreover, the analysis demonstrates that the quality of public institutions, in general, and welfare institutions, in particular, conducts essential influence on the level of trust in the societies. Besides decommodification, the form of social stratification was found to matter for social trust. Preserving existing class structure inherent to conservative welfare regime type influences negatively institutional trust, but positively interpersonal trust. Stigmatizing approach apt to liberal welfare state erodes interpersonal trust, but boosts institutional trust. Finally, socialism's universal approach leads to crowding-in effects in both forms of social trust.

Keywords: Trust, welfare states, decommodification, stratification, crowding-out

1. Introduction

The role social capital performs at individual and societal levels gave rise to numerous studies about its meaning, origins and determinants. One of the often discussed issues in literature is the relationship between social policy and social capital. On the one hand, there is a lot of research which demonstrates that this relationship is negative as it was conceptualized in the 'crowding-out' hypothesis (Fukuyama 2000, Stolle and Rochon 1999, De Swaan 1998). On the other hand, there are studies which point out that social policy boosts social trust formation (Knack and Zak 2001, Szreter 2002, Patulny 2005). The latter is supported by empirical evidence based on positive correlation between welfare efforts measured through social spending and social trust indexes (Delhey and Newton 2004, Knack and Zack 2001, Van Oorschot and Arts 2005).

An alternative operationalization of the state intervention in the form of social policy that consists in constructing dummies for welfare regimes provided similar evidence. Social democratic welfare regime was found to have higher levels of social trust compared to Conservative and Liberal ones (Van Oorschot and Arts 2005). Using Esping-Andersen's typology for studying social policy effects is a clear breakthrough in the empirical analysis, although neither this approach nor the tradition of using social spending reveals the true nature of the mechanism in which social policy affects social trust.

The main objective of this article consists of introducing a new approach in analyzing the effects of welfare state development on social capital which is based on decomposing Esping-Andersen's welfare regime typology into two dimensions and separately analyzing their influence on social trust levels. These two dimensions lying at the roots of welfare regime typology refer to the outcomes of welfare state intervention which includes decommodification of the individual from the market and a certain type of social stratification. The results will have direct policy implication since on their basis it will become possible to infer about the consequences of the recent changes in welfare states consisting in lowering the decommodification level and gradual shift to a liberal paradigm in securing individuals' welfare.

The paper is structured as follows: in the second section the overview of the literature about the state activity affecting social capital is provided. The argument in favour of a new approach is raised in the

following section. This will be followed by the methodology discussions and methods description. The empirical analysis will be provided in the fifth and sixth sections. Finally, the discussion will be closed by the results interpretation and the identification of the directions for future research.

2. The state and social trust: a multidimensional relationship

There is no agreement among scholars about the kind of the effects the welfare state conducts on social trust. It is possible to distinguish among several mainstreams in the literature discussing the relationship in question. The first mainstream can be called 'civic society erosion' argument which assumes the dependence of social trust on the level of development of civic society. Here, the effect of welfare state is intermediated through civic engagement. This thus suggests that welfare state may discourage civic engagement and as such social trust levels go down (Stolle and Rochon 1999) The argument however remains largely theoretical. On the one hand, there is no empirical research up to now which would demonstrate that the welfare state activity discourages civic engagement. On the other hand, the theory is quite ambiguous about the fact that civic engagement may be a determinant of social trust at all (Kumlin and Rothstein 2007, Newton 1999, Uslaner 2000-2001).

Alternative explanations of welfare state effects on social trust were provided by Fukuyama and De Swaan which can be called a 'moral destruction' argument. They both suggest that the crowding-out in social capital will happen if the state starts to undertake activities that are better left to the private sector or to a civic society. Fukuyama (2000) explains the crowding-out mechanism with the fact that if the state gets into the business of organizing everything, people will become dependent on it and lose their ability to work with one another. According to De Swaan (1988), the state activity erodes the individual's sense of responsibility for caring about family members and friends. But again these mechanisms of the crowding-out were never studied empirically.

There are several scholars supporting the opposite effects of welfare state. Positive impact of welfare state on social trust is recognized by Bonoli (2001), Knack and Zack (2001), Patulny (2005) and Szreter (2002). They all base their argumentation on the idea that social policy in this way or another helps to integrate the individual in the society when he or she has difficulties. As a consequence, these theories can be called 'integration' argument. This theoretical argument has been broadly supported by the results of empirical analysis. The findings usually demonstrate positive correlation between welfare state and social trust indexes (Delhey and Newton 2004, Kanck and Zack 2001, Van Oorschot and Arts 2005). These studies however have certain limitations since welfare state development is measured through the level of social spending while ignoring the fact that it does not reflect the actual level of benefit generosity.

The fourth mainstream in the literature can be called 'institutional' which emphasises the role of institutions in inducing pro-social behaviour. The institutional argument about social capital can be divided into macro- and micro-level theories. More specifically, macro institutional theories assert that efficient state institutions promote more trusting societies through reducing the risk involved in the agreements (Herreros and Criado 2008, Rothstein and Stolle 2002, Tillmar and Lindkvist 2007). An alternative way of public institutions influencing social trust consists in evaluating by the citizens the quality of performance of these institutions (Mishler and Rose 2001) or that of elected officials (Thomas 1997). The micro-level institutional theories are focused on the fact that a particular design of welfare state programmes may explain the kind of influence they conduct on social trust. Crowding-out is expected in the case of means-tested schemes while universal non means-tested schemes are usually assigned positive influence on social trust (Kumlin and Rothstein 2007, Rothstein and Uslaner 2006). Finally, the last block of literature on the relationship between social capital and the state recognizes the possibility of a synergy between the state and the society and can hence be called 'synergetic' argument (Fox 1996, Heller 1996, Evans 1996). The main reasoning of this argument rests on the idea of creating by the state the incentives for the collective actions from below which must enforce trust levels. This argument remains however largely theoretical without being quantitatively analyzed.

3. Introducing an outcome spectrum in social capital analysis

The overview of literature on the relationship between the state and social trust allows for drawing certain conclusions which define space for further research. The analysis of literature provided evidence which points out at the lack of empirical studies on the effects social policy may have on social trust. The studies are mainly theoretical which basically speculate on the kind of the relationship

in question rarely employing statistical techniques for checking the plausibility of the ideas underlying the relationship.

The studies on the crowding-out hypothesis constitute an exception here since they usually include empirical analysis of the impact welfare effort may have on social trust. However, they mainly tend to operationalize the welfare state development through social spending measured as a percentage of GDP. This approach can be claimed false since social spending does not reflect the actual level of the support the welfare state provides individuals with. It is plausible to assume that the level of social spending depends not only on the amount of social benefits paid, but as well on the coverage rate. The same level of spending thus can be obtained in the countries with high benefit levels but small coverage rates or in the countries with low benefit levels but high coverage rates. Moreover, this measure of welfare state development does not fully reflect the dynamics of the state intervention in the form of social policy since an increase in the level of spending may also result from the fact that the number of eligible recipients increased while the level of benefits remained unchanged.

The traditional way of operationalizing welfare state development thus fails to measure the extent to which the state affects the individual well-being. It completely ignores the micro-level foundations since it is fully detached from which extent social spending allows for outsourcing of the individual from the market. On the other hand, social spending reflects the process of the state intervention rather than its outcomes. The need therefore consists in introducing an outcome spectrum in the analysis of welfare state effects. This problem is to some extent solved in the studies which are based on including dummies for Esping-Andersen's welfare regimes. But this measure is not perfect as well since it remains unclear here whether it is the level of benefit generosity or the type of social stratification resulting from social rights which can be claimed responsible for variation in social trust levels across welfare regimes. It should not be forgotten that Esping-Andersen's welfare regime typology is by itself a multidimensional concept which is created along dimensions of decommodification, stratification and de-familirization.

The general logic of the analysis thus triggers the need to find a new way of operationalizing welfare states which would more accurately approximate the degree of their development while still being in a direct way linked to the outcomes of the state intervention in societal arrangements at the micro-level. Such measure in our opinion can be obtained by decomposing Esping-Andersen's welfare regime typology into two dimensions and directly relating each dimension to social trust indexes. These dimensions are decommodification and stratification which assess the effects of the degree of outsourcing of the individual from the market, on the one hand, and the impact of the stratification mechanism, on the other hand. The main advantage of this approach consists of measuring the development of welfare states through their outcomes which brings a new spectrum in studying welfare state effects on social trust.

4. Data source and methods description

4.1 Data source

The main data source is the World Values Survey that contains measures reflecting people's attitudes and believes in a wide range of social domains. We will use the data from the most recent wave - 1999. Our sample will include the following countries: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Great Britain, Ireland, Italy, Japan, the Netherlands, New Zealand, Norway, Sweden, Switzerland and the United States[1]. The choice of countries was based on the data availability about their country-level characteristics.

4.2 Methods description

The relationship between decommodification level and trust indicators will be examined at both: individual and aggregated level. The aggregated-level analysis relates average level of social trust indicators across nations to their level of decommodification while sequentially controlling for country-level characteristics. The individual-level analysis represents a cross-sectional analysis based on multilevel modeling. The multilevel linear regression is applied to detect the direct influence of relevant measures of welfare state development on respondents' indicators of institutional trust. For

[1] It should be noticed that the data for some countries included in the survey stem from the previous wave – 1994-1998 due to the lack of data for the last wave. These countries are: Australia, New Zealand, Norway and Switzerland.

interpersonal trust, we will use multilevel logistic regression. We model only fixed effects while random effects are not included. This can be explained with the fact that we are not interested in studying how the effects of individual level variables differ across countries, but rather prefer to focus our attention on the effects of country level variable, namely, welfare state development, which can be done through fixed effects. Moreover, we do not include in the equation other country-level covariates due to the small number of cases at the second (country) level.

The operationalization of the models will be done as follows:

4.3 Dependent variables

As it usually appears in the literature we distinguish between two types of social trust: interpersonal trust and trust in institutions. Interpersonal trust is defined on the basis of the following question: 'generally speaking, would you say that most people can be trusted or that you cannot be too careful in dealing with people?'[2]. The positive answer on the first part of question is interpreted as high level of trust, and is assigned the value of 1. The opposite answer is treated as low level of trust, and has value of 0. Trust in institutions is a synthetic variable constructed on the basis of a range of questions concerning people's confidence in various institutions. The answer to each question is measured on a four-scale basis varying from 'a great deal' to 'none at all'. For our dependent variable we selected the following institutions: the police, parliament, civic service, social security system, health care system, and justice system. Van Oorschot and Arts (2005) showed by using factor analysis that all of them load on the same construct and the new scale provides quite high reliability level (0.80). We came to the same conclusion while repeating the factor and reliability analyses. The new variable 'trust in institutions' was calculated by summing-up scores of construct-parts so that the new scale had values varying from 6 to 24. However, for the ease of interpretation the values are recorded into the range from 1 to 19 reflecting respectively 'no confidence' to 'high confidence' in the selected institutions.

4.4 Independent variables

Decommodification level is operationalized through benefit generosity index which represents the level of generosity of social benefits. The indicators were calculated by Scruggs and Allan (Scruggs and Allan 2006) and made available to the public through their publications. We also use their stratification indexes for operationalizing stratification level in the countries of interest. The indexes were again obtained by replicating Esping-Andersen's analysis of stratification scores (Scruggs and Allan 2006).

4.5 Control variables

Among control variables we distinguish between country-level and individual-level characteristics. The overview of the literature on social trust suggests that the following characteristics should be controlled for at country level: country wealth, income inequality, corruption, percentage of Protestants living in the country and fractionalization level. At the individual level we control, on the one hand, for socio-economic/demographic variables (age, gender, education, household income, employment status), on the other hand, we hold constant attitudinal, perceptual and behavioural causal mechanisms through which socio-economic/demographic variables may have an impact on trust (civic society activity, sociability, religion and religiousness).

Our expectations are formed based on the integration argument and can be formulated as follows:

> *Hypothesis 1: higher levels of decommodification are associated with higher levels of social trust this is so for both levels of analysis: aggregated and individual.*
>
> *Hypothesis 2: Socialism and conservative stratification scores are positively associated with social trust indexes and this is so for both levels of analysis: aggregated and individual.*
>
> *Hypothesis 3: Liberal stratification scores are negatively associated with social trust indexes and this is so for both forms of analysis: aggregated and individual.*

[2] Glaeser et al. (2000), Danielson and Holm (2002) (in Slemrod and Katuscak 2005) measured trust and trustworthiness by conducting experiments with monetary rewards. They find that the standard question used to measure trusting behaviour used in the WVS does not have a significant correlation with trusting choices.

5. The effect of decommodification on social trust

Esping-Andersen (1990) refers to the decommodification as the degree to which individuals or families can uphold a socially acceptable standard of living independently of market participation. Each welfare regime type is thus based on the idea of providing different levels of decommodification which is rooted in the specific regards of the state as the main provider of welfare to the individuals and resulted in three types of decommodification traditions: conservative, liberal and socialism (for more details see Esping-Andersen 1990). Relating decommodification level to social trust indexes at the aggregated level provides evidence advocating for the presence of crowding-in effects in both forms of trust (Table 1). More specifically, interpersonal and institutional trust was found to positively correlate with indexes of decommodification. However, it should be noticed that controlling for the country-level characteristics changes the relationship under analysis.

Table 1: Correlation between decommodification level and social trust, controlled for country-level characteristics[3] (18 OECD countries)

	Correlation between decommodification indexes and social trust	*Controlled for*				
		Fractionalization	**Wealth**	**Inequality**	**Corruption**	**% of protestants**
1. Interpersonal trust	**0.519****	**0.722****	**0.441***	**0.021**	**0.408***	**0.510**
2. Institutional trust	**0.571***	**0.463**	**0.344**	**-0.341**	**0.025**	**0.285**

Source: Own calculations based on the World Values Survey

If sequentially controlling for country-level characteristics, the correlation between relevant social spending and social trust among their direct recipients loses its strength remaining in most cases statistically insignificant at all. More specifically, when controlling for income inequality level the positive relationship between decommodification scores and institutional trust becomes negative although not statistically significant. In the case of interpersonal trust the relationship in question looses its strength completely and becomes as well statistically insignificant. It allows for concluding that the effect of social spending on social trust is absorbed by the inequality variable which means that the effect of welfare state is mediated through reduction of inequality. This can be considered an evidence of integration theory which emphasises that welfare state raises social trust levels through keeping the individual socially integrated and through reducing income inequality levels. Another interesting point that arises from controlling for inequality level is the fact that the direct effect of decommodification is found negative for institutional trust. This means that welfare state crowds-out institutional trust when its redistributive effect is controlled for. However, the mechanism of this erosion remains unclear here. The only option is to use the existing theory which emphasises that the crowding-out happens through destruction of civic engagement or through erosion of people's ability to work with one another. It seems that civic society erosion argument or moral destruction theory hold as well true although we possess no empirical analysis proving this assumption. The effects of welfare state on social trust hence can be considered at least dubious. On the one hand, decommodification level boosts social trust through reduction of income inequality. On the other hand, it erodes trust levels most probably through de-motivating social networks.

An interesting conclusion can be also drawn from the results obtained based on controlling for the corruption level. In most cases the correlation coefficients between decommodification scores and social trust loose their value when controlling for this country-level characteristic and it is especially obvious in the case of institutional trust. It allows for concluding that people form their trust first of all towards public welfare state institutions based on their performance. In particular, they take into account the level of corruption. The effect of welfare state on social trust thus goes as well through

[3] * - 10% , ** 5%, *** 1% and less

the quality of institutions' performance. If they are considered fair in treating people equally, it forms necessary ground for high evaluation of public welfare state institutions which results in high trust towards them. This can be considered a confirmation of macro-level institutional argument which emphasises the importance of the quality of the performance of public institutions in the process of trust formation. The individual-level analysis provides empirical evidence which again advocates for the presence of crowding-in rather than crowding-out effects. Benefit generosity seems to enhance both forms of trust (Table 2).

Table 2: Influence of decommodification level on social trust indexes

	Institutional trust	***Interpersonal trust***
Benefit generosity Index	**0.088*** **	**0.034*** **
Volunteering	0.124***	0.261***
Sociability	0.420***	0.374***
Religion		
Catholic	0.316***	-0.169***
Protestant	0.334***	0.065*
Other	0.115***	-0.120***
Religiousness	-0.159***	-0.024***
Gender	0.117**	0.065**
Age		
15-29	Ref/category	Ref/category
30 – 44	-0.126	0.164***
45 – more	0.192***	0.187***
Education		
Lower	Ref/category	Ref/category
Middle	-0.041	0.100***
Upper	0.134**	0.701***
Unemployed	-0.125***	-0.050***
Income		
1st qu.	Ref/category	Ref/category
2nd qu.	0.146**	0.067**
3rd qu.	0.092	0.222***
4th qu.	0.117	0.433***
5th qu.	0.089	0.576***

Source: Own calculations based on the World Values Survey

Thus, both levels of analysis provided evidence mostly advocating for the positive effects of decommodification on social trust.

6. The effect of stratification on social trust

Another dimension of welfare states classification describes how social policy structures society which allows to investigate the stratification effects of social policy. The main objective here is to show that the programs of a similar 'size' could produce very different outcomes overall. Esping-Andersen (1990) distinguishes between three different traditions in stratifying society each of which is inherent

to three welfare regime types (for more details see Esping-Andersen 1990) . Aggregated level of analysis of stratification effects provides mainly statistically insignificant results[4]. With respect to the individual-level stratification effects on social trust we obtain results which are not completely in line with our expectations (Table3).

Table 3: Influence of stratification level on social trust scores[5]

	Institutional trust			***Interpersonal trust***		
	Conservatism	**Liberalism**	**Socialism**	**Conservatism**	**Liberalism**	**Socialism**
Conservatism	**-0.071*** **			**0.051*** **		
Liberalism		**0.193*** **			**-0.022*** **	
Socialism			**0.190*** **			**0.091*** **

Source: Own calculations based on the World Values Survey

For interpersonal trust crowding-out can be expected in the case of liberalism while crowding-in effects in the case of conservatism and socialism. The conservative approach to organize welfare aimed at preserving the existing class structure seems to affect interpersonal trust positively. Socialism was also found to lead to crowding-in effects in the confidence toward other people. The effect is however almost double stronger for socialism compared to conservatism which is quite modest but still advocates for the presence of positive influence. An approach aimed at supporting the individual independence is hence more productive in generating interpersonal trust than that of preserving the existing class structure. In the case of liberalism, the total effect is negative which allows us to assert that liberal stigmatizing-like social policy leads to an erosion of interpersonal trust among individuals. In the case of institutional trust, the results obtained point out at the possibility of crowding-out for conservatism and crowding-in for liberalism and socialism. The conservative stratification hence tends to negatively influence the confidence towards public welfare state institutions which operate in a way aimed at preserving the existing class structure. It seems that the general principle of organizing welfare based on individual's work history and individual's placement in social structure might produce negative effects on trust towards public welfare institutions.

What comes as a surprise here is that an increase in the measure of liberalism leads to an increase in institutional trust which is against general logic assuming that means-testing and stigmatizing ruins individual's confidence towards public institutions. It is plausible to infer here that the fact that the state provides an individual with financial aid outweighs the negative impact of the way in which this welfare is provided. The positive effect was also obtained for socialism's measure. Providing individuals with welfare on a universal basis can be considered an instrument for increasing institutional trust. To sum up, specification of outcome dimension reveals the fact that in most cases the crowding-in effects are present in the relationship between social policy outcomes and social trust levels.

7. Conclusions

This study represents an empirical investigation of welfare state effects on social trust. Our contribution consists in introducing an outcome spectrum in the analysis of the relationship between welfare state development and social trust. The analysis is based on decomposing Esping-Andersen's welfare regime typology and directly relating the level of decommodification and stratification to trust indexes.

The results obtained point out that regardless of the way the welfare state development is operationalized one might expect that in most cases its impact is positive on institutional and interpersonal trust. Social spending can hence be used as a good proxy for decommodification level since both these measures of the degree of welfare state intervention lead to the same findings which demonstrate positive impact on social trust. What remains unclear here is the mechanism underlying the relationship of interest. There must be many links between welfare state and social trust through

[4] Due to this they are not reported.
[5] The coefficients on individual-level control variables are not reported since they have been referred to in the Table 1

which the effect materializes. Based on aggregated level of analysis it is possible to conclude that the effect itself is at least dubious. On the one hand, welfare state boosts trust by reducing income inequality level and improving the performance of public institutions. On the other hand, the direct effect is negative which may stem from the erosion by social policy of social networks or individual's morality. An additional research is hence necessary to study the mechanism of the relationship between welfare state and social trust.

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The Limits of Rationality on IC and KM Analysis

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Abstract: In this paper we analyse how the concept of rationality is linked with Intellectual Capital (IC) and Knowledge Management (KM). We assume that in traditional economic analysis rationality is a characteristic of the models. But we are also aware that economists have dealt intensively with the problematic of irrationality, and therefore more complex models have tried to address the question of irrationality. One of the main approaches in that context was constructed by Herbert Simon, and was based in the concept of bounded rationality. The events of the last months in the economic world seem to prove that irrationality is an extremely important concept. However, to our knowledge irrationality has been applied very seldom to the analysis of IC and KM. We study the irrationality question in three perspectives: valuation of companies; knowledge sharing and knowledge transfer; knowledge creation. We conclude that irrationality is decisive to understand IC and KM in every one of those three perspectives.

Keywords: Intellectual capital, knowledge management, rationality

1. Introduction

Basic modern economic theories are constructed upon the assumption of rationality (Samuelson and Nordhaus, 2004). The concept of rationality takes many different forms. One of the less disputed aspects in that people and organizations know how too choose between two different sets of goods (A and B) and that only three outcomes may be originated by the act of choosing: A is preferable to B, B is preferable to A or A is indifferent to B (Hirshleiffer, 1980). In particular those choices should be transitive: if A is preferred to B and B to C, A must be preferred to C (Hirshleiffer, 1980). The two ideas just mentioned are important because they base the existence of preference functions. Critics say that preferences may change over time, that people may not be able to compare between some goods, and that some choices may not be transitive. But, by and large, those two assumptions may be accepted easily. However there are some much more controversial and disputed assumptions about rationality.

One of those assumptions states that people and organizations maximize some outcome variable (utility, profits) when they act or they react to facts (Samuelson and Nordhaus, 2004). This idea may be seen as too optimistic, because we may consider that even if humans try to maximize some objective functions, they are not strong or good enough to achieve that goal; they fail, they make mistakes. Rationalization could therefore be a line towards which economic agents tend, asymptotically, only reaching that line eventually. Other of the important assumptions states that people and organizations have perfect information when acting and reacting economically (Samuelson and Nordhaus, 2004). This idea might be also considered as very optimistic, because the economic life is full of situations and histories in which it is apparent that perfect information does not exist, and in which some economic agents are mislead by other economic agents. A good example of this situations is the ENRON scandal (BBC, 2008) but imperfections of information also exist in the relations between buyers and sellers of some goods (houses, second hand cars), between doctors and patients, in the insurance market and in the labour market (Spence, 1973). It is not surprising therefore that the topic of asymmetries of information has become a very important one in the economics, generating the curricula of Economics of Information.

So, when related to choices, maximization, information, expectations and decisions we may consider that the notion of economic rationality is extremely exaggerated, and somewhat of an utopia. The above arguments call for the possibility of a “bounded rationality” as defended by Herbert Simon (1947). Bounded rationality could therefore be a better and more realistic way to explain the economic world. In a such a context, agents do not always choose logically. They do not maximize, but act and accept actions when sufficient gain is obtained. Information is not perfect and people just act according to the available information they have. Expectations are also not perfect, and surprises happen all the time. Sometimes people don’t act in their best interests and must be helped.The concept of bounded rationality has been applied to many fields of the social sciences spectrum, but to our knowledge its application to IC (intellectual capital) or KM (knowledge management) fields has

been very limited. However, Herbert Simon himself wrote an interesting paper on the importance of Information, in the Information age and on the best way to design information systems in companies (Simon, 1998). Simon ended the paper pointing to the importance of human capabilities and time. Consequently, we think that there is plenty of room to apply Simon's thoughts in IC and KM analysis, and we also think that this application could open up new, relevant avenues for the research and practice of IC and KM. Consequently, we think that there is plenty of room to apply Simon's thoughts in IC and KM analysis, and we also think that that application would upgrade decisively the on going discussion on the two topics.

In the present time of economic turmoil, uncertainty, irrationality and limited rationality are major topics in economics and management. In this paper we suggest that their use should be extended to IC and KM. In consequence, and in order to achieve that goal, we begin (section 1) by presenting the rational economic explanation for IC and KM based on the fact that IC and KM are goods / services, which have markets, and that are bought and supplied.After, in section 2, we sum up Simon's criticisms on those rational theories. Some of the topics analysed will be the following:

- The valuation problem (IC as Market value – Book value): If market value is not based on purely rational expectations, is IC a rational figure?
- Knowledge sharing and transfer: How far can we explain these in terms of rational and calculative behaviour? How do e.g. emotions and trust influence knowledge sharing?
- Knowledge creation: Is knowledge creation the outcome of a directed, purposeful and linear process, or an anguish-ridden operation related with serendipities and intuition? How do imagination and non-linear processes of creativity figure in knowledge creation?

Finally, in section 3, we discuss the paper's limitations, present the conclusions and suggest some ideas for further research.

2. The traditional economic explanation on IC and KM

2.1 The basic definitions

Intellectual Capital (IC) appeared in the economic discourse in the decade of 90, as a way of explaining the difference between the market value (MV) and the book value (BV) of companies (Edvinsson and Malone, 1997). Therefore, IC appeared as a way of solving a big accountancy problem. And in consequence IC studies that were done were mostly linked with the situations of private companies (Bontis, 2002; Pike and Roos, 2007; Bonnerman and Alwert, 2007; Tovstiga and Tulugurova, 2007),). When the researchers began to understand the causes of the difference MV – BV they also began to specify the causes of that difference. Therefore IC began to be divided in Human Capital, Structural Capital and Relational or Social Capital (Edvinsson and Malone, 1997). Furthermore four main areas should be analysed in order to understand IC and its effects: finance, costumers, internal processes, innovation and learning (Kaplan and Norton, 1996). Furthermore, following the accountancy tradition and methodology some authors defined MV – BV as Intangible Capital (Sveiby, 1997). Indeed, it may be considered that Intangible Capital and Intellectual Capital are very much the same things. But, it may also be considered that Intangible Capital is a larger notion that Intellectual Capital because Intellectual Capital includes only "Intelligence" and Intangibles also include products of intelligence like brands (Tomé, 2005). T o be more specific, IC includes education, training, experience, R&D, competences, skills, organizational routines, organizational learning, and social connections. IC may be possessed by companies or by individuals. In the last decade the analysis has been extended to countries (Bonfour and Edvinson, 2005, Kahn, 2005, Ricarda, 2008). On this particular topic it is a must to mention the World Bank Conference on Intellectual Capital for Communities held in Paris in 2005, 2006, 2007 and 2008, and the World Bank Website 4KD which provides calculations of Knowledge Indexes for more than 130 world countries (World Bank, 2008).

The concept of Knowledge even if it is very much related with IC, had somehow a different origin . Knowledge workers and knowledge companies were first defined in the sixties by Peter Drucker. Later, an important distinction was made between data, information (organized data) and knowledge (understood information) (Maurer, 1998). Also important was the definition by Nonaka and Takaeuchi (Nonaka and Takeuchi 1995), of the term "knowledge company", as a unit of socialisation, externalisation, combination, and internalisation of knowledge. Sometime later a n important contribution was made to describe the stages in which the knowledge process is divided (Probst and

all, 1997): identification, acquisition, development, distribution, use and retention. Based on these concepts, Knowledge Management may be considered as an activity or as a science (Tomé, 2005):

- As an activity, KM corresponds to an economic sector. The economic sector is put in place by practitioners
- . As a scientific field, KM comprises the analysis of the way people, organizations and countries deal with Knowledge. KM is, thus, the study of the application of Knowledge. In this context it is very important to note that KM is made with the contribution of many specific sciences, like engineering, economics, psychology, sociology, social policy, management, informatics, and logistics: every one of these sciences can contribute to the understanding of Knowledge in society; consequently, every important scientific conference or publication on the field gathers people from all those areas, that share a common interest: the application of Knowledge.

2.2 On the economics of IC and KM

We do not know of any compendium on the economic analysis of IC or KM by themselves. But, we think that the economic analysis of IC and KM has been done (Tomé, 2004; Tomé and Neumann, 2008), and may be done using two main hypothesis:

- Assuming that the analysis gathers the studies made on the components of IC; this means that we must put together theoretical ideas from the fields of economics of education, labour economics, economics of R&D, management, and sociology of labour among others;
- Knowledge and KM may be analysed by assimilation; in fact if we consider that KM is made by the possessors of IC (be them individuals, companies or regions and countries) then the market of KM may be assimilated to the market of IC.

Therefore:

- On Individuals the theories suggest that for individuals IC and KM may be beneficial in terms of higher wages, better employments, and lower unemployment spells (Becker,1993 Heckman, Smith Lalonde, 1999).
- On organizations, the theories imply that IC and KM may have very positive effects in productivity, product quality, working ambiance, relations to costumers, etc (Becker,1993 Heckman, Smith Lalonde, 1999; Carlucci, Marr, and Schiuma, 2004).
- Societies as a whole may also benefit from IC and KM, because the microeconomic effects defined in the previous two previous alineas may be aggregated; therefore IC and KM may explain higher levels of income and social welfare in regions and countries (Ashton and Green, 1996) it may also be considered that IC and KM have an influence on social stability, democracy and peace (Tomé, 2004).
- The analysis mentioned in a), b) and c) suppose that IC and KM are goods or services or activities for which an investment is made that derives returns. The investment should only be made if the expected returns are positive and worth the effort, but the traditional theories assume that individuals and organizations are able to make correct decisions based on the cost / benefit perspective. In that context, the ex-post evaluations and assessments of the investments in KM and IC have become an important scientific field (North, Reinhard, Schmidt 2004;). Those practices began in private companies from the developed world but had spread to other type of organizations in other nations (Bonfour and Edvinson, 2005, World Bank, 2008).
- IC and KM are investments that should be essentially done by individuals, and organizations, be them private or from the third sector. But the existence of the potential benefits just exposed calls for the presence of the public sector in the IC and KM market. That presence is explained if some market failure exists in the IC or KM markets, or, also if there is some big inequality problem in the market also (Tomé, 2004). Of course, the public intervention should only take place in the market if the disruption it causes (also known as public failure) is smaller than the private failure it solves. Among the market failures in the IC and KM markets that may be solved by the public intervention the most important is related with the positive externality in the investment in IC and KM, that may lead to the subsidization of IC and KM. Also it is important to make public investment in IC and KM to prevent social exclusion. Finally, public support may be made to activities related to R&D, because their returns are very random, and those activities are a very decisive constituent of IC and KM.

- Finally, most of the analysis of IC and KM is done in order to define the "stock" of IC and Knowledge of countries or organizations (MERITUM (2002), Danish Ministry of Science, Technology and Innovation (2003). But we may also try to define other elements of the market like the demand, the supply, the investment, the need, and the return (Tomé and Neumann, 2008).

3. The irrationality IC and KM

Quite crucially all the analysis that was previously presented in section 1 is based in Cartesian and rational thoughts. In that hypothesis individuals and organizations tend to maximize their behaviour and to behave correctly. However, that perspective may be considered as very exaggerated. In the real world, people make mistakes and rationality is limited. In consequence we think it is very important to analyse IC and KM in an irrational perspective. As there are too many questions that might be addressed on IC and KM we will focus on three topics we think are essential: the valuation problem (2.1), knowledge sharing and knowledge transfer (2.2), knowledge creation and renewal (2, 3).

3.1 The valuation problem

One of the most important questions in the IC and KM analysis is related to the exact definition of the value of organizations (Edvinsson and Malone, 1997; Kaplan and Norton, 1996; MERITUM, 2002, Danish Ministry of Science, Technology and Innovation, 2003 Bonnerman and Alwert, 2007); In a purely rational world IC should account for the difference between Market Value and Book Value, and most importantly that difference should be defined rationally. But if we take a closer look at the variables that are used to define the market value of an organization, we may find that IC is not exclusively a rational variable. First of all, for organizations that are valued in the stock markets, their market value is influenced by random factors, like the international economic situation, the credit situation , and the price of oil. The recent credit crunch is the demonstration that the MV is very influenced by those random factors. In the last twelve months, the share indexes of the major Stock Exchanges felt by around 40%. The decrease in the MV that ensued is hardly justified by rational factors. Of course, as a reflection of the huge market downturn, the book value of the mentioned companies also suffered a correction, but due to the nature of the elements that usually figure in the balance sheet, that correction was necessarily smaller. The evolution of the market shares is much more influenced by Keynesian "animal spirits", than the evolution of the book value. Therefore, the value of Intellectual Capital is influenced by the evolution of the market. We cannot rationally sustain that the value of the IC of a listed company may fall by 50% in a semester, because the market value of those company felt sharply, due to the fall in the stock market, and even if some correction happened in the book value. But situations similar as those happened frequently in the last twelve months. Therefore, it seems that the markets value companies irrationally, and in consequence the value of the IC of the most important companies of the world is also tainted by irrationality.

Secondly, for companies and organizations that are not in the stock market, the value of IC seems to be a safer bet. But, is it ? In this case we may be thinking about Universities, public institutions, NGOs and important private companies that are not in the Stock Exchange. And it is quite obvious that in those cases Intellectual Capital components may increase the value of the organizations: lecturers, civil servants, routines, relations between the members and with the costumers, all make organizations more valuable. But even if it is easy to define IC as a sum of human capital, social capital and structural capital, is it easy to define precisely the value of each one of those constituents ? We know it isn't. And again, the notion of bounded rationality becomes central to the analysis. We can only define the IC constituents by using proxys, and this is already a very important limitation. Finally, the translation in monetary terms of each component of IC is also a random exercise, and can only by done by approximation. Micro economists know that each method of estimation is random and that each one produces different estimates. Therefore, even for non listed organizations the definition of IC is closer to the thoughts of Herbert Simon, than to the theories that advocate complete rationality. Thirdly, when the analysis shifts from organizations to countries, the complexity increases even further. The tentative to define the IC or knowledge base of countries is made using very complex proxy indexes (World Bank, 2008). Those indexes try to define knowledge and IC by approximation, and in their definition it is implicit that there is a bounded rationality in the analysis, in the sense that the variables try to define a notion that is as latent as inscrutable. Like Achilles tends to catch the turtle, we may tend to a better definition of national IC and knowledge, but probably we will never arrive to the exact definition of a country's IC and knowledge. Finally, thinking in a strict

economic sense, we consider that to concentrate the economic analysis of IC on the definition of the stock of IC and on its short run financial consequences, is extremely reductionistic, and again, it is a form of limiting the rationality of the analysis. In this context we consider that the analysis of IC as an economic variable should include the notions of demand, supply, equilibrium, investment, flow, stock, need, and the return, as it was already proposed (Tomé and Neumann, 2008). The comparison between the two analysis is summarized in Table 1

Table 1: Two ways of considering IC (Source: Tomé and Neumann, 2008)

	Traditional Analysis on IC	New methodology
Basic perspective	Accountancy	Economics
Basic question	market value minus book value	market of knowledge and IC
Variables analysed	assets (stocks, flows)	demand, supply, investment, stock, flow, equilibrium, needs
Outcomes analysed	revenues (short run)	returns (economic and non-economic, short and long run)
Organizational perspective	company- and organization-based; residual regions and countries	microeconomic for companies and macroeconomic, for economic spaces
Management perspective	private business	private businesses and public policy
Investment perspective	investment in intangible assets	investment in knowledge and IC
Economic agents that might be interested	managers and stakeholders also: own workers	managers and policy makers also: voters, job-seekers, students, civil society

The new way of analysing is considerably more vast and some more rational, than the first one. But the second one is also very limited in its rationality because it has to use proxys for every variable used, as shown in Table 2 (Tomé and Neumann, 2008).

Table 2: Variables analysed and their proxys in an extended model of IC (Source: Tomé and Neumann, 2008)

Element	national IC markets		knowledge market in companies	
	Meaning	Relevant indicator	Meaning	Relevant indicator
Supply	production of IC	average years of schooling; life expectancy; housing with commodities; number of researchers in R&D	production of knowledge	production of knowledge by the company according to a predefined grid
Demand	use or desire of IC by organizations	number of workers in knowledge intensive sectors; knowledge intensity of the labour force	desire of knowledge	priority of knowledge as defined by the grid
Equilibrium	relation between supply and demand of IC	joint analysis of national values of supply and demand in the country	relation between supply and demand of knowledge	relation between supply and demand for all components of the grid
Need	benchmark to developed countries	gap between the national levels of supply and demand and those of the most developed countries at the time	relation between priority and investment	priority minus investment of a grid of components
Investment	expenses in IC	% of GDP spent in education and R&D; expenditures per capita in health	actions made to develop knowledge	investment on a grid of components of knowledge
Flow	international migrations of IC	inflow and outflow of human and non-human IC	admissions minus of personnel	inflows minus outflows of knowledge using a grid of indicators
Stock	actual level of IC constituents in the country	actual level of human and non-human IC in the country	actual level of knowledge of the company	actual level of knowledge defined by a grid
Return	social impacts of IC investments	evolution of wages, productivity, product exports, GDP	impacts of knowledge after minus before the	comparison of company outcomes “before-after”

			investment	

3.2 Knowledge sharing and knowledge transfer

The cycle of knowledge has been decomposed in several well know phases: creation, identification, capture, diffusion, transfer, sharing, utilization (Nonaka and Takeuchi, 1995). All these knowledge processes are essentially social by nature: knowledge is typically created, enriched, shared and leveraged in social interaction among several people. Most discussion and decision-making occurs in groups, and the social context influences motivation and action of individual organizational members to a significant degree. (Kogut & Zander, 1992; Amabile, 1988; Nemeth, 1997; Nonaka & Takeuchi, 1995.)

Social capital, i.e. the wealth or benefit that exists because of an actor's (whether an individual person or an organization) social relationships (Lesser, 2000, 4) has important consequences for knowledge-related issues. Social capital consists of the relational ties between actors, trust and other relational characteristics of these relations, and common context and language (Lesser, 2000; Nahapiet & Ghoshal, 1998)

Social capital promotes improved information flows, as well as possibilities for influencing and controlling other actors within the social structure (Adler & Kwon, 2002, 28-33). Furthermore, social capital produces mutual support and increases trust, and thereby facilitates cooperation and coordination of collective action (Putnam, 1993). It is also said to provide justification and rationale for individual commitment, to enable flexible organization of work, and to facilitate the development of intellectual capital (Leana & Van Buren, 1999, 547-552; Nahapiet & Ghoshal, 1998).

In sum, knowledge sharing and transfer are fundamentally based on interpersonal issues. It doesn't seem that all of those could be completely explained by purely rational calculations. At the present stage of our research we would think that emotions and "soft" issues like trust are at least as important as rationality in the processes of knowledge sharing and knowledge transfer.

In one hand rationality plays an important part defining the broad setting in which knowledge sharing and knowledge transfer take place. We share and transfer knowledge in organizations that because they are organized, therefore they tend to be rational. Rationality is also important because we tend to share and transfer knowledge with rational goals, like finishing tasks or obtaining a good productivity level, and within rational goals that are set by the rational organization.

On the other hand and within the limits of our own liberty and of our own self judgment, we tend to share and transfer knowledge we like to people we like and with people we trust. And we tend to take pleasure from it.. And to like and to trust are not completely rational constructs, but rather bounded rationality constructs. So, we can't say that the transfer and sharing of information and knowledge is not guided by rationality but by bounded rationality. In the same context it is easy to assume that we tend to use our instincts when deciding what we share / transfer and with whom we share / transfer. So, again the two processes don't seem to be entirely rational. Finally, when we "produce" the transfer of knowledge and the sharing of knowledge we have limited resources, that may limit the outcome of our actions**:** our social networks are limited, time is a scarce resource, and our abilities are limited. In such a world, it seems more rational and correct to defend some for of bounded rationality than to do the contrary.

3.3 Knowledge creation and renewal

Knowledge creation and renewal are two very important research topics in the current analysis of IC and KM (Kianto, 2008). As they knowledge creation and renewal take place in rational and organized organizations, they should be somehow rational. But we may wonder if knowledge creation is the outcome of a directed, purposeful and linear process, or an anguish-ridden operation related with serendipities and intuition? In fact, if we see knowledge creation as a variant of the process of human creativity, linearity and rationality are not the norm. Quite in the contrary, intuition, serendipity, imagination, and anguish are fundamental in any human process of creation. It is well established in the creativity literature that new ideas arise out of diversity through a non-analytical, intuitive process that proceeds in a non-linear fashion (Styhre & Sundgren, 2005; Sutton, 2001). Furthermore, the main determinant of creativity is individual's internal motivation towards conducting a particular task (Amabile, 1988). Internal motivation, i.e. the will to do something for the sake of doing it, rather than

instrumental calculations of punishments or rewards resulting form it, cannot be forged from outside. It depends upon what the individual finds personally inspiring and contributing to one's self-development as a person. In the ideal creative flow, the doing is its own goal and activity and consciousness form a seamless whole (Cskiszentmihalyi, 1995).

Therefore if we assimilate the creation of knowledge to the process of artistic creation, irrationality or at least bounded rationality becomes a fundamental characteristic. If humans "create as they breathe", affection, instincts, and therefore irrationality have a part on it. Furthermore, if we think that the emergence of IC and KM makes of each individual a producer and creator of knowledge, we reach the conclusion that the irrational part of humans is becoming more and more important economically! The same can be said about knowledge renewal, given the fact that even if knowledge renewal is a very complex organizational process, it can also be analysed as and assimilated to a process of knowledge creation, and therefore the considerations we made on knowledge creation apply to knowledge renewal.

4. Conclusions

Economics is rooted in rationality and in maximizing behaviours. However, human beings are not entirely rational and don't always maximize any objective function in their behaviour. Basic economic analysis may be applied to IC and KM. IC and KM may be seen as goods and services, for which there is a supply, a demand, and all the other constituents of economic markets.

Bounded rationality is important in the analysis of the IC and KM markets at least by three reasons:

- 1) The value of IC, considered has the difference between the Market value and the book value of companies in very influenced by the erratic and irrational "animal spirits" elements that make the assets fluctuate in the world markets. For organizations that are not in the stock market IC must be calculated by using *proxys,* of Human Capital, Social Capital and Structural Capital that are by nature a consequence and a proof of our bounded rationality. The characteristic of bounded rationality is further increased for countries' analysis, because the *proxys* we use are even less related to the latent variables they should represent, that in the case of companies. And, finally, if we concentrate the analysis on IC and KM, for countries and companies only on the definition of the stock, we actually limit ourselves immensely, because we omit the other constituents of the market, namely the demand, supply, equilibrium, investment, flow, need, and the return.
- 2) Knowledge transfer and knowledge sharing is done in rationally designed organizations, with rational goals. But an element of social and therefore not entirely rational thoughts comes to the analysis, because we share and transfer based on instincts. Finally, we have limits producing transfer and sharing: time is limited, as are our social networks and our abilities.
- 3) Knowledge creation and renewal may be seen as a part of human creation, irrationality has an important part in that process. In an epoch in which every member of the labour force is becoming each day more a producer of knowledge we conclude that the economic value of irrationality is increasing by the hour.

Therefore, in the IC and KM analysis rationality is more a desire and not a reality.

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Actual Knowledge Management Usage in the Mexican Companies, ¿Fail or Success?

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Abstract: The need for Knowledge Management (KM) has been drastically increasing so organizations may meet the high level of complex business change, dynamics and uncertainty. This research, quantitative and qualitative, approaches the challenge of the KM in a sample of Mexican organizations, a large number of them do not have a standardized model from which they can obtain benefits in order they can achieve higher revenue, increase the employee collaboration and innovation, which impacts not only in the organization´s productivity, competitiveness but in the country one. We found that large companies, with more than 10,000 employees) have already an incipient and isolated KM implementation, most of them with meagre results. In the other side most of the companies within 50 and 1000 employees has no KM implementation, usage or scheme in how to get benefit or instrument a KM solution, they are immediate candidates due to their market position, services they offer and their search to obtain a value added service or product with shorter production cycles, and also due their need to innovate using their own explicit knowledge.We propose a model its usage in Mexican organization to allow them to identify and take advantage of the suitable knowledge and aligned it with their business strategy. The theoretical frame is based in the best practices emitted by international organizations such as the OECD, researchers and leaders in this expertise area and research line, also based in the diverse actual models for KM.The KM goal may vary in the companies, the analysis showed the pertinence to evaluate and measure the benefit and return of investment when they pretend to implement a KM solution, and must add a positive value to the organization to the Mexican Organization.The proposed model, ADSA, includes four stages: analysis, design, solution, appreciation. Each one it is logically aligned to the business requirement a knowledge based value generation, always following up the social and technical enablers.A properly used knowledge management strategy will impact positively in a higher revenue or profit, and also contributes in the generation of collective intelligence, that cans impulse the construction, and sustain for Mexico´s knowledge economy.

Keywords: Knowledge management, Mexico, ADSA, collective intelligence, Latin-American, intellectual capital

1. Introduction

Mexican companies are starting to see how the intangible assets such as brands, intellectual property, documented processes and licenses now comprise a greater percentage of the economic value of successful businesses than ever before. Some executives argue that intangibles represent the main performance drivers in the current transition from a traditional industrial/post-industrial economic structure towards a knowledge economy.

Mexico has many challenges in regards knowledge management (KM), on the way to population ageing, there is a period when the most favourable demographic conditions converge and may help to trigger Mexico's economic growth potential if proper and sensible use is made of them together with the KM. The gradual narrowing of the base of the age pyramid and the movement of the largest generations (corresponding to the high growth rates of the past) first to the economically active age groups and then to the older age groups, leads to a relationship between the productive and dependent population groups that is favourable scenario for employment, the economy and investment. Here Mexico needs to put attention to use the tacit knowledge held in the workers that has fifteen or more years working whom has no documented or put it into explicit mode the most of their learning's, in order to be used for all generations starting with baby boomers and beyond, this case also called demographic bonus or dividend, will briefly remain open in Mexico, for the first and only time, from 2006 to 2028. (Hernández Laos, 2004, p. 28).

Based in the previous finding we explore and survey 250 Mexican companies, representing the three main groups as the INEGI (Instituto Nacional de Estadistica y Geografia, is the Mexican government office in charge of statistics concerning populations, census, agriculture, manufacturing and many other industries) divides the companies, Small, Medium and Large business for Mexico. Our goal was to assess the actual KM usage and implementation inside the Mexican organizations, focused mainly in companies with high level of knowledge workers as the main or one of the main incomes for the revenue.

Also we look for the actual usage level for KM within the companies, since we found in an previous research in the market very few companies in the process to implement or KM usage.

Based on the findings we propose a new model that localize the KM for Mexican companies and institutions and look forward to accelerate the return on investment (ROI) for knowledge development, if we consider that knowledge from a financial stand point is a debt, an investment for the future which yield will be determined in the future, and the KM is the market administrator (Tiwana, 2002). KM usage is vital to achieving business success. Sveiby (2001) defines knowledge management as "the art of creating value from an organization's intangible assets". Prusak (1996) said: "The only thing that gives an organization a competitive edge… is what it knows, how it uses what it knows, and how fast it can know something new." In other words, how it applies KM.

2. Mexican context for this paper

This research was held in August-September 2008, including 250 companies from the Mexico City and metropolitan area. Based in a study made by the National Science Foundation, USA (NSF, 2007) only the 0.40% of the GDR is invested in Mexico for research and development purposes, and beyond Universities and other public Institutes, the private companies are investing a very small portion of their net income in research and development that reflects in the low level of KM. Mexican companies are facing many challenges in a rapidly shifting global economy. As we run in the 21st century, they face a world that is more interconnected, one in which knowledge, creativity, and innovation are the essential elements of prosperous companies and societies. Some of the companies we survey realise that research and development investments needs to be higher, but have some concerns in regards how to protect, control, reuse their intellectual property produced by them and how the organization policies can ensure that all participants share in the income derived from the KM on a foundation that is fair, unbiased that encourages disclosure of inventions and discoveries with the proper recognition inside the organization.

3. Research design

3.1 Subjects

The target subjects in our universe for the research was companies through their general managers, chief executive officers, chief knowledge officer, human resources manager or intellectual capital manager; we exclude any information technology related position in order to be more business oriented in the results. Applying a non experimental transectional descriptive methodology (Hernandez Sampieri, et al, 2006), the field research was conducted in the city of Mexico City Metropolitan Area, during the period between August 11th and September 30th 2008. A total of 250 surveys, interviews and self administered questionnaire were conducted, which resulted in almost 2000 pages, analysed with missing information of 38% and partially answered 40% of the observed population.

The questionnaire consists of five sections:

- Interviewed executive profile
- Organization profile
- Understanding, intention and collaboration of KM
- Their experience with KM initiative
- Future vision and expectative

In order to validate the questions in the survey we ran a pilot study, in June 14th to 24th 2008, upon completion of the pilot study, corrections were made, and the final survey was sent to the target sample of the population. The results of this pilot survey will not be included in the final results.

We divide the results into five clusters companies based in the amount of employees the organization has in order to identify possible trends in regards trends on innovation in the cluster (Shao, 2008)

Table 1: Organization- company size cluster classification (Trejo-Medina, 2008)

Amount of the employees in the organization	Cluster name
1 to 50	A
51 to 250	B
251 to 1000	C
1001 to 10 000	D
More than 10 000	E

3.2 Survey

The survey was based on a previous work used to measure the adoption level of knowledge management in Mexico City, (Trejo-Medina, 2008) and in a study made by the Centro de Sistemas de Conocimiento (CSC, 2001), includes 30 questions and was measured using Likert scale.

3.3 Procedure

We sent the research package using courier service to the 250 contacts in the organizations. The package included an introduction letter with our goals, the survey questionnaire and a stamped, pre-addressed envelope to return the completed survey, including also the procedure to do it using the internet. After the first week we made calls to follow up the advance in the answers.

4. Result analysis

After we receive the answers and process data, the following results showed up:

- 80% of the companies are privates companies, 20% government institutions
- Only 20% of the sample expressed a know how to manage the knowledge
- 90% of consider KM a valuable asset
- 22% of the population has a KM project in place or already executed
- Only 10% of the sample is aware of a KM initiative running inside the organization
- 55% of the organization with a KM project implemented gets lower results than expected
- 10% of the organization with a KM project implemented gets higher results than expected
- The three main issues in the failure of the initiative of KM in Mexico are:
- **No framework reference in how to implement the KM,67%**
- **Low experience in KM, 21%**
- **No executive level support / financial support, 8%**
- 67% of the organizations with a KM project implemented consider the main cause of failure the lack of reference framework.
- 41% of the population express the intention to run a KM project in the near term, 12 months.
- The main detractor for the KM project is lack of IT support and experience in KM process for implementation
- 76% of the organization mentions that KM must be a priority of any world class organization.
- 77% of the sample consider they have no experience to implement a successful KM initiative

Also the main applications the companies in process to implement a KM solution are:

Table 2: Top seven applications to be implemented in the next 12 months

Main KM application to implement in next 12 months	Preference for sample
Identification and best practices explicit transfer	53%
Organization based on knowledge	50%
Learning organization	46%
Human Capital system	42%
Learning on practice communities	36%
Knowledge visualization systems	33%
IT systems to share and distribute knowledge	28%

If we review the results per the organization employee number we have the following results:

In organizations with more than 10,000 employees

- They document more tan 75% of the process
- They have a dominant position in the market and sell product and services
- They consider themselves different due their own innovation level (product and services)
- 80% try to document their processes in order to be non indispensable

- KM is a high priority initiative
- 50% has already a KM solution or are on the way to implement it
- Staff turn-over is 5% average

In organizations between 1000 and 10 000 employees

- Staff turn-over is 20%,
- Process documentation average is 45%
- They sell products and services and have a strong market position
- They differentiation in the market is based on quality
- 50% pretend to implement a KM solution in the next 6 months

For organizations between 50 and 1000 employees

- Staff turn-over average is 13%
- Process documentation average is 50%
- They sell mainly services with a sustainable market position
- They try to differentiate by innovation in the services
- They consider the KM a key initiative, but they have no budget to invest in the near term

Organizations upto 50 employees

- Staff turn-over average is 8%
- Process documentation is 10% only.
- They sell products and few of the services, their market position is sustainable
- They try to differentiate by operative efficiency (price oriented)
- They consider KM a high priority, but they have no funds to start a serious program for themselves.

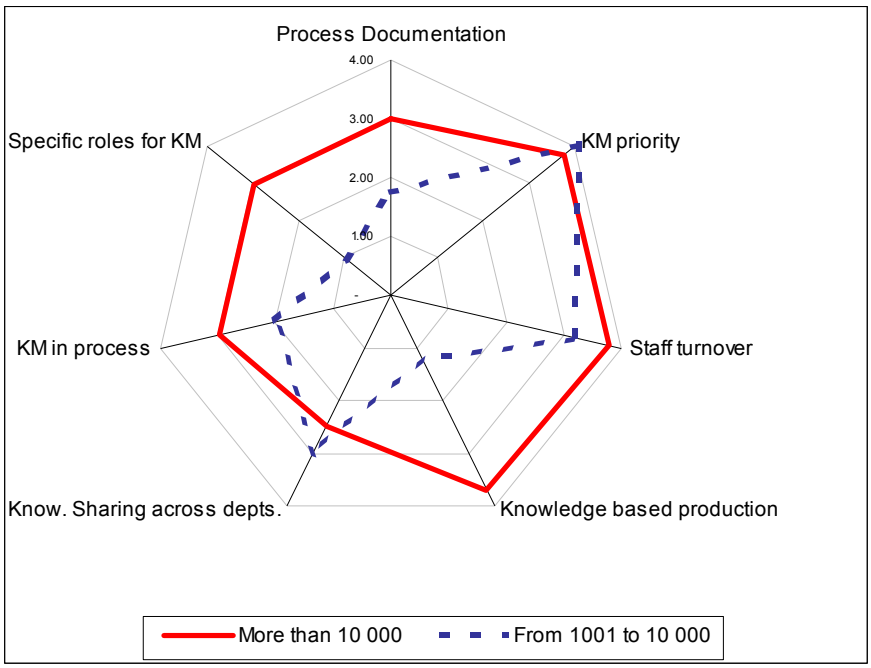

Figure 1: Main KM trends in organizations per number of employees

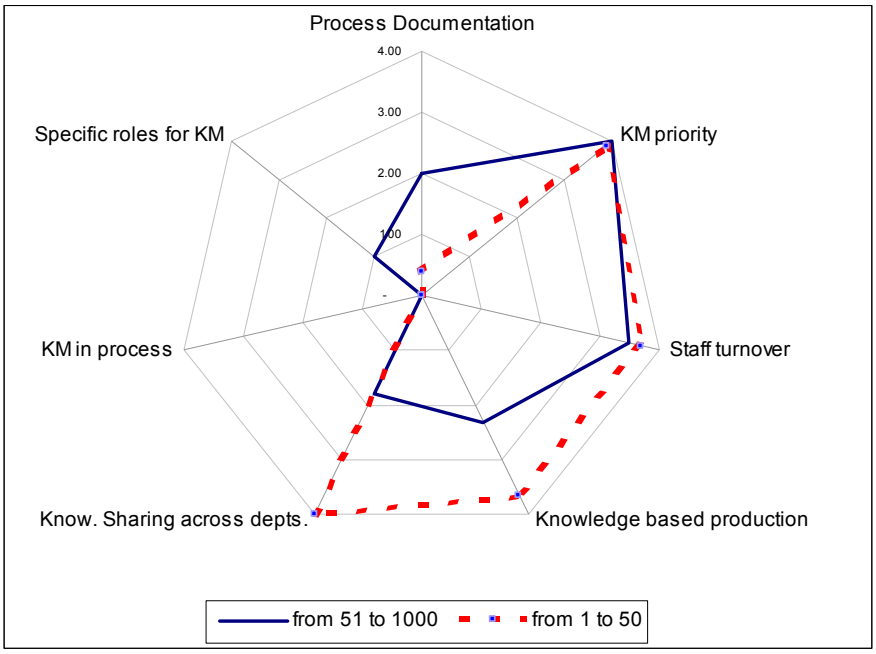

Figure 2: Main KM trends in organizations per number of employees

Most of the companies in the research express that KM is a key factor for the next years as part of their competitive strength, however almost every company with less than 1000 workers has no KM initiative in process or knows how to implement a KM for their own benefit, the financial point of view is consistent, they have no budget or have no reference in how to measure the benefits or the return of investment (ROI), the medium size companies (50-1000 employees) has aversion to the KM due their Enterprise Resource Planning systems experience in long time implementation with low ROI return, and low benefits in short terms in savings.

Almost a half of the companies who has implemented a KM solution in Mexico, has lower results compared with the initial expectation, the constant answer to this question was a missing and objective framework reference in how to implement the KM.

During research we found that there was no structured model to follow up for a knowledge management implementation, the organization with successful one has a very defined project and goals, the rest only have the idea to install a content manager system an share the information inside the system, most of time without a prior assessment in terms of expected benefits.

Also they have no defined roles beyond the traditional project leader and some supporters to execute the tacit to explicit knowledge process. Human resources or human capital areas express that one of the frequent feedback they got when a worker leave the job was the frustration to obtain basic information regarding his day basis job process and execution, the time invested in search information was up to 12 hours a week, this time is average result; the main companies with this issue has between 50 an 1000 employees, and most of this companies in our research has no KM solution in process or running.

For this 50-1000 workers companies the KM is almost inexistent, we could show up a failure in the execution, nevertheless this companies are the one with higher need of KM usage, and the information goods, even when difficult to develop, may be easily and inexpensively replicated, also mere access to information or knowledge may not automatically result in value creation, the human process it is important and must be aware of the team for KM.

Based in the results, we start to develop and work with a model named ADSA (Trejo, 2008) that includes four stages: analysis, design, solution, appreciation; which tries to address the issues found in the research.

The ADSA model pretend to address the main omission or failure that surveyed companies faced in the KM implementation process. Every step propose to include a business align measure, in order to

get partial deliverables with immediate concrete results for the company, and take advantage of the best practices found and try to avoid deviations in the KM process.

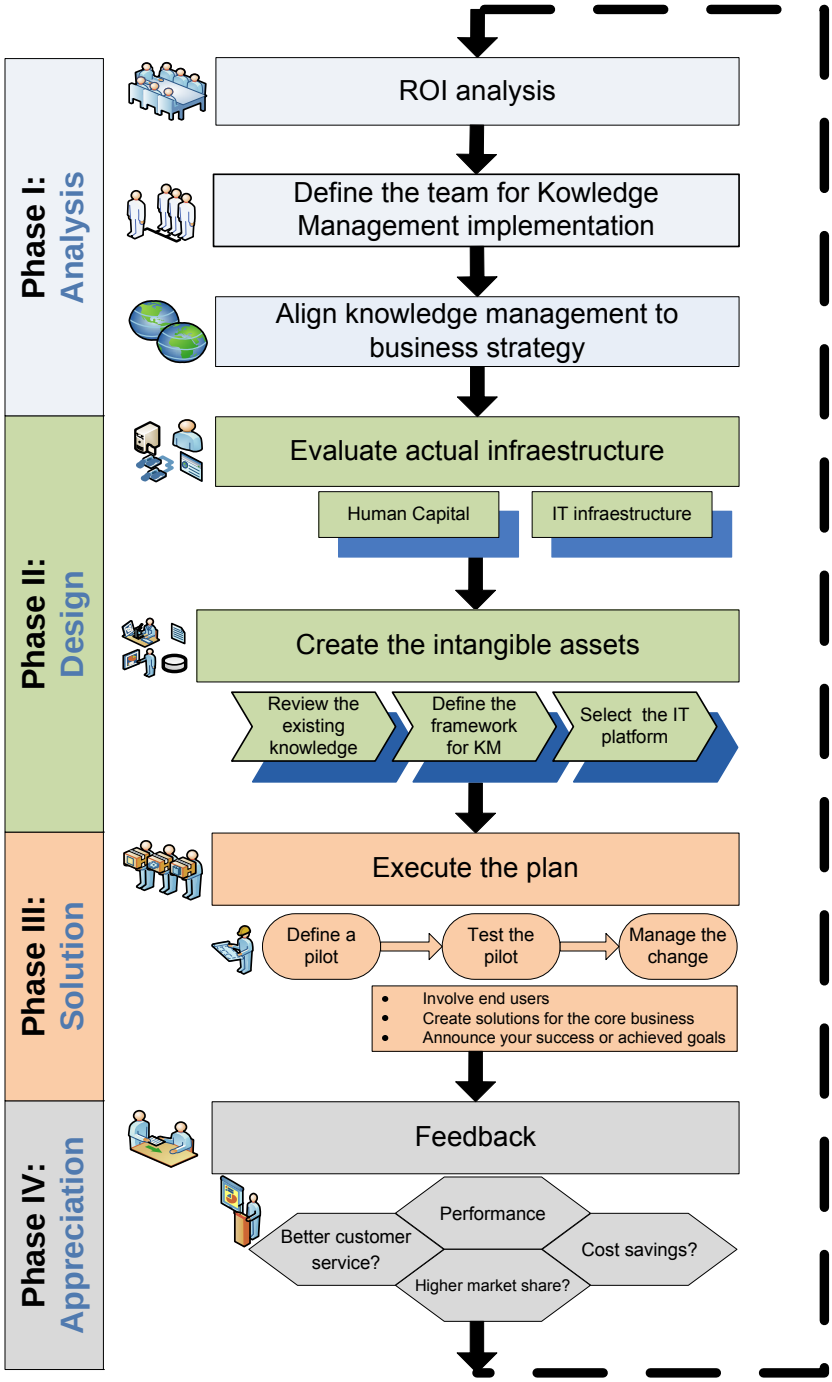

Figure 3: ADSA Model

The first stage consider the ROI as the first step if we wish to consider and implement a KM initiative, must add a value to the organization in terms of savings (time, money, sales cycle, innovation cycles, among others). It is important to show that team collaboration it is crucial in the development of any KM initiative, must have senior management sponsorship and must be involved all areas which has any relation with the process, from knowledge creators to analyst. The people working in the team has not necessary be the head of the area but must have enough experience and empowerment, if the people has additional competencies or comprehension of other areas will make a bigger impact, must believe in the KM project, depending on value for the company the people can be partial or full time involved.

One of the main questions we had is how to measure the impact of a KM implementation, there are several ways to do it, for a risk management point of view to a cost of opportunity, we propose a initial one using a operational approach, in the following table we propose a basic approach, that helps to evaluate if a benefit that will be received is it positive or the breakeven point is on company time expectative.

Table 3: Basic considerations for savings calculation in a KM implementation

Variable	Description	Unit
π	Amount of people to be benefit of KM (per employee ranking)	men
μ	Working hours per day	Hr/day
κ	Working days per week	Days/week
ρ	Working weeks per year	Weeks/year
α	men/hour cost for data classification/categorization	$/men hour
β	Men/hour cost for search information	$/men hour
δ	Men/hour Cost for process documentation	$/men hour
x	Estimate savings per year	$/year

$x = (\mu\kappa\rho)(\pi\beta_n + \pi\alpha_n + \pi\delta_n)$ Where *n* represent every level of employee ranking involved.

This above formula only measure the basic cost, depending on company profile must include the staff turnover cost, this must be compared against the implementation investment of a KM initiative, if the savings are greater than investment it is a profitable project to do; otherwise must be re-evaluated.

If you get a positive result in the formula, also you need to keep clear in your mind and strategy: What is the nature for this KM initiative?, Why must me implemented?, Where will be implemented (in your central office, in every department)?, Who is the main user?, When must be finished?, How you can afford the project in financial terms?.

If you get the positive result and you have the multi-department and engaged KM team, the final stage in the phase is align the goals for KM with the company goals and or business strategy, it means, initially we must be able to answer the questions: What we know or believe we know about our customers/users?, the actual knowledge we have, Can be transferred to other business units? Are we suing this information in any new product/service creation?

Also we propose to address carefully the team selection and collaboration, thus we can evaluate and measure the most appropriate people to be included in the process, and then align the KM strategy to the business strategy and use it. If any of these initial requirements are not filled we must stop and reconsider other way as per our research we have some propensity to fail.

In the initial stage, an analysis of your organization can fit in two main business models, the new or the old, the “new” model include organizations that have lot of information to be process (telco, finance, retail, education, revenue services, among others) and in an early stage we propose to focus in the new knowledge domain generation. In “old” model (manufacturing, packing, agriculture, among others) we propose to focus in the information codification and dissemination process. (Tiwana, 2002)

The design stage includes the infrastructure analysis in terms of information technology (IT) but also in human capital terms, we must consider and appraise the actual explicit knowledge we have, and then, try to acquire or ingest as much of the tacit knowledge we have and how to select a proper solution for the management. In this phase most of the failures in the analyzed organizations showed up, since they turn the KM initiative in a kind of IT data mining solution. We must conclude with a plan for the KM implementation.

We need to scale our knowledge level within the organization if goes from no-knowledge based process which means we have an undefined learning process in the organization, if we are art oriented i.e. only few brains knows the process and we are very repetitive process organization, or if we can measure the main knowledge, or if the case we have full knowledge and sharing organization.

As part of this phase, we must include and identify most of our intangible assets to be included, from the regulatory ones (patents, trademarks, industrial secrets, proprietary technology, licenses, among others), assets that help us to position in the market (installed base, employee expert identification, customer databases, value chains, market awareness, distribution network) the one with functional capacity (delivery process, innovation process, worker skills, corporate culture, quality standards) and the technological (it systems, ERP, emails, among others).

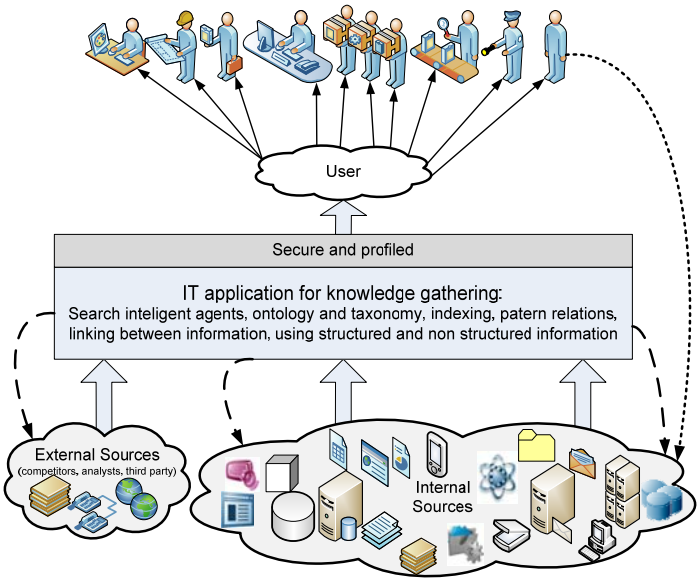

Figure 3: Data and information sources in KM creation

In this phase we should obtain the goal definition for knowledge impact in the organization that includes the ideal condition and the percentage of explicit knowledge we have. Third phase is the solution and execution of the plan, we propose to use small pilots as business releases for the KM solution we pretend to deliver, always working together with final users and knowledge specialist, looking to show immediate value to the organization; after every pilot we need to be able to answer: What is our business result?, the changes needed in policies, procedures or metrics to execute this phase, How we can measure the result?, we use in our implementation the incremental process for software implementation (Fichman et al, 1999). In the last phase we look out to measure the real impact for the organization in the usage of the KM, if has a real value added to the intangible asset usage or perception. The KM is a cyclic process and we propose to evaluate in early stages or initial adoption in the organization, for example: How many time are you saving to find the knowledge? KM helps to create new and faster product?, customer satisfaction level increases. In terms of human capital, for instance, we can measure if the employees, collaborators work and share more explicit information, finally how much is the impact for innovation cycles (are cycles reduced?), we offer better and faster answer to customer questions or request of service?

5. Conclusions

The KM in the Mexican companies we analyze, have a low adoption level for the small and medium business (SMB). The large organizations, mainly government and some private companies with competition within their vertical market, has been implemented a KM solution but only 45% of them perceived or received benefits from it.The sample show up a lack of KM model, regionalized or localized that assist KM deployment for core business and get perceived benefits as results. The successful KM projects we found mostly are based in a ROI previous analysis they expect and have a strict support and follow up from executive level.The starting point in major cases for KM projects was marketing and operation areas with high request for collaboration using explicit knowledge, in which the worker maturity and willing to work as a team impulse the success of the KM itself.

Now the economy is not the same, since subprime *mortgage crisis in 2008 the business has changed, organizations needs to use the intelligence of their collaborators and push the collective intelligence to help; the old analytic with structured data software solutions are not enough, the knowledge needs to be explicit and useful to support business decisions.*

The KM in Mexico for organizations will be directly related with the adoption degree of the Knowledge assets they require to execute their strategy, among the structure to support the Knowledge stock which impulse the pressure to learn and learn faster.The model ADSA was adopted already in some organizations as a way to reference the execution of KM and get a more precise way to measure and follow up the progress, this model has been accepted due the organizations perceive a business oriented result in terms of ROI for them using the model. Some analyzed organizations are working as a cluster and they found that if they use a KM solution in order to share their experience into explicit knowledge may help the cluster to increase innovation capacity and growth and productivity, mainly in technology ones. Main concern is intellectual property disclosures. This cluster is almost in the early stages for their operation but now they want to include the KM as part of their strategy, this opens a new line of research. The Knowledge in the organization must converge; the proper management of intangible assets will impulse a competitive advantage in the increasing global, intense and dynamic market environment.

The organization not only need to impulse this KM initiative in a market in development, but also must ensure the privacy and protection for themselves and their investors that knowledge, innovation or ideas created has a proper control, since this new created asset is key part of this knowledge economy.The KM it is turning into a successful initiative mainly for bigger companies and institutions, main concerns goes to executive support and not turn this into a pure IT project. As most process some fails in the implementation due the lack of executive support, financial funds and maturity in their collaborators within the company, here, change management could help them to turn it into a successful trend.Other measure that may or may not apply is the level of protection, safeguard and control of the intellectual property (in electronic format), since some of the KM they create is partially developed by Universities and Institutes and want to go further in the results they get, KM turns into a guidelines that help them identify and manage their intellectual property and copyright portfolio that will contribute to generate greater corporate value.

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The Virtual Tool for the Intellectual Capital Management

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Abstract: For IC management is offered unique and simple virtual tool **"Virt Trend Chart" (VTC).** It simulates the basic functions of popular methods of IC measurement, and the tool of the European innovative policy. The research of 194 organizations of the European innovative networks, 62 Russian innovative centers, 31 transnational corporations, 21 Russian large commercial organizations (CO) and 103 universities are carried out by means of VTC indicators. The analysis of indicators has allowed defining character and quality of IC management, trends of IC development. Managers of strategy and innovative policy by means of VTC can: independently estimate efficiency of business and its infrastructure; display the future successes of the organizations; reveal tendencies of development. Unique advantages of VTC are: it aggregates the basic advantages of known methods and models, including IC Index, Scandia Navigator, and IC Monitor (Edvinsson and Malone, 1997; Stewart, 1999; Skyrme, 2002; Sveiby, 2006). VTC is objective, does not depend on the human factor, it is accessible, but the main thing adequately considers the important component of knowledge economy - developing infrastructure of information-telecommunication technologies, features of network economy. Moreover, VTC reflects balanced of IC indicators to the strategic purposes and tasks. The Virtual IC Model - is a network model, which simultaneously displays the new virtual organization, new management system, and external influences of an environment – the market, branch, competitors by whom it is possible to identify and measure in network by means of searching systems and their thematic catalogues. Offered ideas and model have not analogues.

Keywords: Network economy, virtual intellectual capital, IC measurement and management

1. Introduction

The amount of Internet users has made of 1 billion 21 million ("The Report on information economy" at the end of January 2006 year, at conference of the United Nations on Trade and Development, www.ng.ru. The number of the Internet resources in October 2008 has reached more 110 million. Experts mark, that to prompt growth the Internet-sites, especially last two years, promotes additional opportunities for small business, and the general availability of network resources and ease in circulation with them. The Internet resources (IR) are intellectual product based on knowledge (Vahanyan and Vahanyan, 2005). IR can be considered as intangible assets (Andriessen and Tissen, 2000). Its market value depends on quality, demand and rendered services. IR becomes a dominating component of the intellectual capital (IC) especially in network economy (Marr and Schiuma, 2001; Marr, Schiuma and Neely, 2002; Bontis, 2002; Marr, Gupta, Pike and Roos, 2003; Vahanyan and Gaponenko, 2007; Westphal, Thoben and Seifert, 2007).

2. The model of virtual IC

VTC is the tool developed by the author (Vahanyan and Vahanyan, 2005; Vahanyan and Vahanyan, 2006), which includes model of the **virtual intellectual capital (VIC)** and the system of balanced scorecard (Vahanyan, 1985; Kaplan and Norton, 1996; Vahanyan, 2007a). VIC is the intellectual capital of the virtual organization or network representation of the organization, functioning in the form of a web page, a web site, or a corporate portal, the knowledge database or electronic library (Vahanyan, 2007b). VIC includes the **Internet resources (IR**), identified domains or sub domains names **of the electronic files and directories, servers and networks**. The intellectual capital (IC) of the organizations includes the virtual intellectual capital. With development of network economy share VIC in IC will increase, and growth of cost of the organization and its competitiveness will be determined first by VIC growth and increase of efficiency of its management. The VIC scorecard system includes: **the indexes of the intellectual capital (QI); indexes of citing (popularity and the importance) of the IR**, as in English-speaking (global) business environment (in a global virtual segment), and in Russian-speaking (local) environment (national virtual segment); **indexes of IR quality and demand** – corresponding rating of the indexes of citing, by the normalized values; and **parameters of QI variation.** Citations are a widely used, conventional measure of research strength. Indexes of IR citing are taken from the invisible knowledge, according to the thematic catalogues and ranks of the global search engines. Indicators of the IR quality and demand can be ranged in a regional segments also. By the author's conclusion it is revealed, that with development of network economy a curve of QI distribution for the virtual organizations will come nearer to the curve of normal

distribution. IC Management efficiency of the company can be identified by the indicator of a mismatch (a difference between the maximal value of QI taken from all organizations, and concrete QI of the examined organization). The parameter of variation IC pays off as the attitude of QI of organization to average QI of all examined organizations. For good IC management author recommended to create a rating web portal for VIC research. Comparative IC rating parameters are suitable for extraction of the invisible knowledge of search engines, for example, such popular as Google and Yandex, competitors considering knowledge, both in branch, and in a regional section. They allow revealing at early stages tendencies in development of marketing and administrative strategy of the basic competitors. The comparative analysis of QI rating tables with indexes of the company's competitiveness will promote in revealing problems of knowledge management. VTC allows aggregating and transforming knowledge also in the situational and strategic centers of the analysis not only for top managers and shareholders, but also for all personnel.

Besides information, the concept of quality IC incorporates in itself a set of other quantitative and qualitative characteristics: reliability, timeliness, urgency, the importance, presentation and availability, authoritativeness, etc. They can be displayed as one aggregated indicator of quality and a demand (popularity and authoritativeness) or a rating of citations that is how many time and in what the IR are quoted and refer to the given resource, a web site, a portal, web page etc. Ratings of VIC are modeling information aspects, traces of management, external and internal influences on the organization, and results of the strategy, accepted decisions. The ratings are especially sensitive to behavior of clients, to their visions, moods, preferences and needs. It allows diagnosing at early stage behavior of consumers of services and production.

Many managers, at all seeming simplicity of a question of efficiency of a web site (portal), do not distinguish efficiency concept of IC. For example, quantity of visitors (clicks, links, and users) is identified by quality of a site, by its content or by quality of the organization and its management. The question is enough many-sided and combined. However, it is possible to allocate the typical reasons of mess. First, managers, especially experts in marketing wrongly consider that web resources are tools of the use, which should lead to increase in number of "calls" at a site. However, in conditions of knowledge economy the Internet resources are, first, the tools of the management of knowledge, both the organizations, and clients, shareholders and their attitudes. The IR is source of knowledge and IC.

Virtual IC management is maintenance of total success. The author puts forward a construction problem of measurement system and an estimation of virtual IC model, which provides identification, measurement, and an estimation of qualities of virtual "brain" of the organization, its business in the ratio with "brain" of the market. It is the sensitive and exact tool of early diagnostics for effective integration of IC components, a synergy of creative potential of the human capital that promotes steady movement to the purpose at which risks are minimal. Hence, the concept of virtual IC management is a concept of continuously increase IC by integration of the traditional IC with virtual IC (virtual IC competitors, clients and clients of competitors) for capture new knowledge. The idea of growth IC due to "capture" of a part of global virtual IC networks is an innovation in IC management. It is a model that provides achievement of competitive advantages in network economy. It is offered to measure two asymmetric indicators - qualities and demands of IR, both in "English-speaking", and in "Russian-speaking" virtual business space (in particular, for Russia).

On indicators, there are construction ratings that are ranged for comparison. Further we count more sensitive, generalized universal indicator - IC index (QI). On the interconnected tables of IR quality and demand indicators, VIC and QI managers "see" how much their activity; behavior corresponds to values and expectations of the company and investors. Moreover, it is very important. On tables or balance scorecards is visible the balance of interests of the market (tables 1, 2, and 3). They promote formation in collectives of creative-pragmatically culture; aspiration to achievement of visible results on the purposes, stimulate competition, access and consumption of knowledge, virtual network intelligence - the powerful generator of new knowledge and ideas.

The formula for IC index (QI), created by author for the organizations: $\mathbf{QI^2 = (IR_{Google})^2 + (IR_{Yandex})^2}$**,** where IR_{Google} and IR_{Yandex} - the relative values of the indexes of quality and demand IR, equal according to attitudes $IR_{kGoogle}$ and $IR_{kYandex}$ (indexes of IR popularity and importance = indexes of web citing, calculated by Google.com and Yandex.ru) on maximal values $MaxIR_{Google}$ and $MaxIR_{Yandex}$ for organizations, where k - the name of the organization. The greatest value QI reaches, when the rectangular with the sides equal IR_{Google} and IR_{Yandex} has the form of a square, and the sides are = 1.

More significant QI = more dense "packed" the IC. **Relative index of IC (IQI)** = $2(IR_{Google} + IR_{Yandex}) / IR_{Google} \cdot IR_{Yandex}$. More significant IQI (the attitude of perimeter of rectangular to its area), IC is more uniformly distributed and intellectual resources are more qualitative, and greater success can achieve in conditions of an external and internal competitiveness. For the decision of special tasks, there are offered other IC indicators: continuity, uniformity, overlapping, rhythm and intensity. The innovation in IC management leads to the reduction of time of an estimation and measurement, and to increase of scalability. Use of the software, developed by the author, makes a series of simultaneous calculations which borrow tens seconds.

The offered concept of use of collective intelligence of a network consists of two "hemispheres" – national Russian-speaking and international English-speaking. Managers will prefer the tool, which will give the objective information. Innovations are not limited to methods of IC measurement. The author's offers methods of interpretation of results of measurement and the ways of estimation based on criteria of comparison of reference and actual models of IC indicators. Qualitative information filling of a site depends on IC holder. It not only displays content, but also represents the form. In dialectic knowledge the content, define the form, and the form influences on content**.** The virtual IC is the form of development of the IC in network economy and it is characterized as new, not studied completely, intangible capitalization, a synergy intercultural, social and business relations.

Growth of capitalization of the Internet searching systems evidently testifies to growth virtual IC, tables and thematic catalogues of IR, about demand of services, which they give. For example, net profit Goggle Inc. in the first quarter of 2007 has grown on 69 % in comparison with the similar period in 2006. Such data contain in the financial report of the company. For three months in 2007, 1 billion dollars were earned. Profit of the company was 3.68 dollars for the share that has exceeded expectations of analysts (Rosbizneskonsalting, 20.04.2007).

Operating experience of the developed model for management tasks of the innovative centers, strategic universities, and in research and IC measurement of some commercial organizations in world, Russia and Armenia are testifies to its high degree of utility. Using the tool in the situational and strategic analysis centers, will allow intellectualizing decision making, to save expenses due to unification and standardizations of administrative procedures and technologies. The economy of time and costs at the diagnosis of problems in competitive environments, concentration of resources on the major directions, will provide high efficiency in management, fruitful cooperation of business. You will see examples of measurement in the result tables 1, 2 and 3.

On interrogation UNCTAD are made lists of the countries by the most attractive to the future researches and development for 2005-2009 (www.unctad.org). In our opinion, ratings of competitiveness of economy in the countries in 2007 will come nearer to the received results, so QI allows predicting estimations of ratings of competitiveness. On IC index Russia wins first place (the country has huge potential), and on appeal to the future researches and development - second place, conceding to the Great Britain. The basic conclusions received by means of new model of IC measurement for 2005-2009, coincide with results of interrogations and estimations of experts UNCTAD. Strategically proved policy of innovative development of Russia is attraction of the transnational corporation and increase in their share in development of research and development, creation of own corporations and maintenance of intensive and their advanced IC development, injection of greater means in education by investments into leading strategic universities, growth of investments in managers education, balanced IC development. Studying of results of rating parameters and IC estimations has allowed coming to the following conclusion: QI leaders are **the Great Britain, Norway, Poland, Spain, Russia, Italy, France, Germany, Israel, Estonia, Turkey, Netherlands, and Sweden** (Vahanyan, 2007b).

Ratings of competitiveness of economy of some the countries in 2007 and 2008 will come nearer to the received results, so QI allows predicting estimations of ratings of competitiveness. On IC index Russia wins first place (the country has huge potential), and on appeal to the future researches and development - second place, conceding to the Great Britain. The basic conclusions received by means of new model of IC measurement for 2005-2009, coincide with results of interrogations and estimations of experts UNCTAD. Strategically proved policy of innovative development of Russia is attraction of the transnational corporation and increase in their share in development of research and development, creation of own corporations and maintenance of intensive and their advanced IC development, injection of greater means in education by investments into leading strategic

universities, growth of investments in managers education, balanced IC development. Studying of results of rating parameters and IC estimations has allowed coming to the following conclusions. Transnational Corporation's advance the Russian organizations by QI (VIC) index (see table 1 and table 2); Russian universities lag behind to the Russian large commercial companies (CO). Russian innovation centers lag behind leading Russian universities. European innovation centers network lag behind Russian innovation centers. Average value of QI = 0.68.

Table 1: QI Ratings of the large Russian commercial companies (20.01.2006 - 20.10.2008)

№	Company Name	Rank	QI	Growth	Rank	QI	Growth	Rank	QI	Growth	Rank	QI
		20.10.08			23.05.08			01.10.07			20.01.06	
1	RBkonsalting	1	1.414	=	1	1.414	=	1	1.414	1 ↑	2	1.062
2	Rostelekom	2	0.247	=	2	0.281	4 ↑	6	0.152	2 ↑	8	0.335
3	RAO-UES	3	0.237	=	3	0.270	=	3	0.468	2 ↓	1	1.112
4	Gazprom	4	0.205	=	4	0.224	=	4	0.230	1 ↓	3	0.734
5	Mosenergo	5	0.128	6 ↑	11	0.071	9 ↓	2	0.559	12 ↑	14	0.167
6	Nor.Nickel	6	0.100	=	6	0.128	2 ↑	8	0.128	2 ↓	6	0.399
7	Tatneft	7	0.078	2 ↓	5	0.140	4 ↑	9	0.119	2 ↓	7	0.385
8	KAMAZ	8	0.078	1 ↓	7	0.091	3 ↑	10	0.097	1 ↓	9	0.308
9	Severstal	9	0.077	1 ↓	8	0.080	7 ↑	15	0.067	11 ↓	4	0.501
10	Surg.neftegaz	10	0.068	=	10	0.076	4 ↑	14	0.071	3 ↓	11	0.244
11	MGTS	11	0.061	2 ↓	9	0.077	2 ↓	7	0.143	3 ↑	10	0.293
12	Baltika	12	0.055	2 ↑	14	0.060	2 ↓	12	0.076	=	12	0.231
13	Slavneft	13	0.055	=	13	0.064	2 ↓	11	0.092	2 ↑	13	0.195
14	LUKOIL	14	0.044	2 ↓	12	0.069	7 ↓	5	0.197	=	5	0.428
15	V.B. Dann	15	0.041	=	15	0.055	2 ↓	13	0.073	2 ↑	15	0.167
16	Vimpelkom	16	0.032	=	16	0.050	2 ↑	18	0.015	3 ↑	21	0.005
17	Kaz.hel. fact.	17	0.018	=	17	0.020	1 ↓	16	0.021	2 ↑	18	0.103
18	LOMO	18	0.015	=	18	0.018	1 ↓	17	0.018	=	17	0.111
19	N. ship.comp.	19	0.013	=	19	0.014	=	19	0.014	=	19	0.071
20	P.ship. comp.	20	0.011	=	20	0.012	=	20	0.012	=	20	0.041
21	Elektrosila	21	0.001	=	21	0.001	=	21	0.003	5 ↓	16	0.141
	Aver. value		0.14			0.15			0.19			0.33

Table 2: The list of the organizations, ranged by QI (20.01.2006 - 23.05.2008)

N	Organizations	Number	QI 23.05.2008	QI 01.10.2007	QI 20.01.2006
1	Transnational corporations	30	1.414	1.23	1.414
2	Russian large organizations	21	0.9	1.04	0.99
3	Russian universities	30	0.65	0.68	0.52
4	Russian innovation centers	62	0.38	0.4	0.41
5	European innovation centers network	194	0.057	0.06	0.036
	Average value		0.68	0.682	0.674

It is recommended to carry out an effective cost control of brand and goodwill by method of a comparative estimation of triads: the name of firm, a name of top-manager, and IC index of the organization with the system of combined indicators corresponding with quality and demand on web resources. Results of estimations will allow revealing: adequacy of management models to the CO models, conformity of management models and IC management, conformity of models of qualities of

chiefs and qualities of management, adequacy of strategy, the strategic purposes and tasks to models of IC management and, at last, ability of chiefs to reach results by construction of effective strategy management. Introduction of IC management is expedient for carrying out on stages, in the Russian transnational corporations, then in the CO with high IC, having experience of knowledge management, in the CO using the balanced scorecard (BSC), and in other commercial enterprises. Russian CO is needed to create IC departments.

The examples confirm conclusions of the author and testify the quality of the offered tool of IC measurement for transnational corporations, taking account the world economic crisis situation. Leaders on IC index by 20.01.2006 (table 3) are Microsoft (1.41), Intel (0.4), IBM (0.336), Hitachi (0.307), and Motorola (0.23). Average QI value for 30 transnational corporations = 0.132. Only eight corporations have QI above an average. Leaders on IC index by 20.10.2008 (table 3) are: Microsoft (1.41), Intel (0.758), IBM (0.388), Motorola (0.371), and Nokia (0.185).

Net profit of the one of leading world manufacturers of cellular telephones Motorola Inc. during first six months in 2006 has grown by 27,4 % and has made $2,07 billion in comparison with year earlier - $1,63 billion (http://www.utro.ru/news/2006/07/20/567292.shtml). The sales volume of the company in I half-year 2006 has grown by 26,6 % and reached $20,48 billion. In 2005, this parameter has made $16,18 billion. The operational profit for the accounting period has grown on 30,7% and has reached $2,37 billion in comparison year earlier - $1,81 billion. Net profit Motorola in II quarter 2006 has grown by 48,3 %, having reached $1,38 billion instead of $933 million for April-June, 2005. The sales volume has grown by 29,4% and has reached $10,88 billion. In I quarter 2005 this parameter has made $8,41 billion. The operational profit has grown by 58,9% and from $958 million has reached $1,52 billion. From 2006-2007 average value of IC index has decreased until 0.122 (from 0.132). Eight corporations have QI above an average in 2008.

The profit of Rostelecom (Russia) for the first half-year 2006 has made 2,735 billion ruble, that twice less than a corresponding parameter for the similar period of the last year - 5,661 billion ruble (table 1). For 2006-2008 average value of IC index in Russian large CO has decreased until 0.14 (from 0.33). QI only 4 Russian organizations have QI above an average in 2008. QI decreases at "RAO UES of Russia ", Gazprom, MGTS, Lukoil, and Severstal. Comparison of data on capitalization on 2006 and 2007 and significances of an of the IC index shows, that, as a rule, vectors of change of parameters are identical, moreover, functionally they are corralled. From considered 19 CO at 13 (it is 70 % of all CO) vectors of development of parameters of capitalization and IC index have coincided. Changes of significances of IC index predetermine similar changes on a parameter of capitalization approximately for a year. The similar picture is observed at the analysis of the transnational corporations. Except for Microsoft first ten corporations has lowered QI. However all corporations which were in first ten in 2006 have remained in 2007 in the list of leaders except for Wal-Mart Stores. Motorola, Samsung Electronics, SONY and Siemens have improved rating parameters. Hitachi and Wal-Mart Stores have worsened parameters. Only seven corporations have significant IC index above an average for 2007 while in 2006 they were eight. **8-10 corporations in the world are locomotives of development of the intellectual capital.** The sum of their QI blocks the sum of QI of all other corporations. The Russian leading enterprises in a greater degree depend on external effects and internal factors and are subject to changes to greater dynamics, than foreign. QI "RAO UES of Russia" and Microsoft are essential above "competitors" from the list. However, in conditions of rigid competition, globalization and an openness of economy of knowledge the Russian corporations should force accumulation IC and have more an effective utilization for maintenance of success (Vahanyan, 2007b; Vahanyan and Gaponenko, 2007; Vahanyan, 2008).

2.1 The - QS and ArcaLer (QI) World University rankings 2008- http://www.iatp.am/arcaler_scorecard/index.htm

The Times Higher Education - QS World University Rankings identified these to be the world's top 100 universities in 2008.These institutions represent 20 countries with Israel represented for the first time. Whilst North America dominates with 42 universities, Europe and Asia Pacific are well represented with 36 and 22 respectively. ArcaLer (QI) identified top 103 (the same 100 World & 3 Russian) Universities (table 4). From 103 Universities 37 have QI more than average value (0.163) by 23.10.2008.

Table 3: QI Rating of the transnational corporations (26.05.2006 - 20.10.2008)

№	Company Name	Rank	QI	Growth	Rank	QI	Growth	Rank	QI	Growth	Rank	QI
		20.10.08			23.05.08			01.10.07			26.05.06	
1	Microsoft	1	1.414	=	1	1.414	=	1	1.414	=	1	1.414
2	Intel	2	0.758	=	2	0.798	1 ↑	3	0.366	1 ↓	2	0.40
3	IBM	3	0.388	=	3	0.433	1 ↓	2	0.486	1 ↑	3	0.326
4	Motorola	4	0.371	1 ↑	5	0.177	2 ↑	7	0.161	2 ↓	5	0.23
5	Nokia	5	0.185	1 ↓	4	0.190	=	4	0.209	2 ↑	6	0.188
6	Philips Electronics	6	0.154	1 ↑	7	0.157	1 ↓	6	0.190	3 ↑	9	0.122
7	SONY	7	0.146	1 ↓	6	0.167	1 ↓	5	0.202	3 ↑	8	0.169
8	Wal-Mart Stores	8	0.145	5 ↑	13	0.043	4 ↓	9	0.064	1 ↑	10	0.118
9	Siemens	9	0.107	1 ↓	8	0.137	13 ↑	21	0.019	10 ↓	11	0.108
10	Samsung Electronics	10	0.093	=	10	0.066	1 ↑	11	0.049	4 ↓	7	0.173
11	Hitachi	11	0.054	2 ↓	9	0.068	1 ↓	8	0.079	4 ↓	4	0.307
12	Shell	12	0.052	=	12	0.045	2 ↓	10	0.055	2 ↑	12	0.047
13	Toyota Motor	13	0.047	2 ↓	11	0.056	1 ↑	12	0.049	1 ↑	13	0.047
14	McDonalds	14	0.044	=	14	0.041	1 ↓	13	0.033	1 ↑	14	0.035
15	Nissan	15	0.040	13 ↑	28	0.003	2 ↑	30	0.004	3 ↓	27	0.007
16	Procter & Gamble	16	0.031	2 ↑	18	0.026	4 ↓	14	0.032	4 ↑	18	0.027
17	Pfizer	17	0.028	3 ↑	20	0.023	4 ↓	16	0.027	3 ↑	19	0.027
18	Johnson & Johnson	18	0.024	3 ↑	21	0.019	2 ↓	19	0.024	1 ↑	20	0.023
19	Volkswagen	19	0.023	4 ↓	15	0.033	=	15	0.028	=	15	0.031
20	Renault	20	0.023	4 ↓	16	0.029	1 ↑	17	0.025	1 ↓	16	0.031
21	Peugeot	21	0.022	4 ↓	17	0.027	3 ↑	20	0.024	3 ↓	17	0.029
22	Sharp	22	0.021	3 ↓	19	0.023	1 ↓	18	0.025	3 ↑	21	0.023
23	Nestle	23	0.020	1 ↓	22	0.019	=	22	0.018	=	22	0.017
24	L'Oreal	24	0.018	1 ↓	23	0.016	=	23	0.016	=	23	0.017
25	Mitsubishi	25	0.017	=	25	0.007	2 ↑	27	0.007	3 ↑	30	0.00
26	Philip Morris Int.	26	0.014	3 ↑	29	0.001	4 ↓	25	0.013	1 ↑	26	0.009
27	Pepsi	27	0.013	3 ↓	24	0.010	=	24	0.013	=	24	0.014
28	Philip Morris, USA	28	0.009	2 ↑	30	0.000	4 ↓	26	0.008	1 ↓	25	0.01
29	Olivetti	29	0.005	2 ↓	27	0.005	2 ↑	29	0.006	1 ↓	28	0.006
30	Nissan	30	0.004	4 ↓	26	0.005	2 ↑	28	0.006	1 ↑	29	0.006
	Average value		0.142			0.135			0.122			0.132

QS and ArcaLer Ranks are different (table 4) and by authors conclusion ArcaLer Ranks are more adequate. Two Russian Universities are in the top of 30 universities. Best Europe University of Nottingham Rank = 16 (QI) and = 86 (QS). Only 7 Europe Universities are in the top of 30. Massachusetts Institute of Technology is a leader, QI value = 1.046 and QI Rank = 1, QS 2008 Rank = 9, but QS 2007 Rank = 10. QS 2008 Rank of the Lomonosov Moscow State University = 183, but QS 2007 Rank = 231. Columbia University QI value = 0.566 and QI Rank = 3, QS 2008 Rank = 10, QS 2007 Rank = 11. Princeton University QI value = 0.47 and QI Rank = 4, QS 2008 Rank = 12, QS 2007 Rank = 6. QI value of the Yale University = 0.438 and QI Rank = 5, QS 2008 Rank = 2, QS 2007 Rank = 2.

Table 4: (first 37 Universities) Arcaler QI* (23.10.08) & QS (2008)** Rankings of 100 World & 3 Russian Universities

№	Institution	Country	QI	Rank	QS 2008 Rank	QS 2007 Rank
			23.10.08			
1	Massachusetts Institute of Technology	US	1.046	1	9	10
2	*Lomonosov Moscow State University*	*Russia*	*1.003*	*2*	*183*	*231*
3	Columbia University	US	0.566	3	10	11
4	Princeton University	US	0.47	4	12	6
5	Yale University	US	0.438	5	2	2
6	Stanford University	US	0.421	6	17	19
7	University of Michigan	US	0.354	7	18	38
8	Boston University	US	0.342	8	46	47
9	University of Pittsburgh	US	0.31	9	97	77
10	University of Washington	US	0.301	10	59	55
11	University of California, Berkeley	US	0.284	11	36	22
12	Harvard University	US	0.269	12	1	1
13	*Saint - Petersburg State University*	*Russia*	*0.267*	*13*	-	-
14	Dartmouth College	US	0.265	14	54	48
15	University of Texas at Austin	US	0.261	15	70	51
16	University of Nottingham	UK	0.252	16	86	70
17	University of Queensland	Australia	0.251	17	43	33
18	University of Minnesota	US	0.24	18	87	142
19	University of Geneva	Switzerland	0.239	19	68	105
20	Brown University	US	0.220	20	27	32
21	Duke University	US	0.218	21	13	13
22	Purdue University	US	0.212	22	99	77
23	University of Warwick	UK	0.21	23	69	57
24	Lund University	Sweden	0.202	24	88	106
25	University College London	UK	0.195	25	7	9
26	Carnegie Mellon University	US	0.191	26	21	20
27	New York University	US	0.188	27	40	49
28	McGill University	Canada	0.186	28	20	12
29	Cornell University	US	0.186	29	15	20
30	University of California, Los Angeles	US	0.185	30	30	41
31	Chinese University of Hong Kong	Hong Kong	0.184	31	42	38
32	*The Moscow State Institute of International Relations*	*Russia*	*0.181*	*32*	-	-
33	University of Virginia	US	0.181	33	96	110
34	University of Wisconsin-Madison	US	0.179	34	55	55
35	University of Cambridge	UK	0.178	35	3	2
36	University of Toronto	Canada	0.173	36	41	45
37	University of Pennsylvania	US	0.165	37	11	14
	Average value		0.163			

*QI - index of the virtual intellectual capital (ArcaLer) ** Source: http://www.topuniversities.com, http://www.timeshighereducation.co.uk

3. Conclusions

The offered tool provides adequate measurement, identification and an estimation of IC components. This instrument enables the organizations to increase IC, using virtual intellectual capital, improve quality of IC management, and design effective strategy. It expands creative potential of top-management, personnel, visualizes advantages and lacks of competitors, allows operatively, in a mode of real time and on -line to receive new knowledge. Obtained data are interpreted in accessible language. By redistribution IC it is possible to achieve the decisive superiority on the certain directions of business above the basic competitors and to provide success in a global competitiveness.

VTC are a key of creation of values and transformations of new knowledge. The knowledge received from network is qualitatively more valuable as consider knowledge of clients of the competitors, their suppliers and investors, and e-business community. Synergy effect from strengthening and growing knowledge during creation of an added value is difficult for overestimating. The estimation of IR of competitors promotes understanding of advantages and lacks IR, to the occurrence of new ideas. VTC helps to search new technologies and values, stimulates the creative approach to work, causes aspiration and taste to innovations, and creates conditions for fast development and introduction of new culture of thinking.

IC management on the base of VTC identifies orders of the knowledge, data, experience, ideas and intellectual assets from the global network. It builds them in the strict, logically interconnected structure in the form of strategic balanced scorecards or maps of indicators. VTC is interactive and invariant. It has allowed defining the facts of market redistribution of IC and its concentration in leading corporations in the world.

VTC helps clients organizations (companies, universities) assess how they compare with others in their ability to compete in the global knowledge economy. It can develop a framework that clients can use as the basis for their transition to a network economy; illustrate the rapid progress in IC management that can be made. In the future the VTC research and development is planning to use with K4D (the World Bank Institute's Knowledge for Development Program) for innovation IC measurement for countries and regions to better understanding strengths and weaknesses, as well as the strengths and weaknesses of actual and potential competitors. Countries, TNC, profit and non-profit organizations, Universities need a simple and the same IC tool for IC management and must then articulate their goals and develop policies and investments to achieve them.

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Using Scenarios to Explore the Potential for Shifts in the Relative Priority of Human, Structural and Relational Capital in Generating Value

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Abstract: Collaborative research over a two year period involving eighteen knowledge management practitioners and a team of academics explored the evolution of a next generation knowledge management agenda. Three scenarios were developed that explored the implications of two dimensions: firstly the underpinning organisational purpose in relation to the factors of production in both an industrial and a knowledge economy paradigm, and secondly the consequences of a predominantly transactional or relational psychological contract between individuals and organisations. By studying the drivers shaping the dynamic evolution of each scenario, we identified that organisations need to pay different levels of attention to the components of structural, human and relational capital in order to optimise value generation in each scenario.

The first scenario looks at the natural evolution of the industrial economy paradigm as the pace of change accelerates and the expansion of the competitive environment increases the need for product innovation. The stimulus for this innovation is the quality and motivation of the people employed. Human capital management is the main lever to optimise organisational performance in this scenario. The next two scenarios look at organisations operating in the knowledge economy paradigm. One considers the consequences of continuing with the conventional psychological contract with employees based on a transactional exchange of money for time. A large investment is needed in the structural capital mechanisms to manage the organisational ownership of knowledge and to monitor and stimulate performance in delivering knowledge-based services. In the other scenario, the focus shifted to a situation where individuals and organisations negotiate common areas of interest before becoming involved together in something approaching a partnership. Learning and competitive agility emerge from networks of individuals and groups coalescing around shared objectives. Relationship capital becomes the basis of value generation.

Keywords: Knowledge management, scenarios, intellectual capital, knowledge economy, psychological contract

1. Introduction

Organisations first started to focus on knowledge as a crucial resource around twenty years ago (Barney 1986, Dierickx and Cool 1989). Managing knowledge as a field of business practice evolved within Industrial Economy mindsets. Yet the economics of knowledge resources are fundamentally different from those of tangible resources where asset ownership confers power by controlling supply and demand (Toffler 1990, Grant 2002, Spender 2002, von Krogh and Grand 2002). Although knowledge supply is virtually infinite, ownership is never exclusive.

As a result of a period of intense social, political and technological changes in recent years, organisations now need to relate more proactively and constructively to stakeholders outside the boundaries of the firm. This requires more than pushing knowledge from the organisation to the outside world (Tapscott and Williams 2006), rather organisations need to engage in meaningful dialogue about areas of mutual interest with customers, suppliers, partners and competitors. Learning, collaboration and innovation through participation in a multifaceted “Value Universe” (Allee 2000, Carillo 2006) have become key drivers of performance. In an intensely interconnected world, an organisation’s ability to satisfy the values of its stakeholders affects its reputation, and reputation is an attractor for the critical knowledge relationships an organisation increasingly requires. There are new challenges for organisations heavily reliant on intangible resources for value generation and with potentially conflicting needs of diverse stakeholders.

The research presented in this paper was undertaken to explore the proposition that to adapt successfully to the changing world, organisations, individuals and societies must transform the way they manage knowledge. This has implications for the priorities of knowledge managers responsible for developing and sustaining intellectual capital.

2. The shifting role of intellectual capital

In the industrial economy, capital in the form of money is the basis for acquiring the key inputs of physical materials. The outputs are goods and increasing wealth. Efficient production, with minimum waste of limited resources, has been assumed to be a major economic contribution of the firm to society. As we move into an economy where knowledge is a more significant factor of production (Grant 2002, Burton-Jones 1999), key inputs are intangible (digital resources, technological knowledge, brands, reputation) and valued outputs include stand alone services, or services that amplify the worth of tangible goods. Recognising the influence of diverse stakeholders requires the definition of worth to evolve from a purely monetary basis to include societal contribution in a broader sense (Andriessen 2003). The balanced scorecard (Kaplan and Norton 1992) has become a widely accepted method for taking a broad perspective on organizational performance to support better decision-making.

With the evolution of the knowledge economy, the intangible assets of the firm (in particular its intellectual capital) now account for a significant proportion of stock market valuations, though the perception of potential return on assets is fragile and the valuations are vulnerable to rapid fluctuations. A variety of approaches has emerged to value intellectual capital, ranging from those which try to place financial valuations on either specific components or on their overall contribution to the perceived value of the company, to scorecard methods which allow trends to be monitored without necessarily attempting exact financial calculations. Scorecard methods provide the basis for monitoring current performance and learning to adapt for the future, as well as communicating with external stakeholders (Sveiby 2001b). Examples of scorecards include the Skandia Navigator™ (Edvinsson 1997) and the Intangible Assets Monitor (Sveiby 1997).

The authors of scorecards define the components of intellectual capital in subtly different ways, though the three core components are consistently human capital, structural and relational capital. The definitions adopted in this paper are slight modifications of those used by Sveiby (2002). The term human capital encompasses all the employees of, and individuals available to work for, the organization. This defines knowledge workers in very broad terms and recognises the potential contribution from employees with a variety of forms of practical and intellectual expertise, as well as a variety of forms of contractual relationships. We also extend relational capital to encompass all the external players in the industry (customers, suppliers, strategic partners, key members of the industry, regulators etc.). This is in line with thinking about the extent of an organization's "value net" (Allee 2000, Nalebuff and Brandenburger 1997). The term structural capital describes the systems, processes, culture and other mechanisms for capturing and coordinating the knowledge available within the formal boundaries of the organization.

First generation knowledge management focussed on attempting to capture in IT systems. This effectively viewed the purpose of knowledge management as the conversion of human capital to structural capital and was based on the metaphors and assumptions of proprietary ownership derived from the industrial economy. Second generation knowledge management acknowledged the greater value of tacit knowledge so shifted priorities to improving the flow of knowledge to the point of need and learning the lessons from the past (Sveiby 2001a). Thus knowledge management priorities encompassed a more dynamic balance between human and structural capital components. Third generation knowledge management (McKenzie et al. 2007a) is evolving to incorporate the full potential of the organisation's network of external connections, placing ever more emphasis on integrating relational capital in new and creative ways to enhance human and structural capital.

If organisations are to adopt a post-industrial philosophy and adapt to the demands of knowledge economy, then it is worth considering how they might get from where they are now to this more integrated position. Exploring possible ways the future might unfold and the implications for how third generation knowledge management could evolve is the subject of the research described in this paper.

3. Research method

Scenario planning is one way to explore possible futures (Shwartz 1991). To this end, the Henley Knowledge Management Forum conducted an interactive collaborative research study (van Winkelen and Truch 2002) to explore the scope and shape of third generation KM activity. The project drew on the expertise of twenty individuals, working together in a community of inquiry (van Winkelen et al.

2008). Two core researchers and 18 senior KM practitioners from a wide variety of large private and public sector organisations participated in ten half-day workshops between September 2006 and May 2008. They followed a structured process, guided by the academics and informed by expert input at key stages. These workshops focused on understanding the forces shaping future scenarios (Shwartz 1991). Project members conducted a macro-environmental analysis (Fahey and Narayanan 1986) then constructed three coherent scenarios using a process of appreciative inquiry (Cooperrider and Srivastva 1987) enhanced by visual and artistic stimuli. Literature sources were then used to develop understanding of the issues identified through the scenario planning process, to look for examples of how these are currently enacted and to relate them to trend studies carried out elsewhere.

4. The interface between individual and organisation affects knowledge value generation

Several recurring themes emerged from an initial macro-environmental analysis. Primarily, these revolved around tensions between individual motivations to share knowledge and the organisational orientation towards its use. Organisations create structural capital to manage human capital. Business purpose and the collective assumptions and metaphors shape that organising process (Morgan 1997). Whether the collective mindset is rooted in an industrial economy model or a knowledge economy model of priorities shapes the way the psychological contract between the organisation and individuals plays out. Knowledge is created by individuals and changes constantly through the process of interpersonal negotiation (Blackler 1995). To fulfil its purpose, a firm needs to coordinate and integrate this human capital, which is optimised when knowledgeable individuals share what they know willingly. Knowledge workers' willingness to contribute to organisational activity with care and attention (van Winkelen 2006) tends to be grounded in priorities associated with self-actualisation/personal fulfilment, having choices in their work life balance, and belonging to something they find meaningful and with which they can be proud to be associated (Drucker 1999, Davenport 2005). Scenario planning starts with the identification of two intersecting and polarised forces that fundamentally affect future outcomes. As the foundation for our scenarios we identified these key parameters as the interface between the metaphorical assumptions underpinning organisational meaning and purpose in both industrial and knowledge economics, and the alternative ways individuals relate to the organisation based on the fundamental priorities in the psychological contract – either engagement with something the individual believes in or employment as a transactional relationship. The timescale we considered was "medium- to long-term", likely to be ten to fifteen years from now. Three viable scenarios emerged from our scenario planning process, identified by the names in italics in the centre of Figure 1.

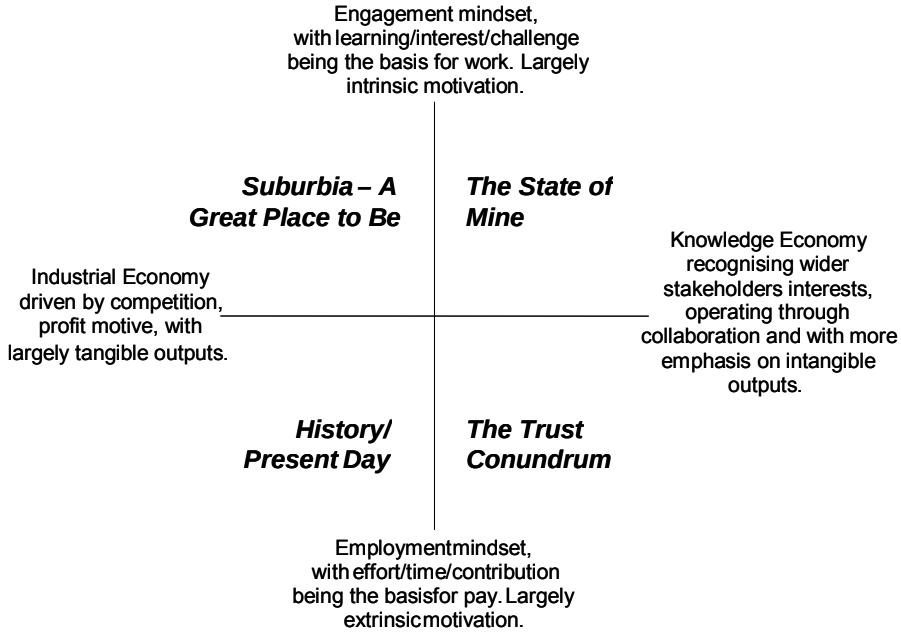

Figure 1: Potential boundaries for future scenarios

The workshop process identified the underlying assumptions in each of the different scenarios and some of these are shown in Table 1.

Table 1: Assumptions Shaping each Quadrant

Consideration	Historical and present day position	Suburbia – A great place to be	The Trust Conundrum	The State of Mine
Underpinning assumption of value creation	Industrial economy (Profit motive for capitalist wealth)	Industrial economy (Profit motive for improving societal wealth)	Knowledge economy (Differentiated value for societal stakeholder groups)	Knowledge economy (Value for individual societal stakeholders)
Transaction approach	Employment	Engagement	Employment	Engagement
Primary factor of production	Tangible goods and capital	Tangible goods and capital	Intangibles	Intangibles
Knowledge Purpose	The efficient co-ordination of goods and activities to maximise rents. Knowledge considered a subsidiary contributor to performance.	Product innovation - To amplify the utility of tangible products through the addition of knowledge in order to grow the wealth of society.	The co-ordination and integration of knowledge to satisfy broad stakeholder interests steadily and responsibly through organisational control.	Process innovation - To use knowledge to improve the quality of life fulfilment/ happiness for everyone involved.

5. Managing intellectual capital components in each scenario

5.1 Suburbia: A great place to be

The first scenario, *Suburbia: A great place to be*, looks at the natural evolution of the industrial economy paradigm as the pace of change accelerates and the expansion of the competitive environment geographically and technologically increases the pressure for product innovation and service differentiation. The stimulus for this innovation is the quality and motivation of the people employed. Talented individuals contribute creatively when they feel they belong to something that matters, joining the organisation because of its reputation for interesting work and good employment conditions. Human capital management is the main lever to optimise organisational performance, while structural capital investments are needed to integrate knowledge effectively and efficiently.

In this scenario, the organisation is driven predominantly by the profit motive, although shareholder value is perhaps a richer measure. Results are achieved by the efficient delivery of a product (though not necessarily a physical product). Efficient production of repeatable units is the basis for value creation with continued reliance on industrial command and control techniques. Predetermined output and quality targets are used as a primary driver of employee performance. However, increasingly creativity and innovation are essential to respond to the pace of change, for example, in marketing and new product design.

Various manufacturers and construction companies (see for example Benetton (Camuffo et al. 2001), Toyota (Forster 2006), and aircraft construction (Brusoni et al. 2001)) appear to be early examples of operation in this scenario.

To excel in this scenario, organisations require different human resources management approaches for different employee groups. This could manifest itself in different types of employee contract, or through significant outsourcing or insourcing (Kang et al. 2007). It is critical to find appropriate ways to incentivise high quality contributions from the people associated with the organisation. Organisations need to develop a reputation for good employment terms and conditions since skilled and creative people can choose where to work.

There are two key aspects to co-ordinating the knowledge available to the organisation in this scenario.

- Modularisation of the organisation delivery process (Mankin and Cohen 2006, Felin and Hesterley 2007, Sawhney and Prendelli 2000) using the knowledge of smaller groups of motivated people.
- Very strong knowledge integration skills, with enough comprehension of all the diverse expertise to consistently interpret and facilitate communication at the interfaces between specialisms (Gnyawali and Madhavan 2001).

A tension between the drive for profit and maintaining the engagement of employees dominates this scenario. Leadership and sophisticated HR practices are important to resolve this tension – moving human capital management the highest priority. Structural capital investments in systems and processes to encourage collaborative working and communities of practice support knowledge integration.

5.2 The trust conundrum

This scenario highlights the consequences of maintaining the conventional psychological contract between employees and organisations based on a transactional exchange of money for time, whilst placing an increasing emphasis on knowledge as a key economic factor. Effectively, this scenario describes the uncomfortable situation of becoming a knowledge-based operation, whilst failing to engage with employees as true knowledge workers (Drucker 1999, Davenport 2005). The organisation remains possessive about knowledge, viewing it either as a strategic differentiator or as a risk to be managed, whilst simultaneously expecting to foster a climate of individual knowledge sharing and commitment amongst those who really possess it. It was evident that this tension leads to an orientation towards measurement as the basis for encouraging and tracking relevant behaviours and performance. A large investment is needed in the structural capital mechanisms to manage the organisational ownership of knowledge and to monitor and stimulate performance in delivering knowledge-based services (Marr 2006).

Corporate responsibility for results dominates the management philosophy, even though the organisation nominally encourages employees to take responsibility for their own performance (Brook and Ober 2003). The legacy of a transactional approach to employment relationships prioritises control and efficiency as core business values. This makes it hard to trust that opportunistic, intrinsic motivation for knowledge work will deliver results. So the firm is compelled to manage through intensive measurement and to collect extensive amounts of data to support decisions.

Alongside this, there is an increasing need to invest in building relationship capital to understand the expectations of diverse external stakeholders and find new ways of operating within a network of knowledge based relationships (Adler 2002). The external need to engage with relevant and committed stakeholders (e.g. staff, communities in which people operate, alliance partners, suppliers and customers) forces clarity around governance and values.

This scenario appears to particularly describe the public sector organisations increasingly developing knowledge based service delivery. There are two key aspects to co-ordinating the knowledge available to the organisation in this scenario.

- A more comprehensive approach to tracking knowledge value against a broader range of outcome measures to satisfy the variety of stakeholders (Edvinsson 2002). This requires a modification of processes, roles and performance targets (e.g. time and resource allocations) to collect and interpret a wider range of data.
- Improving internal communication as a key co-ordinating mechanism to attempt to motivate transactionally employed individuals and help them understand and appreciate complex external drivers shaping the organisation's activities. Communicating values consistently and thoroughly by 'walking the talk' is challenging but critical to engendering trust. Demonstrating respect for the balanced objectives has to be authentic in all the company's actions, otherwise the trust necessary for knowledge sharing by individuals becomes unsustainable.

The inherent tension in this scenario is between authority vested in the hierarchy of the organisation to deliver performance and the trust required for individual knowledge sharing. Structural capital investments to ensure scrupulous fairness and extensive and open communication become the basis for resolving this tension.

5.3 The State of Mine

In the second scenario in which knowledge is the significant factor of production, the dynamics change to a situation where individuals, groups and organisations negotiate common areas of interest before becoming involved together in something approaching a partnership. Learning and competitive agility emerge from networks of individuals and groups coalescing around shared objectives. Relationship capital becomes the basis of value generation, while light touch structural capital creates coherence and identity.

Within this scenario, both the individual's and the organisation's wider responsibilities to other activities and society are fully acknowledged, with a wide variety of work arrangements and reporting mechanisms being available to support this. Many individuals work on a portfolio of tasks and for more than one organisation, depending on their personal skills, motivations and life goals (Handy 2001). The organisation is continuously morphing, varying its purpose and the knowledge resources it uses to satisfy the value needs of society and the individuals or small groups it works with (Rindova and Kotha 2001). Relationship management in terms of negotiating roles to get the best value from those involved with the organisation is a key organisational capability in this scenario. The boundary of the definitions of human capital and relational capital becomes increasingly blurred due to the variety of employment and partnership arrangements.

Organisational boundaries are considerably more fuzzy, with self-employed people, small firms and collaborative partnerships all working together as a network. Effort is co-ordinated through mutual enthusiasm for the purpose and mission of the organisation as well as the task at hand (Brafman and Beckstrom 2006). Shared principles and values about how to work together to achieve outcomes are negotiated in advance and form the basis for collective endeavour. Successful organisations are those which innovate to give greater freedom of choice to many people (Chesborough 2006). They achieve this because they have a profound knowledge of how to facilitate the integration of ideas and knowledge across their network.

Organisations that may be moving towards the *State of Mine* scenario include film sets (Bechky 2006) and essentially knowledge based businesses such as Yahoo, Google, Visa and American Express (Forster 2006).

A key aspect to co-ordinating the knowledge available to the organisation in this scenario is recognising that a distributed and flexible workforce needs to use collaborative technologies to support effective knowledge flows. Automating information and explicit knowledge sharing through technologically based structural capital investments is essential. Tacit knowledge is what individuals and groups bring to the organisation and need to share to generate value together and advanced technologies need to be used to make virtual inter-personal connections as real as possible.

In this scenario, a key source of tension lies in the identification of “the organisation.” A coherent identity is difficult to maintain with fluid and flexible boundaries and patterns of relationships. Yet, long term close relationships are known to be the basis for more effective knowledge sharing, particularly tacit knowledge sharing (McKenzie and Van Winkelen 2004). Developing a coherent identity for the organisation based on clearly articulated values means giving time and attention to the ongoing negotiation of interests, roles and responsibilities. This requires sophisticated inter-personal and thinking skills (McKenzie et al. 2007b).

6. Conclusion

Each of the scenarios represents a fairly idealised extreme based on the value assumptions underpinning the transactions between individuals, organisations, business and society. Clearly it is not possible to change one factor wholly independently of another. For example, the move to greater measurement of intellectual capital resources in *The Trust Conundrum* would demand at a reasonable level of staff engagement to make it work. What really differentiates ‘journeys’ towards the future via these scenarios is how steep the trajectory is across the scenario grid, from the bottom left to the top right in Figure 1. A steeper climb (via *Suburbia: A Great Place to Be*) holds to today’s business model, focussing on efforts to engage the attention and creativity of knowledge workers. A shallower slope (via *The Trust Conundrum*) allows lesser emphasis on new relationships with staff as knowledge workers until the structures and rules of the business are modified to support more open exploration of new opportunities.

This research started with the intention of stimulating thoughts about the future of knowledge management. What emerged is a picture of the future that challenges the purpose of business and the process of organising, with knowledge being harnessed for gains that are valued by a wider range of organisational stakeholders. No scenario is right or wrong – or even desirable or undesirable. All have the potential to succeed or fail in their own terms and in the market, depending on the quality of the execution. There are clear indications that different sectors are already moving along paths associated with each scenario. Manufacturing, construction and other industries associated with physical products are tending towards "*Suburbia – A Great Place to Be*". Public sector bodies seem to be on a path through "*The Trust Conundrum*". A few dynamic, fast moving, creative and service driven industries are experimenting in "*The State of Mine*". Understanding the competitive and macro-environmental drivers shaping the organisation's path is the starting point for any knowledge strategy. This research relates this understanding to prioritising investments choices in establishing and sustaining appropriate human, structural and relational capital appropriate for the future.

These scenarios were developed before the recent global economic turmoil began to unfold. The research immediately following the development of the scenarios concentrated on understanding more about some of the drivers (for example, how to work more collaboratively internally and externally). It would now be interesting to observe the extent to which the evolution of these scenarios is affected by the new financial constraints and priorities. Continuing to track macro-environmental trends and relate them to the scenarios needs to be an ongoing activity.

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Intellectual Capital Research in Romania: The Case of Developing a University Research Centre

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Abstract: The paper presents the case of developing the *Research Centre for Intellectual Capital*, within the Academy of Economic Studies, Bucharest. This Centre has been started immediately after our participation to the IC Congress 3-4 May 2007, organized by the Research Centre for Intellectual Capital, INHOLLAND University, Amsterdam, taking as a model the work pioneered by Professor Daniel Andriessen. We summarize its process of formation, considering its premises, its promoting factors, as well as the inertial forces which had to be overcome. Further on, we discuss the realism of its mission, based on the analysis of its internal and external environment, and list the main challenges for the centre, in a short-term, and in a long-term perspective, while advancing strategies to react to these challenges. Specific issues concerning Romanian university management and research management are outlined, in order for the audience to better understand the opportunities and limitations the centre is subject to. An evaluation of the present state and future scenarios of evolution constitutes the main outcome of this study, which raises an issue of interest for Romanian research in universities, in the broad sense, as well as for researchers focused on intellectual capital, in the narrow sense. Our conclusions serve as a base for comparison with other similar research centres in the world, by checking the relevance of our problems and solutions against reports from other peers engaged in the same kind of research. The situation of our centre, as presented in the paper, is illustrative for the positioning of a new field of study in the research context of Romanian universities, and may lead to a rethinking of the premises on which research is projected and supported. The importance of our presentation for the intended audience resides in the novelty of the research centre, in a country with an emergent economy, whose industry and academia discover, these days, the realm of intellectual capital. The case of this research centre is significant for the intangibles' revolution, in a society, the university included, still reluctant to the principles of this post-tangible era.

Keywords: Intellectual capital, research centre, Romanian university

1. Intellectual capital research in Romania

The intellectual capital for the Romanian emergent economy is like a paradox: on one hand, as an emergent economy we strongly need to develop our intellectual capital research; on the other hand, the proletarian mentality acts as an entry barrier for those who promote research in this new field. Thus, our contribution to the field is still at its beginnings. Several papers were published in peer-reviewed journals or presented at international conferences in the past few years (Bratianu, 2004, 2005, 2006, 2007, 2008; Bratianu, Jianu, Vasilache, 2006; Jianu, Vasilache, 2006; Jianu, 2007; Prejmerean, Vasilache, 2007, 2008), and several PhD theses in intellectual capital or in complementary fields are in working progress, creating the image of a research group preoccupied by these topics. Bratianu, Jianu, Vasilache (2006) introduced the concept of integrators of intellectual capital, in a dynamic perspective, a concept which needs further refinement, in order to be turned into an alternative model of intellectual capital.

Some recent national research projects of the aforementioned team are dedicated to the empirical testing of these theoretical concepts. In order to sustain the development of these incipient researches and to ensure their international visibility, we took the decision, in 2007, to create, taking the model of professor Andriessen's research centre at the INHOLLAND University, The Research Centre for Intellectual Capital, lead by professor Constantin Bratianu, in the Academy of Economic Studies, Bucharest. In order to understand the positioning of this centre, and its organizational particularities, we present a short overview of research management in the Academy of Economic Studies, Bucharest.

2. Research management in the Academy of Economic Studies

Formally, research in the Romanian universities is organized similarly to the Western European universities, by centres and departments. However, there are some differences. For instance, research and teaching, in Romanian universities, do not have separate management bodies, according to their specific. Research centres are, actually, affiliated to faculties (schools), and they only report, annually, to the university research department their achievements, and delegate to the department the right to represent them in national and international project competitions, and to

supervise the periodic evaluation of the projects progress. The research department is subordinated to the vice-rector responsible for research activities, but there is no such a thing as a board for research, like in most European universities. At the faculty level, one of the vice-deans is responsible for research. Still, the position of the heads of the research centres is not clearly outlined in the university hierarchy. Usually, they are heads of chairs, deans, or vice-deans. Because teaching and research activities are performed by the same faculty members, most of the research centres, in the Academy of Economic Studies, exist only virtually, as structures of the chairs which take over the research activity, the team of the centre being, usually, the team of the chair, and the location of the centre being the location of the chair. As centres do not benefit of adequate spaces and infrastructure of their own, the sense of belonging is diminished, and the equipments of the centre, acquired by research grants, that is, by certain teams, are in the "public domain", and can be used by any of the faculty staff as in socialism.

This mixture of teaching and research activities and the indistinguishable managerial responsibilities between research directors and departments heads are clear barriers in developing a healthy and efficient research core competence to contribute substantially to the competitive advantage of the university. The reason for this ambiguity is due to the inertial force of the academic management (i.e. deans, vice-deans, heads of departments) and to resistance in developing research leadership. Several problems emerge from these organizational particularities.

The most important is the financial and legal dependence of the research centres on the university. The centre can not attract other funds than those allocated from the projects in which the university is involved, can not issue any documents in its name, can not make acquisitions, or participate as a legal entity in project competitions. Because of the strong identification which exists between the centres and the teaching departments in the university, there is the risk that faculty members teaching in a certain department will automatically choose to belong to the corresponding research centre, which limits interdisciplinary and collaborative work. Faculty members who prefer teaching to research have, still, to be members of a research centre, which leads, often, to a lack of involvement in the activities of the centre. Because the centre is not independent from the university, which means zero external autonomy and a very low internal autonomy, it can not hire external collaborators, members of European universities or independent investigators. Additionally, the fact that the budget of the centre is controlled by the university limits the flexibility in acquisitions, which have to be made by the lengthy and rigid in choices procedure of the public auction.

The bureaucratic procedures, whose dimension is given by an average of five signatures on each document regarding activities of the research centre (acquisitions, reimbursement of conference fees for the members, membership fees for various associations that the research fellows may join, subscriptions to journals, research visits, etc.), and the corresponding waiting and wasting time, add to these difficulties in properly managing research in a research centre. In the remainder of this paper we outline, the way our centre addressed these problems.

3. The Research Centre for Intellectual Capital

The *Research Centre for Intellectual Capital*, founded in 2007, sets as its mission knowledge generation through basic and applied research, technological development and innovation in the field of intellectual capital, knowledge to be disseminated by publications, courses and conferences. The centre promotes, as its core processes, inter-disciplinarily approaches, international cooperation and scientific production. This centre belongs, formally, to the *Chair UNESCO for Business Administration*, but it seeks to reunite all researchers from the Academy of Economic Studies interested in the field. The head of this Chair is in the same time the director of the research centre. The centre seeks to obtain international visibility, by creating the premises for outstanding doctoral research and the stimulating atmosphere for performing high level academic and public-private research. The centre holds as research priorities the following domains: organizational intellectual capital, strategic management, knowledge management, organizational learning, organizational intelligence, all connected with the requirements of a knowledge economy, as set on the Lisbon Agenda.
The structure of the centre is presented below:

- **Director:** Professor Constantin Bratianu, PhD
- **Director's assistant:** Assist. Simona Vasilache

Members: Professor Nicolae Al. Pop, PhD

Assistant Professor Mihaela Prejmerean, PhD
Assistant Professor Adriana Agapie, PhD
Assistant Professor Alexandru Agapie, PhD
Assist. Ionela Jianu
Assist. Anca Mândruleanu
Assist Corina Pelau

The members of the centre, which undergoes a process of rapid expansion, are divided into two teams: professor Bratianu's team (Simona Vasilache, Ionela Jianu, Anca Mândruleanu), committed to intellectual capital measurement issues, organizational intelligence, scorecards for intangible assets, and professor Pop's team (Mihaela Prejmerean, Adriana Agapie, Alexandru Agapie, Corina Pelau), committed to relational capital research, data mining, algorithmic models of customer relationship management. In this way, by attracting researchers from business administration, marketing, and applied mathematics, our centre meets its collaborative desiderate. Our projects are also open to a wider group of researchers, from statistics and management departments, who are collaborators of the team members. Also, we participate in curriculum modules and full courses of Knowledge Management and Innovation Management at the master and doctoral levels.

We present, in the following, results of a SWOT analysis we performed for the *Research Centre for Intellectual Capital*:

Table 1: SWOT analysis of the Research Centre for Intellectual Capital

STRENGHTS	WEAKNESSES
visionary leadership an inspiring mission statement; young, dynamic team, with growth potential; international visibility of the experienced researchers in the centre; involvement in six on-going national projects, and in one international, FP 7, project; internal recognition in the university; good correlation with the university curriculum, having a course in Knowledge Management at the master level; papers accepted and presented at some important international conferences; direct involvement in editing an international journal on Management & Marketing, with a strong emphasis on Intellectual capital; direct involvement in organizing an annual international conference on business excellence, with a dedicated workshop on learning organizations; integration of teaching and research since professor Nicolae Al. Pop is the dean of the Faculty of Business Administration, and professor Constantin Bratianu is head of the Chair UNESCO for Business Administration.	not enough national and international recognition, due to its newness; low managerial decision power due to the university research management structure and traditions; working in a bureaucratic system; not having a good web page yet, independent of that of the faculty; not enough financial power to enlarge our international participation to conferences dedicated to this field of research;
OPPORTUNITIES	**THREATS**
European projects; new frameworks for research; the possibility to get accredited by the National Research Council, which creates better awareness; collaboration with similar research centres, at national and international levels; involvement of undergraduate and post-graduate students in the centre's activities; good cooperation with the Research Centre for Intellectual Capital, INHolland University, Amsterdam, The Netherlands; international conferences on Intellectual Capital and Knowledge Management.	the attractiveness of the topic, which makes researchers without any tradition in the field to claim rights in this domain, and to mystify its concepts and methods; the economic crisis which is propagated from USA to Europe.

Considering the above SWOT analysis, we outline the significant opportunities existing for this centre at both national and international level, opportunities which can be turned into feasible projects, considering the centre's notable experience and notoriety, as related to its age. The best strategy for the centre is to develop as to reach its maximum potential, observing the limitations of the legal and

financial frameworks of the university which, for the time being, it can do nothing to remove. Also, the centre is trying to enter to some research international networks.

4. Conclusions

The mission of the *Research Centre for Intellectual Capital* is realistic, considering its background in promoting quality research initiatives among its members, and the constructing of a stimulating environment for collaborative, networked research. The strategic directions proposed are well-tailored, taking into account the opportunities available for the centre. Still, the centre should consolidate its awareness in the field, by cooperating with similar European and national centres, so that it minimizes the threat of other specialists annexing this domain, as a side line of their main research topics. The competitive advantage obtained so far on the Romanian market should be developed further to increase its sustainability. Also, developing a broad view networking at the global level, this centre can become a real knowledge generator and transformer for the Central and Eastern European countries.

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Linking Business and Competitive Intelligence with Intellectual Capital – How Could BCI Contribute to ICM?

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Abstract: Intangible assets are increasingly emphasized as important means of gaining competitive advantage. In addition of managing and developing intellectual capital (IC), e.g. intellectual properties and human capital, organizations are increasingly using information and knowledge to rise to the challenges caused by changing business environment. The markets are turning global and changes occur faster than before and demand quicker response. Business and competitive intelligence (BCI) is one of the means that organizations utilize to overcome these challenges. BCI refers to a process aimed to support organization's decision-making by providing information essential for its operations as well as for forming and executing its strategy. By utilizing a BCI process an organization refines raw data into information and actionable knowledge.

BCI and intellectual capital management (ICM) seem to have many things in common. They both aim to enhance business performance by creating value from intangibles, BCI by enabling better informed decisions and ICM as better developing and utilizing various kinds of intangible assets. BCI can also be seen as a part of organization's IC, since it both uses and produces intangible assets aiming to create value from them for the organization. Since BCI seems to intersect IC and ICM in many points, could there be some synergy found by examining these research themes together?

This conceptual paper discusses the linkage between BCI and IC and discusses how BCI could contribute to ICM. The paper consists of the following sections: First, BCI is defined in the context of this paper. Second, BCI is examined as a part of IC by classifying its components according to a general tripartite IC classification. Third, BCI's possible contributions to ICM are contemplated.

As a conclusion, the paper suggests that BCI creates and increases organization's IC and acts as an ICM tool. The BCI process uses organization's IC as an additional input with information acquired from external sources, combines them, shares them within the organization and thus creates and accumulates organization's IC. At the same time BCI also enables knowledge accumulation and this way develops HC: BCI increases the amount and quality of information and knowledge available for employees, thus improving the accumulating of their knowledge and thus, develops HC. Including employees in BCI process also turns HC into SC: when employees' tacit knowledge is combined with other information and documented in explicit form, it is simultaneously turned into SC, thus becoming and organizational asset. BCI also provides the organization a clearer view and understanding about its business environment, and this can be seen as developing RC. Hence, BCI can be seen as an ICM tool that seems to have most contribution in turning HC into SC and developing RC.

However, as a discipline BCI seems to be somewhat apart from the IC field, even though there are a lot of similarities in the scope of academic and managerial activities within the two fields. It seems possible that cross-disciplinary research efforts could provide some new insights for both fields of research.

Keywords: Intellectual capital, intellectual capital management, business and competitive intelligence, knowledge, refining information

1. Introduction

Organizations are more and more starting to see intellectual capital (IC) as an important source of competitive advantage. In addition of managing human resources and competence, organizations need to understand and anticipate situations in their business environment. Intellectual capital management (ICM) and business and competitive intelligence (BCI) contribute to this effort. Both BCI and ICM concentrate on getting the most out of organization's intangible assets, but from different viewpoints: ICM embraces a whole variety of intangibles, whereas BCI focuses on different levels of information and attributes related to refining them. They both aim to enhance business performance by creating value from intangibles, BCI with enabling better informed decisions and ICM as better managing various kinds of intangible assets.

Both IC (and hence ICM) and BCI are relatively new terms and research themes (see e.g. Fleisher 2001, Nonaka and Peltokorpi 2006, Pirttimäki 2007, Zambon 2006). From this derives also that the terminology, concepts and boundaries of these research themes are yet unestablished (Kianto 2007, Pirttimäki 2007). The research on BCI as well as IC has accelerated since the mid 1990s and gained more interest in the recent decade (see e.g. Carr et al. 2004). This can be explained by shifting to

knowledge economy, rapid development of information and communication technology and resulting grown emphasis on intangible assets and information as the enablers of competitive advantage. In addition to this the markets are turning global and changes occur faster than before and demand quicker response. Organizations need to pay more attention to using intangibles as means to compete.

Business and competitive intelligence (BCI) is one of the means that organizations nowadays utilize to overcome the challenges rising from rapidly changing business environment. BCI refers to a process aimed to support organization's decision-making by providing information essential for its operations as well as for forming and executing its strategy. By utilizing a BCI process an organization refines raw data into information and actionable knowledge. Bontis (1998) states that IC is "the pursuit of effective use of knowledge as opposed to information", which implies that BCI in fact is IC. BCI can also be seen as a part of organization's IC, and correspondingly IC can be seen as input and output of BCI process.

ICM has not one established precise definition, but many authors provide their own slightly different definitions of the concept (see e.g. Choo and Bontis 2002, Edvinsson 1997, Nickerson and Silverman 1998). Despite the amount of definitions they all seem to have common characteristics. Kujansivu (2008) has identified six characteristics that are all emphasized in different ICM definitions. According to Kujansivu's (2008) summary ICM

- is managing both intangible resources and their transformations,
- takes a balanced overall view of organizations intangible resources,
- focuses on value creation or maximizing value,
- can be carried out on different organizational levels,
- is aligned with organization's strategy and vision, and
- includes a multifaceted group of functions and tasks.

Kujansivu (2008) defines ICM as managing strategically important issues as a whole aiming to value creation and better business performance. Nickerson and Silverman (1998) include environmental scanning for recognizing competitive opportunities and threats regarding IC in ICM. This said, BCI and ICM *de facto* have common goals.

BCI seems to have many things in common with IC and its management. Since these concepts seem to intersect in many points, could there be some synergy found by examining these research themes together? This conceptual paper discusses the linkage between BCI and IC and discusses how BCI could contribute to ICM. The paper consist of the following sections: First, BCI is defined in the context of this paper. Second, BCI is examined as a part of IC by classifying its components according to a general tripartite IC classification. Third, BCI's possible contributions to ICM are contemplated. Finally, implications and limitations of the analysis are discussed as well suggestions for further actions regarding the issue.

2. Business and competitive intelligence

2.1 BCI process aims to gain competitive advantage from information

Organizations do not operate in a vacuum, but they are affected by what happens in their surroundings. The economic situation, competitors' actions, customers' needs and consumer trends, changes in legislation, environmental issues etc. have an impact on organizations. In order to rise to the challenges deriving from the ever-changing business environment, organizations need to understand what is going on, why is this happening and how does it effect the organization. This is done by continuously scanning the environment; gathering and linking pieces of information and analysing them to provide insights to back up decisions furthering the organization's business goals (Fleisher 2008; Fleisher and Bensoussan 2007, Badr et al. 2006). In this paper these activities are referred to as business and competitive intelligence (BCI).

Many may have heard of business intelligence (BI) and competitive intelligence (CI), but the term BCI may be yet somewhat unfamiliar. Although intelligence activities *per se* are nothing new (see e.g. Calof and Wright 2008, Juhari and Stephens 2001, Wright et al. 2004) in business context they have

been studied only for a few decades, and only from the mid 1990s have they become more of an academic interest (Fleisher 2001, Pirttimäki 2007). The relative novelty of the discipline explains the separate terminology used to describe intelligence activities (Pirttimäki 2007), and they alter depending on the author and region (Global Intelligence Alliance 2007). For example, in Northern America CI is the prevailing term, whereas in Europe the same activity is usually called BI (Koskinen et al. 2005, Lönnqvist and Pirttimäki 2006, Buchda 2007). In Europe CI is defined to be a sub term of BI focusing on external information and mainly competitive issues, whereas BI is seen as a more comprehensive issue with broader scope (see e.g. Buchda 2007). To make it even more confusing, in Northern America BI is understood as a group of technological solutions to support CI, referring to data warehousing and data mining etc. (Kalakota and Robinson 2001) and focusing on internal information about the organization itself (Bose 2008).

To overcome talking about apples and oranges i.e. the confusion of the two terms and their overlapping meanings, a combination of these two has been suggested to replace them (Fleisher 2008). The term business and competitive intelligence (BCI) is suggested to be an umbrella concept that has an overall view of intelligence activities: BCI includes both the technical solutions as well as the more human centred actions related to intelligence activities, deals with both internal and external information, and has a larger focus area than merely directly competitive issues (Fleisher 2008).

This paper follows the above definition of BCI and further specifies it to be a process including several phases, illustrated in Figure 1.

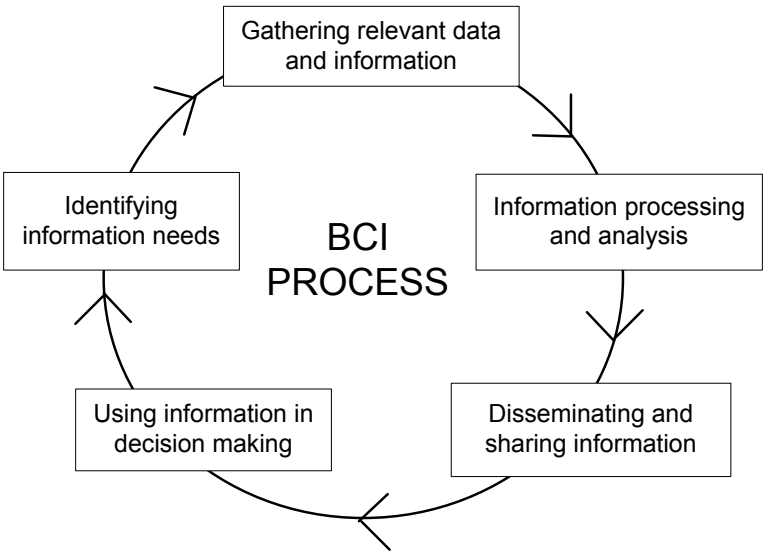

Figure 1: A general BCI process

As presented in Figure 1, and described by several authors (see e.g. Bose 2008, Collins 1997, Cook and Cook 2000, Saayman et al. 2008, Thierauf 2001, Vitt et al. 2002), a BCI process typically consists of following phases:

- identifying what information is needed in the organization,
- gathering information from multiple sources according to the needs,
- processing and analysing information by combining it with existing knowledge and applying suitable analysis methods,
- disseminating and sharing information in form of analysis, presentations, reports etc. and storing it in databases or other suitable places, and
- using information to form decisions that steer the organization towards its goals.

The objective of BCI is to provide information that helps the organization to understand what is going on in its business environment, identify possible threats and opportunities that might affect the organization in some way and act accordingly. The ultimate goal is to stay ahead of competition by reacting to changes faster than competitors and thus maintain a competitive edge (see e.g. Collins 1997, Cook and Cook 2000, Vitt et al. 2002). Accordingly, the most common reason for organizations

to implement BCI is the hope of being proactive, dynamic and a step ahead of competitors instead of just reacting to the changes after they have already happened (Tyson 1986).

2.2 Practical details and challenges

In real life BCI might not live up to expectations, because being proactive is difficult. Predicting the future accurately is hard, and in many cases impossible. In practice being proactive actually means acting upon a piece of information, or a hunch, before its consequences have realised. For example, a manufacturing company continuously follows possible changes on legislation regarding the raw materials needed to manufacture its products. Thanks to this, the company finds out that in a certain market area one of the chemicals needed in manufacturing one of their products is considered to be banned. This might not happen, but nevertheless the company starts to develop an altered product that can be produced without using that certain chemical. When the decision of banning the chemical is made, the company already has a product in accordance with the new legislation, unlike those competitors that only now realise they have to adjust their products to the new legislation. Hence, reacting to information can generate proactive actions, and thus at its best BCI can be a proactive support of decision making.

Carrying out BCI process and benefiting from it is not as straightforward and simple as theory might suggest. It can even be argued that BCI process described before is not even applicable as such in every-day business life. Not all companies have a systematic and organized BCI function such as a BCI unit or full-time analysts dealing with business information. However, it can also be argued that every company does at least some of the phases of BCI process (i.e. defining information needs, information gathering, processing, analysing, use and feedback). BCI activities are not always conducted consciously and businesslike, but they are rather ad-hoc and non-systematic in their nature. In many companies intelligence processes and activities are not formally documented or acknowledged. To call these actions BCI the efforts must be conscious and organized at least to some extent.

There are also other challenges of trying to enhance decision making with BCI. Idealistically decision-making should be based on reliable, accurate and timely information, which BCI aims to deliver to decision makers. In reality, decisions are often made in a small time-window and under pressure. Often decision makers' information needs surface only in the moment the decision has to be made and providing accurate and highly analysed information to such ad hoc needs in time is in most cases impossible. Therefore, despite all BCI efforts, decisions are usually made relying on limited amount of unsecured information making the decision making a bit of a gamble and keeping fingers crossed that the results will be good. This however should not mean that it is not worth trying to enhance the decision making process, and BCI is one mean to do this.

3. BCI as a part of organization's IC

Intellectual capital (IC) is a variety of intangible assets that create value for an organization (see e.g. Kujansivu 2008). A common classification of IC is dividing it in human capital (HC), relational capital (RC) and structural capital (SC). Figure 2 illustrates this classification.

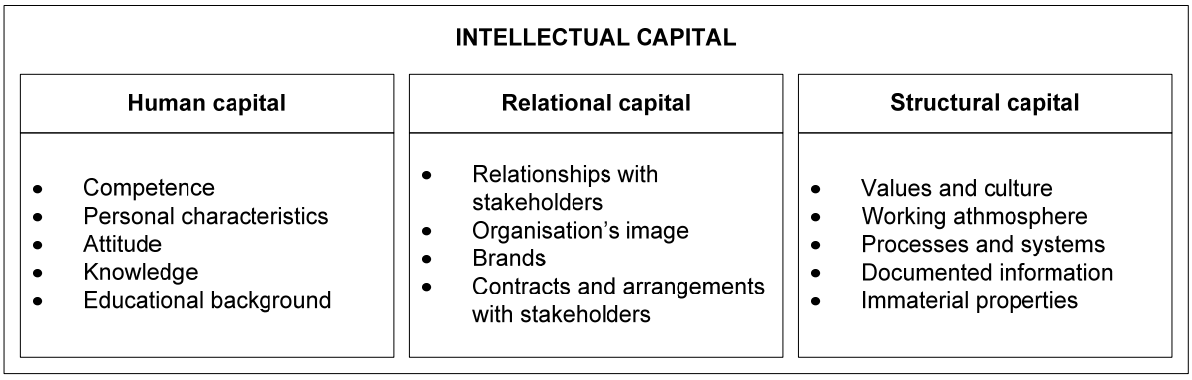

Figure 2: Classification of IC (adapted from Kujansivu 2008)

HC is said to be the foundation of IC (see e.g. Pienaar and du Toit 2008), because it is needed to form SC and RC (Bontis et al. 1998). For example, organizational culture and processes do not exist

without employees and their HC, and neither can there be relationships with stakeholder groups without any human interaction. The problem, from an organization's point of view, is that HC cannot be owned by the organization because it is individuals' features (Edvinsson and Malone 1997). SC, on the contrary, can be owned by the organization (Bontis et al. 1998). Therefore, it is important for an organization to improve and develop HC and to turn as much HC into SC as possible in order to secure the value of organization's IC even when employees leave the organization (Pienaar and du Toit 2008).

BCI can be seen as part of organization's IC, since it both uses and produces intangible assets aiming to create value from them for the organization. To further examine the nature of BCI as a part of organization's IC, BCI's components are divided under the above mentioned three sub categories of IC in Figure 3.

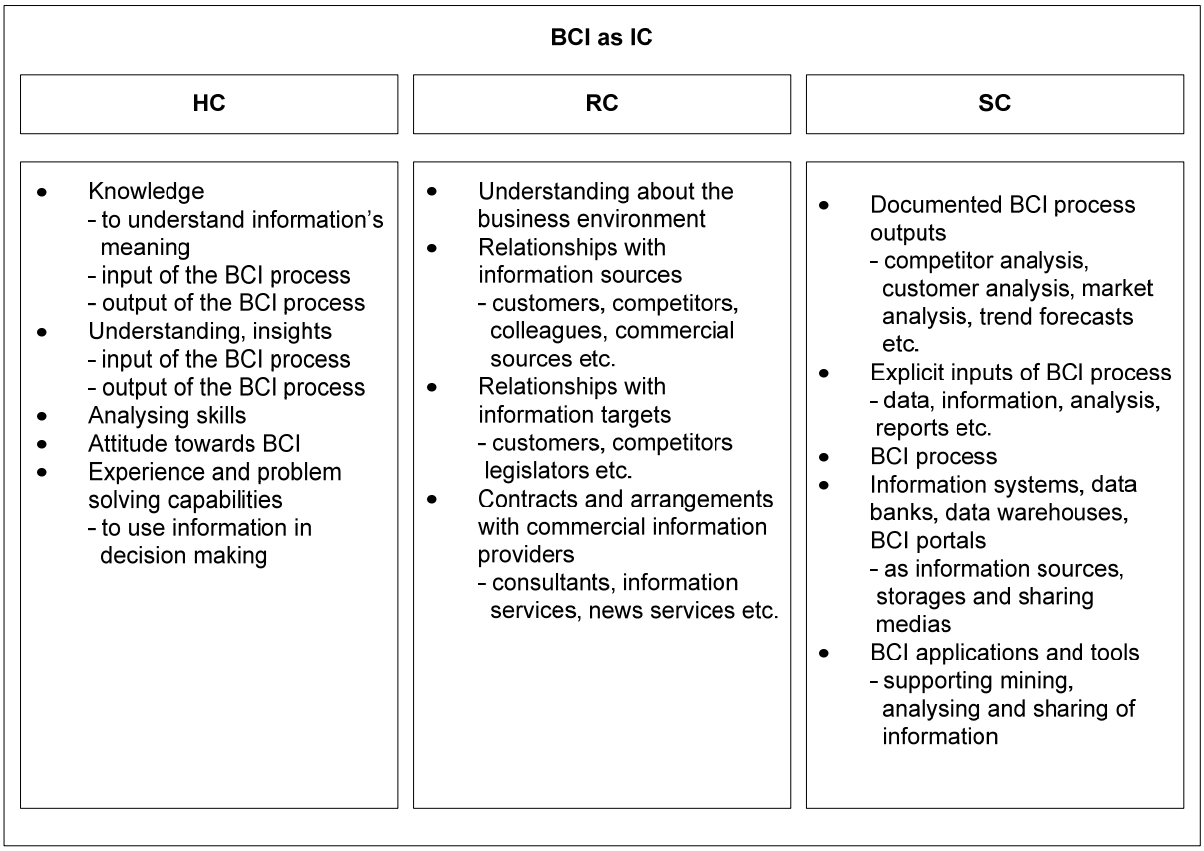

Figure 3: BCI as organization's IC

In Figure 2 knowledge is defined as a part of HC. As IC is in this context seen as an organizational level concept, it should be noted that not any knowledge is regarded as IC: Pienaar and du Toit (2008) emphasize that in IC knowledge is always business oriented. In BCI context this means knowledge that is needed to understand the relevance, reliability, accuracy, implications and meaning of pieces of data and information that BCI process uses as building material. It also refers to knowledge needed to understand the meaning and implications of analysis provided by BCI. Knowledge is also an input of BCI process: BCI process combines gathered data and information with existing knowledge to give it a context and meaning. Knowledge can also be seen as an output of the process since the information provided by BCI process accumulates individual's knowledge. Some of the outputs of BCI process are in tacit form, such as oral presentations and information shared in discussions and meetings, and are simultaneously turned into employees' tacit knowledge, HC.

Skills, competence and experience needed to analyse information are also part of HC. It takes certain knowledge to pick the suitable analysis method to use in a certain situation let alone to use the method correctly (Fleisher and Bensoussan 2007). A good analysis also calls for insight and seeing beyond the obvious (Bose 2008), which derive from personal experience and knowledge. Attitudes towards BCI, both management's as well as employees, affect the effectiveness and results of BCI (Qiu 2008). The value of BCI process realises when information is actually used in decision making.

Using information and making decisions acquires experience and problem solving capabilities, which can be classified as HC (Kujansivu 2008).

RC refers to organization's external relationships: outside parties, stakeholders and people who the organization does business with (Carson et al. 2004). BCI components categorized as RC are relationships with personal information sources of BCI. These include e.g. customers, competitors, news services, banks, government etc. (Butcher 1998, Thierauf 2001). Some of information sources can simultaneously be information targets, i.e. organization gathers information related to them. Organization may also have formal contracts or other arrangements with its information sources, especially with commercial ones. Bontis et al. (1998) note that in addition to actual relationships issues related to these stakeholders also contribute to RC. For example, according to this definition, information related to competitors and customers as well as competitor and customer analysis and profiles are a part of RC. This clearer view and better understanding about the organization's business environment might be were BCI's best potential regarding IC lies.

According to Bontis et al. (1998) SC comprises of processes and organizational routines that turn HC into organizational capital. SC can be seen as "captured" HC: it is formed by the intellectual input of employees and relies on employees' ability and willingness to utilize it (Carson et al. 2004). SC is processes and procedures (i.e. how things are done) that are documented so that they can be repeated (Carson et al. 2004) regardless of who is doing it. Erickson et al. (2003) simplify SC to be "knowledge about how to organize organizational resources to best affect".

BCI produces explicit information products, such as different kinds of analysis on markets, competitor profiles, technology forecasts, newsletters, monthly market reports etc. These fall under SC, as do the explicit inputs of BCI process: data and information in form of reports, figures, graphs, analysis etc. SC is said to include "access to information for codification into knowledge" (Bontis 1996, Lynn 1998). Transforming information into knowledge is what BCI process aims at and hence, the BCI process itself is SC. Information systems, data warehouses and BCI portals act as information sources as well as storages for explicit BCI outputs. They also support in sharing information in the organization. Other technological applications used to support BCI, such as data mining and analysis software etc. are also regarded as an organization's SC.

4. Potential contribution of BCI to ICM

4.1 BCI process creates IC

BCI process aims to create value from information by refining it into such form that it can be used in decision-making. This can be for example processing numbers and data from operational information systems into analysis that implies what the figures mean. For example, this analysis can reveal what kind of customers by certain products and when, which then helps to plan marketing actions. Dzinkowski (2000) states that IC can act as both output of a knowledge transformation process as well as the knowledge itself transformed into intangible assets in the process. Figure 4 presents how BCI process uses organization's IC as an additional input, refines data into knowledge and creates competence, and thus creates and increases organization's IC.

The inputs of BCI process are data and information gathered from both external sources (e.g. information services, customers, websites) and internal sources (e.g. information systems, employees, meetings, databases) (see e.g. Butcher 1998, Thierauf 2001). During different phases of BCI process raw data is turned into organization's and its employees' information and knowledge, i.e. IC. This IC generated in BCI process enables better decision making which can lead to changes in strategic and operational actions. BCI produces relevant information for decision makers and they analyse it using their existing knowledge to create understanding of the matter in hand. That way organization creates new HC and BCI process gets new input.

BCI process uses information and knowledge obtained from organization's employees and combines them with information and knowledge gathered from different internal and external sources (see e.g. Drott 2001). This way BCI can create more meaningful and actionable outputs and make them more usable in e.g. strategy formulation. Thus, BCI improves the use of organization's IC and especially managing and utilization of HC.

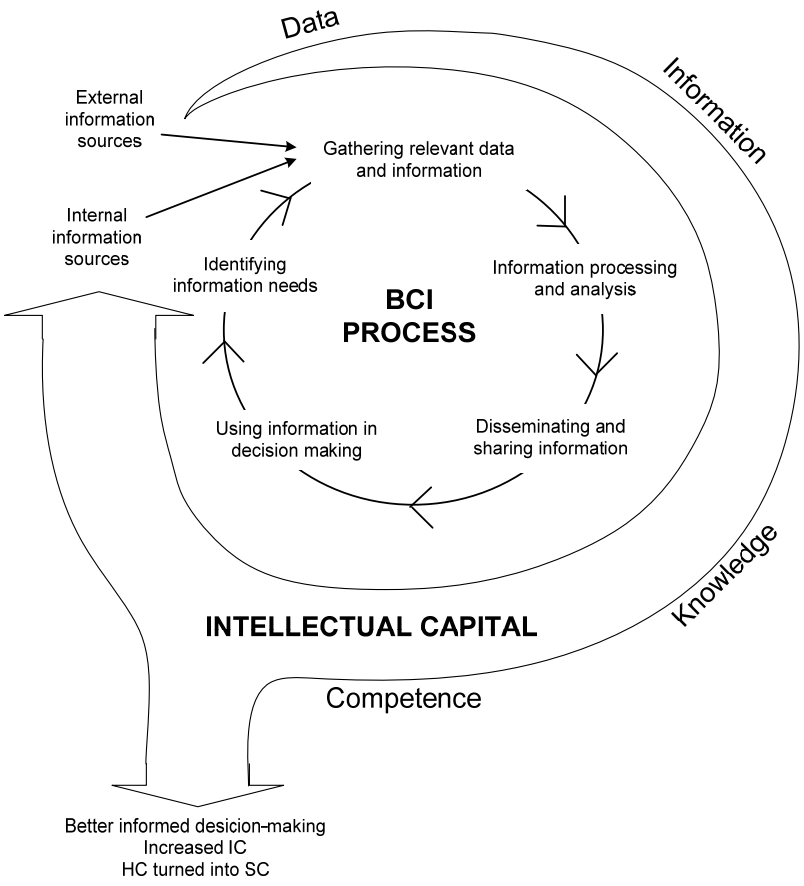

Figure 4: BCI process utilizes and creates IC

The output of BCI process often consists of qualitative assessments, news stories, etc. combined with quantitative information. One way of combining different types of information and forming entities of bits and pieces is establishing centralized BCI units or intelligence networks, with assigned key roles ensuring the sharing and combining of information (Viitanen and Pirttimäki 2006, Cross and Prusak 2002, Awazu, 2004). BCI enables covering and combining qualitative and quantitative as well as formal and informal information, which makes it easier to cover phenomena that may be ambiguous in nature, such as those related to IC.

4.2 BCI enables accumulating knowledge and thus develops HC

It can be argued that BCI acts as a tool for improving HC. Some operative BCI products, such as news service targeted for a large group of employees, also act as IC development tools. They increase the amount and quality of information and knowledge available for employees, thus improving the accumulating of their knowledge and thus, HC. When employees have access to reliable, timely and good quality information they are able to make better enlightened decisions. In addition, when employees do not have to individually acquire all information to fulfil their often overlapping information needs, they can concentrate on their focal duties and carry them out more effectively. Improving HC also improves its contribution to organization (Pienaar and du Toit 2008).

4.3 Including employees in BCI process turns HC into SC

All of organization's employees participate in some level in producing data, information and knowledge, i.e. the inputs of BCI process, and thus affect the organization's decision-making. Employees often have valuable information not only on organization's own operations but also on its competitors, customers and other actors in its business environment (Drott 2001). Although an organization would acquire information from the same sources the information obtained by employees may be more of value: when the information is processed in human brain it gains insights, values, opinions and perspective making it richer (Nonaka and Takeuchi 1995). Intuitions about what a competitor's action could mean can also seem too vague and unclear to be written into formal

document or a memo, but they are easier to be expressed in meetings or informal discussion. Formal and informal discussions, where this information and knowledge are shared, are therefore important parts of organizations' BCI activities.

Decision making needs not only explicit information in form of reports or such. An important input is personal accumulated knowledge and experience. In addition, not all information can be bought from consultants or picked from media. The most valuable information is often inside organization's employees' heads. This, however, is often problematic, because it is HC that cannot be owned by the organization. BCI process can contribute to turning this HC into SC: For example, rumours and first hand information concerning competitors that is provided e.g. by the sales force operating in the field can be combined with competitors' financial figures, thus making the competitor analysis more multifaceted and profound. When employees' tacit knowledge is this way combined with other information and documented in explicit form, it is simultaneously turned into SC, thus becoming and organizational asset.

5. Discussion

Classifying BCI according to the tripartite categorization of IC and examining the potential of BCI in ICM context makes it seem evident that BCI has most potential in developing RC and turning HC into SC. BCI accumulates RC by enabling better understanding about the organization's business environment and enables using this the best way possible. It also codifies knowledge in to explicit form during analysis phase. BCI could possibly be utilized in turning HC into SC.

It can be argued that in everyday business BCI and ICM go often hand in hand and are in some cases even somewhat overlapping. Both are often situated under business development department, with BCI having more emphasis on external issues and ICM on intellectual properties or human resources. In many organizations they are also both frequently incorporated under corporate performance management or business performance management. This indicates that in practice BCI and ICM interact and are practiced together at least to some extent.

As research fields BCI and IC, however, seem to be quite separate. A comprehensive study by Fleisher et al. (2007) on BCI publications shows that between 2003-2006 the top three journals in which BCI articles are published are *Journal of Competitive Intelligence and Management, Marketing Intelligence and Planning* and *International Journal of Technology and Planning* (Fleisher et al. 2007). According to the study by Fleisher et al. (2007) only one article on BCI has been published in *Journal of Intellectual Capital* (see Silvi and Cuganesan 2006). The study (Fleisher et al. 2007) also reveals that of all articles published during 2003-2006 only three have been published in journals located within the discipline of "intelligence and intellectual capital".

Correspondingly, examining the titles and keywords of articles reveals that only one article discussing BCI (see Carr et al. 2004) has been published in the two main journals in IC discipline, *International Journal of Learning and Intellectual Capital* and *Journal of Intellectual Capital*. Based on this cursory examination it seems that as a discipline BCI is somewhat apart from the IC field, even though there are a lot of similarities in the scope of academic and managerial activities within the two fields. It seems possible that cross-disciplinary research efforts could provide some new insights for both fields of research.

When reviewing this paper and its attempt to find the link between BCI and IC it should be noted that the issue has been approached in a very suggestive manner. Both BCI and ICM can be applied in many different ways in different situations and objectives, where they can be differently defined and interpreted. This paper still aims to raise thoughts and discussion on further examining the linkage between and synergy of BCI, IC and ICM, which so far seems to be somewhat lacking of research.

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Future-Proofing Heros: Moving From Theory to Practice

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Abstract: HEROs (Higher Education and Research Organisations) are embedded in a changing environment that is increasingly marked by growing competitiveness. Changes in society and the economy have a fundamental impact on the way HEROs need to behave and develop. These external factors are linked to internal challenges for which their traditional culture, structure and strategy are not providing sustainable answers. They need to build an intelligent organisation with a vision of the future, while incorporating and applying sustainable management methods. So-called intangibles are of special interest in the management and development of HEROs, because they make up the core justification for their very existence. It could be expected that HEROs are experts in development and exploitation of intangibles, e.g. its Structural Capital, its Human Capital (including, but not only, its students and faculty) and its Relational Capital. Nevertheless, this expectation is not yet satisfied in all cases; HEROs need to improve their mental models, skills and methods related to the management of their intangible success factors, from vision building to the assessment and continuous development of their Intellectual Capital (IC). All HEROs have both intangible assets and liabilities; among the latter may be a culture, or structure, that effectively discourages cross disciplinary research and development, or the industrial and commercial exploitation of its IC by only rewarding traditional academic achievements (such as the number and impact of publications) in promotions to tenured or management positions. As Foresight methods are characterised by participative processes that promote the interplay of all the relevant stakeholders, they can be used to address intangible barriers and educate power brokers in the advantages of adopting a holistic view of the HERO's role in regional socio-economic development.The paper focuses on how, with the right quality of leadership and appropriate preparation, it may be possible for a HERO, in either the Public or Private sector, to address the challenges of major change management programmes over a period of time by implementing on-going Foresight and IC Management processes. This is addressed by exploring the extent to which the application of these methods at an organisational level could increase the probability of sustainability in the face of the present and upcoming challenges for HEROs. The paper points out benefits that could be derived from current approaches and proposes the development of a holistic view that covers the entire management cycle by integrating Technology Foresight (TF) and IC Management.

Keywords: Foresight, intellectual capital management, organisational development, sustainability, competitiveness, universities and research organisations

1. Introduction

Sustainable futures cannot be based on crystal ball gazing. Nor can they be based solely on the tangible resources that were relied on in the past. This paper explores the possibilities of combining techniques of Technology Foresight (TF) with Intellectual Capital (IC) Management, Development and Exploitation. The objective is to promote in a multi-disciplinary vein the dialogues between the practitioners of Foresight with those of IC; particularly in the field of Higher Education and Research Organisations' (HEROs) management.

HEROs are immersed in an intense reform process; not only across Europe but in many parts of the world. New capabilities could be developed to improve their processes of management and funding accountability by adapting existing methods for IC Management and TF. The paper presents the two approaches, namely TF and IC Management, and suggests a combined use of them by HEROs to meet the reform requirements being placed on them as part of the overall endeavours to achieve more sustainable and competitive "knowledge based" societies.

The success of today's organisations is measured by how much of the available knowledge they can capture from a wide variety of providers, how they synthesise this for their strategic purposes and how they make use of it to develop future capabilities. In this regard, the success (and eventually the sustainability) of individual HEROs, is closely related not only to how they manage their own knowledge and that of their collaborators, but increasingly to the way they make use of it to develop new capabilities and improve their competitiveness and social relevance.

2. Foresight methods: How can HEROs use them?

The term 'Foresight' has become widely used in recent years to describe a range of approaches to improving decision-making, to anticipate better the future and share future technological developments (Cagnin & Keenan 2008). Foresight can be defined as:

> *"the application of systematic, participatory, future-intelligence-gathering and medium-to-long-term vision-building processes to inform present-day decisions and mobilise joint actions" (Miles & Keenan 2002).*

It brings together key agents of change, and various sources of knowledge, in order to develop strategic visions and anticipatory intelligence to create a shared vision of a desirable future, so as to develop and implement a strategy that can increase the likelihood of achieving it (Miles & Keenan, *ibid.*). TF can also facilitate dialogue among actors who might otherwise not be communicating with each other (Rader & Porter 2008).

The methods used most often in Foresight are Brainstorming, Environmental Scanning, Scenarios, Delphi, Critical/Key Technologies, Cross-impact analysis, Technology Road Mapping (TRM), Simulation modelling and Trend extrapolation. However the process is equally open to new ideas and the use of new methods, which can be designed or imported from other literatures such as policy, management and systems science; according to the practitioner's skills and experience. Other techniques of Knowledge Management, information retrieval and pattern recognition are also proving to be useful in Foresight exercises.

Foresight approaches and methods came to prominence during the Cold War period and then, during the 70s, these tools were adapted to improve the understanding of the linkages between technology developments and social needs. During the last decade, foresight developments have been extended from concerns in policy and investment decision processes to areas of socio-economic life and organizational vision building. As explained by Cagnin & Keenan (2008), a wider examination of foresight is needed in disciplines such as epistemology, political science, sociology, economics and management and organisation science. By providing that, we will get in turn a better understanding of foresight by using concepts drawn from social science and humanities. For example, the learning effects using concepts borrowed from organisational or management studies (Barré & Keenan 2008).

Dr.ir. J.M.M. Ritzen (President, Maastricht University) presented the Keynote address at the OECD Ministerial Meeting on June 27th (Athens, Greece) entitled, "Scenarios for Higher Education, 2020", in which he pointed out that, *"Scenarios for the future course of higher education are more likely to occur if they are rooted into an understanding of the dynamics behind the demand for and the supply of higher education"*. In which he analysed the factors that will increasingly determine the demand for HE and those affecting its supply.

Foresight combines a holistic analysis with greater links to action and wider participation than do many futures studies. This is achieved by its emphasis on networking and stakeholder participation and engagement during the future oriented vision development and policy-making processes. This long-term orientation; the examination of a wide range of factors; the drawing on widely-distributed knowledge, and the institutionalisation and creation of networks, makes it particularly relevant to the efforts by HEROs to identify, prepare for and meet the challenges that rapidly developing social and economic contexts present.

Formal methods have been quite prominent tools in Foresight exercises. Some of the main benefits that HEROs can obtain by their use are:

- Making the Foresight process more systematic, with a set of well-defined steps to achieve outputs and outcomes;

- Increasing the transparency of inputs, processes, and outputs;
- Constituting 'hybrid forms' for interaction and communication between various system actors;
- Aiding the visualisation of possible, probable and desirable futures.

The selection and integration of methods are determined by a set of criteria including:

- The objectives and desired outputs and outcomes of a Foresight exercise (e.g. process and/or product oriented);
- Available resources (time, money, and human resources);
- Nature of desired participation (engagement of 'physically present' and/or 'remotely sampled' participants);
- The accessibility of the qualitative and quantitative data requirements of methods;
- The availability of methodological competence.

Methods should be selected and combined to achieve the desired impacts as a result of the Foresight exercise. However, the most important thing is that the purpose of each method and its 'fit' with (i) the objectives of the exercise and (ii) other methods used in the process should be clearly justified.

3. Intellectual capital approaches in HEROS: a tool for sustainable management

The idea of considering the IC of an organisation originates from the insight that the tangible factors alone are not enough for an accurate estimation of the value of an organisation and much less so of its potential for value creation. Intangible factors were increasingly considered to be crucial factors for organisational success, not only in the form of products (services economy), but also as factors influencing processes and decisions of any kind.

As is the case for other kinds of organisations in the knowledge-based economy, contemporary universities are immersed in far-reaching transformation processes, which exert pressure on them, their behaviour, culture, internal structures and management systems. Adapting to the new requirements implies the introduction of management systems, traditionally used by private companies, in order to govern universities according to the criteria of efficiency and effectiveness.

However, HEROs are complex organisations with specific characteristics that make them unique. Sporn (1999) proposes that the distinguishing aspects of academic organisations are: goal ambiguity, client service, task complexity, professionalism and administrative values, and environmental vulnerability. In addition, they have to deal with specific external constraints; such as the changing role of the state, public budget pressures and new societal demands for relevance, accountability and transparency.

Even though assessing a university's outputs and inputs is not a completely new idea, implementing IC approaches within HE institutions means going one-step further. The identification of the three forms of IC (Human, Structural and Relational Capital), their links with the knowledge production processes, the organisation's strategic objectives and the definition of a battery of indicators, simultaneously improve internal transparency. An IC Report is a tool for comprehensively visualizing inputs, processes and outputs. Furthermore the proper management of IC at universities has a significant impact on the performance and efficient use of resources (Leitner 2004). Hence, practitioners and experts on this topic affirm that those academic and research organisations able to develop both the culture and the capacity to identify, manage and report on their IC, will be advantageously placed in the HE scenario. The positive experiences of Research Organisations with IC Reports are also noteworthy (Koch et al 2000; Leitner & Warden 2003 and Leitner 2005). Nevertheless, IC Reporting and IC Managing – which are sometimes confused – should be clearly distinguished so as to understand the challenges that lie in a continuous, and thus sustainable, management cycle. Models have been developed by several countries and integrated on a European level (e.g. projects such as MERITUM, RICARDIS & InCas) that cover the transparency of and reporting on IC. They have not evolved so far as to include the entire management cycle of steering intangibles. An example of extending the German model so as to address the continuous

development aspects can be found in Flicker & Pook (2007), but this also provides only a starting point, which has to be refined. Therefore we distinguish between IC Reporting and Managing. For the former, both methods and even software (currently in German) are available, for the latter, these still have to be developed and refined.

The benefits of using an IC Report fall into two categories (Marr 2005 and European Commission 2006):

- It's potential to function as a management tool to help develop and allocate resources – create strategy, prioritise challenges to the firm's development, monitor the development of the firm's results, and thus facilitate decision-making (internal reporting function).
- Its potential to function as a communication device linking the institution to the outside world and as a way to attract resources – financial, human and technological (external reporting function) and to foment relationships with partners and customers.

Therefore, IC information is conceived to complement financial management information (internally) and the financial report (externally).

By analysing the most outstanding experiences developed in different HE institutions on a voluntary basis across Europe, and other international experiences like ETRI (Electronics and Telecommunications Research Institute in South Korea), and the case of Austrian universities that have to implement IC Reporting by law (Leitner 2005), some of the co-existing potential benefits and drawbacks of the different models and indicators can be outlined (Sánchez & Elena 2006; Elena 2007 and Sánchez et al 2009). The most significant of these are:

1. On an internal level, as a management tool, an IC Report:

- Defines and updates the mission statement of the HE institution.
- Helps to identify priorities in terms of research and teaching activities, clearly defining the organisation's profile.
- Communicates strategy throughout the organisation.
- Allows the alignment of individual goals within institutional objectives.
- Links strategic objectives to long-term targets and annual budgets.
- Promotes an internal process of learning about the institution's structure and performance.
- Facilitates strategic discussions among the members of the organisation.
- Enables the discussion on the intangible value drivers and success factors.
- Monitors the achievement of goals and assesses the organisation's performance over the course of time.

2. On an external level, as a disclosure tool:

- In general terms, it improves the level of transparency.
- It provides comprehensive and valuable information to stakeholders: students, teaching personnel and researchers, Ministries, funding organisations, businesses, and society as a whole.
- It can enhance competitiveness. For instance, when a University needs to renew a grant or attract additional funds for research, assessing performance is of crucial importance. Accordingly, the IC Report can facilitate the presentation of results, which could contribute to attracting funds to the detriment of other lower-performing (or less well reported!) competitors. However, as pointed out previously, HEROs also have intangible liabilities so if it is deteriorating, disclosure may prejudice the chances of getting future grants.

Therefore a HERO's decision to disclose information on its IC places a serious responsibility on its Management and can pose important challenges to the institution's culture in terms of transparency and honesty.

Nevertheless, even in an environment where disclosure is compulsory, it becomes obvious that reporting on IC is not enough to responsibly and continuously manage its IC. This highlights the weaknesses of the IC Reporting methods as they only provide guidelines for assessing and reporting. Development aspects are not necessarily addressed and the benefit of promoting an internal process of learning is an opportunity that is seldom used if it is not complemented with a general perspective towards organisational development. IC Reporting does not automatically lead to reasonable and continuous management of IC.

4. Why use foresight and IC management for HEROs?

Higher Education Institutions are operating in a rapidly-changing environment, as economic, societal and technological developments (such as cost containment and lifelong learning) force them to adopt flexible structures that can adapt quickly to market demands (Sporn 1999). The focus of this paper is the proposal that the appropriate use by HEROs of IC Management (ICM) and Foresight can facilitate effective responses to these challenges. These approaches, which are participatory in nature, bring people together in a social process to elaborate on individual experiences and expertise, to create a common language, structure collective thought and enable appropriation by decision-makers. They can contribute to organisational and regional risk management, knowledge management, organisational learning, and instantiate democratic principles in the early phases of decision-making processes. They can also be used in a Change Management process that addresses Cultural Liabilities by providing education to power brokers that may facilitate their acceptance of new values and procedures. In other words, they endeavour to use current knowledge for shaping future actions by exerting influence on the decision makers and opinion formers.

Policy and strategy development are increasingly being conceptualised as a continuous and reflexive learning process that requires systematic instruments of analysis (Smits & Kuhlmann 2004). Foresight has the potential to offer such a set of instruments; it produces a wide variety of tangible 'outputs' (e.g. reports) and less tangible 'outcomes' (e.g. changes in organisational culture, new networks and the articulation of widely-shared - or divergent - visions). IC Management facilitates a clearer understanding of intangible value drivers and provides methods for transforming strategy into actions. Both approaches need to incorporate an iterative monitoring and on-going learning process over a period of time and not be carried out as a "one-off" stand alone exercise. The real benefit lies in the medium term adaptation of strategies to the unexpected and uncontrollable.

As noted above, HEROs need to become (more) flexible in their way of thinking about their role in society and to strategically develop their future according to specific competences or their competitiveness in a specific (market) environment. Depending on the country we are talking about, this already has very different forms and degrees of realisation. The differences include questions like:

- Whom do they serve?
- How are they financed?
- To what extent is (institutional or faculty) co-operation with private sector companies accepted and welcomed, while continuing to ensure the independence of the educational and research programmes (e.g. in fields such as pharmaceutical or bio-tech)?
- How important is general education, in contrast to concrete qualification for a specific industry or services sector? etc.

These questions can be used to tackle the basic underlying values of education and research in our societies. Fostering the notion of HEROs as organisations that have to live, survive and evolve in a changing and increasingly competitive environment, and proposing the use of "management" methods (such as IC Reporting, the development of intangibles or TF) does not mean that the underlying values are being questioned or changed. But it does mean the fostering of learning and development when it comes to considering and managing an organisation's IC – not only as an input and output in the sense of a product (output) or a "material" to be processed (input), but also in the sense of the collective intelligent behaviour (especially decision making) of an organisation. In fact this debate raises a series of important issues:

- "Why shouldn't methods such as IC Management and TF be used with a focus on continuous holistic management of academic institutions?"

- If not in HEROs, "where should the potential of developing intangible assets be more prominent, or the production of IC Reports and drafting of Guidelines for their interpretation more relevant, than in the 'science-society' debate?"

- Or, "where else is there a greater need for the inclusive and process oriented focus of TF than in harnessing the development of HEROs to meet mankind's major challenges?"

As mentioned earlier, a real-life example of the use of IC Reporting has been provided in recent years in the case of Austria, which has gone beyond the focus on profit organisations and established compulsory guidelines for the reporting by Universities on their IC (Universitätengesetz 2002). These guidelines focus on comparability among organisations and the assessment aspect but (unfortunately) less on development aspects (Leitner 2004).Although the focus on reporting aspects is coherent with the basic intention to enrich the classical annual report by intangible factors, it is necessary to use the internal (confidential) and external (published) IC Reports as inputs to a continuous development cycle and then extend this to a holistic model of development.

5. Sustainable HEROs – The contribution of ICM and TF

Taking the concept of sustainable development (not only in the ecological sense, but as a basic principle of the successful survival of organisations in their environment), we find a match between management principles and the ICM and TF approaches. Among the key requirements of governance for sustainable development, Meadowcroft et al (2005) mention:

- Developing appropriate political frameworks and adopting a long-term focus;

- Integrating different kinds of knowledge into decision processes.

Foresight and IC Management widen the view for medium and long-term benefits by integrating multiple perspectives, focussing on resource development (instead of only benchmarks) and being oriented towards possible futures and the options that have to be designed so that the proposed actions achieve lasting, sustainable effects. For this to happen the Foresight 'sponsor' (political authority, funding agency or the senior management of an organisation) needs to go beyond involving stakeholders in the discussion process to incorporating their pro-active involvement in the policy implementation stage. In this way the sponsor can induce both the reconsideration and modification of policy strategies and funding decisions (both in terms of input funding and internal resource allocation) and widen the likelihood of their acceptance within the stakeholder communities.

Sustainability and growth for HEROs passes through their developing their capacity to define the major challenges that their respective "products" (graduates, PhD researchers, service or technological innovations etc) will need to meet. In the case of ICR this can provide an effective communication with Society that can be used to highlight the value added nature of the returns on the resources Society dedicates to HEROs. It can also contribute to giving academic success/results more/better impact in the non-scientific spheres of activity. This in turn fosters the acquisition of resources for scientific activities.

If HEROs are to fulfil their calling to contribute to future socio-economic growth then, especially during periods of economic downturn, they need to develop a carefully thought through and well presented line of argumentation that demonstrates fine resource management and accountability in support of clearly defined, attainable and relevant goals. Such argumentation can facilitate the efforts of their organs of governance to swim against the commonly adopted short-term perspective of reducing public budgets. From the internal managerial perspective, both Foresight and ICM can contribute to making the best use of available resources. These two goals are realised by balancing, in a reasonable way, science and research interests with the management of their realisation. In other words: Establish/optimise management and service processes to foster the organisation's successes, which can be characterised, for example, by:

- more research activities/projects;

- high quality and good visibility of research results;

- high potential students, research and teaching staff;

- excellent reputation and international standing.

The aforementioned can be illustrated by the following examples:

- Vision and strategy: Build a shared vision of the future among the members of the HERO.
- Management and organisation, Structural Capital, Relational Capital: Understand that even the most exciting research results have more impact when they are strategically managed (efficient resource planning, excellent relationships with financial and political stakeholders, visible placement in scientific and non-scientific (!) media etc.).
- Human and Relational Capital: Critical success factors for qualification of scientific staff for work outside academic institutions, building a dense network of "stakeholders", e.g. alumni and collaborators of high standing.

Whereas the development of a Strategic Plan is a starting point (currently developed by most European HEROs and even a requirement placed on them by some national governments) the definition of priorities (which implies resources' allocation) and the implementation of the Strategic plan is not always "possible" due to the organisational models and practices that most universities and some public research organisations have (protectionist behaviour of individual interest groups, etc). The methods discussed here import "business thinking" (business development, organizational development, customer care, networking) into the academic field of HEROs; in both mindset and action, so as to identify and address their specific environments or markets, which consist of "customers", "co-petitors", "power-brokers" and "stakeholders".

TF can be used to address a common pitfall of management tools being "superimposed on older managerial practices" (Deem 2001), and at the same time "educate" an organisation's internal stakeholders in issues such as: First develop an appropriate culture and structure and then adopt the desired processes and procedures. We could phrase this as follows, "Do not choose the horse before you see the cart and know the journey". In other words, know the 'load' that has to be pulled, how far and over what terrain before choosing the 'horse' to do it. The use of IC Reports as part of the material considered in the foresight exercise could be a suitable way to cope with the new managerial requirements, since they allow a good visualization of an organisation's inputs, outputs and processes in a comprehensive way and so provide a way to justify and support the decision making process.

6. Concluding summary and future lines of action

HEROs, as well other organisations, are part of a changing environment that is characterised by increasing uncertainty, growing competitiveness and new demands for accountability and socio-economic relevance. They are increasingly affected by changes in society and the economy. The need to build an intangible organisation with a vision of the future, while incorporating sustainable management methods, is becoming crucial for HEROs; especially because the entire reason for the existence of a HERO is the development and exploitation of intangibles (both its "own" and those of its "co-petitors"). Due to the specific character of HEROs, and in contrast to clearly profit-oriented companies, a serious difficulty is encountered when trying to implement "business" thinking in universities, where departmental directors and faculty deans are academics elected by their own scientific community (often on the basis of *"Whose turn is it for the next two years?"*). In their role as the head of a Department or a Faculty they have to deal with financial and organisational affairs, including managing people, for which their academic expertise is no guarantee of success. In fact, managerial skills are rarely taken into account when electing this person and much more emphasis is put on the candidate's academic prestige (Elena 2007). In some organisations, with the right quality of leadership and appropriate preparation, it may be possible to address this situation over a period of time by implementing a Change Management process that incorporates both TF and IC Management techniques in an inclusive and participatory way. Many of the issues addressed and illustrated in this paper could provide the starting point of such an initiative.

It may be appropriate to discuss in future work the extent to which their application on a organisational level could increase the probability of sustainability in the face of present and upcoming challenges for HEROs, to extend existing methods and models with respect to holistic sustainable management and to promote further empirical research on these issues. This paper may be a starting point providing the core idea; now concrete hypotheses should be generated, discussed in detail, rigorously analysed and empirical evidence sought.

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Intellectual Capital Creation in Post-Communist European Union Economies in 2004-2008

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Abstract: The paper will aim to gauge the impact of all major classes of intellectual assets on the recently admitted post-communist countries of the European Union (EU) by addressing the following two hypotheses: Hypothesis 1: the high quality of intellectual assets in ex-communist, EU convergent economies has helped lure foreign capital and has led to substantial direct and indirect investments in these countries. Hypothesis 2: the aforementioned investment inflows have spurred creation of immaterial goods and services in these countries, as emphasis on research and development on intangibles has grown, while commercialisation and legal protection have improved dramatically. The EU expansion implemented since 2004 has been the most significant of its kind since the inception of the Community. Many new EU entrants have struggled to overcome the backwardness of their systems: conceived and cultivated in (perhaps) the most dysfunctional and counterproductive economic circumstances ever imaginable. As bizarre as it may appear in the context, the EU convergent economies, despite an undisputable obsolescence of their infrastructure and manufacturing/services potentials, have displayed a high level of sophistication in selective - and yet critical – areas of intangible development:

Human capital The educational systems of post-communist EU countries have, generally, delivered a superior standard of instruction and – oftentimes – scientific research, with particular regard to scope and universality.

Social capital: The societies of the admitted EU countries have displayed numerous characteristics of modernism (including youngness of their populations), which has positively reflected on the propensity to innovate.

Risk tolerance The new EU countries have shown a profound appetite for risk, a prerequisite for innovation. This has been as much a function of economic development and aspirations, self-reliance (shock therapies of post-communist governments wiped out much of the welfare state benefits) as technological leapfrogging.

Having said all that, the ex-communist countries of the enlarged EU at the very outset of their transition faced systemic obstacles to the expansion of their immaterial asset base:

Commercialisation The post-communist EU members have not been equipped with the managerial skill set necessary for the successful marketing of intangibles created within their borders.

Inadequate legal protection The collectivism of communist economies did not foster an environment of security with regard to traditional assets, let alone vis-à-vis intangibles. Plenty thus needs to be done to reform the ex-communist legal systems.

Emigration Following the overthrow of communism and gradual lifting of barriers to the free movement of intellectual assets across the enlarged EU, some innovators and many of their works have oozed away. This, if left unmitigated, might be a long-term threat to intangible creation in “New Europe”.

The research will try to examine correlations between the initial status and growth of intellectual assets in the post-communist EU and inflows of foreign investment after the accession. Individual EU members will be ranked by the quality of their intellectual capital base, and scale of foreign direct/indirect investment. Finally – policy recommendations will be formulated to enhance the potential for intellectual capital creation.

Keywords: Intellectual capital, post-communist, European Union

1. Introduction

The paper endeavours to demonstrate the significance of intellectual capital for the growth of post-communist economies of Central and Eastern Europe, which have successively joined the European Union. Firstly, it offers a glimpse of EU eastward enlargement – in geopolitical and scale-related terms. Given the international character of the conference, such a succinct preview seems justified. Secondly, the publication examines the inflow of foreign investment in two principal forms (direct and indirect).Thirdly, this brief study endeavours to tie foreign capital commitments in both forms with the diffusion of selected intellectual capital factors in the Central and Eastern European region, and a proxy for risk. The choice of intellectual capital “drivers” employed for the purposed of this paper is as much a function of technical appropriateness as practical availability. Last – but not least – tentative conclusions relating to the purported link between foreign investment into the region and the potential

for intellectual capital growth are drawn.Given the obvious limitations (the EU's expansion in post-communist countries has a meagre four-year record), any wide-ranging observations and glittering generalities are particularly dicey. Despite the constraints, a few compelling suppositions can be risked.The appendices (1-9) contain statistical data compiled for the purposes of this research.

2. European Union's eastward enlargement

Central and Eastern European (CEE) countries have joined the European Union in two waves following the precipitating erosion of the Soviet Union's command economy and gradual dismantling of the entire Communist Bloc. In 2004, the EU was expanded eastwards by eight members: the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia and Slovenia.In 2007, upon completion of the most recent enlargement exercise in CEE, the EU extended south-eastwards – to Bulgaria and Romania. Thanks to the combined effect of both enlargements in CEE, the Community added, roughly, a million square metres to its area (one fourth of the present-day size) and some 100 million to its population (one fifth of today's total). See Figure 1.

Figure 1: EU enlargement source: Gateway to the European Union (http://europa.eu/).

Table 1: EU enlargement in Central and Eastern Europe undertaken since 2004 – basic data

Country (original name)	Entry year	Political system	Capital city	Total area (km^2)	Population (million)	Currency (code)	Official language
Bulgaria (България)	2007	Republic	Sofia	111,000	7.7	Lev (BGN)	Bulgarian
Czech Republic (Česká republika)	2004	Republic	Prague	79,000	10.3	Czech koruna (CZK)	Czech
Estonia (Eesti)	2004	Republic	Tallinn	45,000	1.3	Estonian kroon (EEK)	Estonian
Hungary (Magyarország)	2004	Republic	Budapest	93,000	10.1	Forint (HUF)	Hungarian
Latvia (Latvija)	2004	Republic	Riga	65,000	2.3	Lats (LVL)	Latvian
Lithuania (Lietuva)	2004	Republic	Vilnius	65,300	3.4	Litas (LTL)	Lithuanian
Poland (Polska)	2004	Republic	Warsaw	313,000	38.1	Zloty (PLN)	Polish
Romania (România)	2007	Republic	Bucharest	238,000	21.6	Leu (RON)	Romanian
Slovakia (Slovensko)	2004	Republic	Bratislava	49,000	5.4	Slovak koruna (SKK)	Slovak
Slovenia (Slovenija)	2004	Republic	Ljubljana	20,000	2.0	Euro (EUR)	Slovenian

Source: Gateway to the European Union (http://europa.eu/), national web sites, CIA World factbook 2008

3. Inflows of direct and indirect investments into CEE in 1998-2007

To begin with, it is useful to define the concepts of foreign direct investment (FDI) and foreign indirect investment (FII). FDI is thus "an investment involving a long-term relationship and reflecting a lasting interest of a resident entity in one economy (direct investor) in an entity resident in an economy other than of the investor. The direct investor´s purpose is to exert a significant degree of influence on the management of the enterprise resident in the other economy. FDI involves both the initial transaction between the two entities and all subsequent transactions between them and among affiliated enterprises, both incorporated and unincorporated. FDI may be undertaken by individuals, as well as business entities"(UNCTAD 2008).

3.1 FDI inflows into CEE

The CEE countries have all experienced FDI inflows into their economies during 2004-2007, albeit their magnitudes have varied and have exhibited considerable volatility. It is noteworthy that the biggest inflows took place on the eve of and during the first wave of EU enlargement (2004).

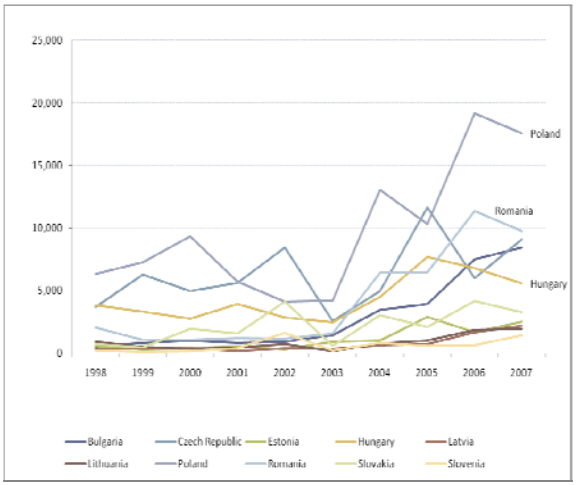

Figure 2: Foreign Direct Investment inflows into CEE economies in 1998-2007(US$ million) Source: UNCTAD 2008

Due to the extended data range, significant number of observations and clear disparities of economic scale amongst the CEE economies under review, a measure of total FDI influx into the entire region is by far more illustrative. As shown in Figure 3, the polynomial order-6 trend line exhibits a near perfect (an R-squared value of 0.949) fit with the data series for summary FDI in CEE. Interestingly, the first EU expansion wave (in 2004) triggered a massive FDI rally across the entire CEE 10-member board, as if the subsequent enlargement (accomplished in 2007) had already been anticipated.FDI expansion for the region peaked out in 2007 and – as a result of global factors as well as problems relating to macro- and microeconomic restructuring – is expected to contract considerably in 2008. This is mirrored by the final stretch of the trend line.

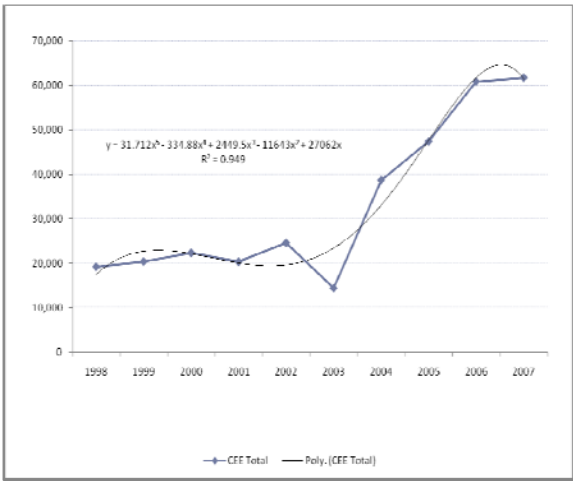

Figure 3: Total Foreign Direct Investment inflows into CEE(US$ million) *Source: UNCTAD 2008*

3.2 FII inflows into CEE

For the purposes of this study, FII is defined by the international investment position of individual countries according to the Statistical Office of the European Communities (Eurostat 2008).

Eurostat's international investment position (IIP) statistics "record the financial assets and liabilities position of a country vis-à-vis the rest of the world. The data are based on the guidelines on the statistical reporting requirements of the European Central Bank (ECB) in the field of balance of payments, international reserves and international investment statistics". In order to account for the portfolio equivalent of FDI (i.e. long-term commitment to a listed company's capital through the purchase of financial securities), Consequently, the extent to which indirect investment has been committed to a CEE economy can be gauged by the scale of "liabilities" (at national level) owed the outside universe and held in the form of listed equity. The Eurostat data, broadly, follow the growth pattern demonstrated by the FDI graph (with investment euphoria gathering momentum in the course of EU accession), albeit conclusions can be drawn only with a few significant caveats. Firstly, Eurostat's data set is incomplete, which is particularly vexing in the case of Slovenia in the final year of observation (2007, when historical growth for CEE appears to have receded to pre-accession levels). Secondly, the insignificant (yet rising) effect of capital flows within the peer (CEE) group slightly distorts the overall findings. Thirdly, and lastly, strong reservations have to be expressed as to lasting character of investments in financial securities – this, however, is the very nature of liquid financial markets and something beyond the scope of this publication.

The graph is a close (R-squared value of 0.933) match for the order-6 polynomial trend line (whose formula is displayed below). As mentioned, owing to the misgivings about the Eurostat data series, caution ought to exercised in arriving at far-reaching conclusions.

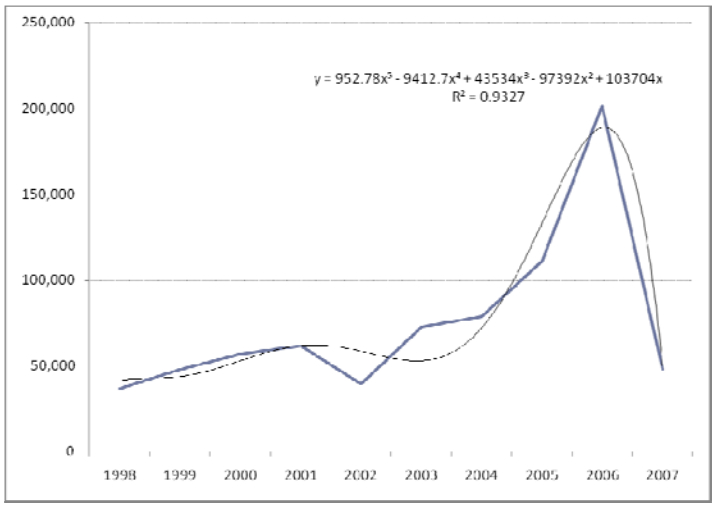

Figure 4: Total Foreign Indirect Investment into listed equity in CEE in 1998-2007 (ECU/€ million) source: Eurostat 2008

4. Intellectual Capital creation in CEE in 1998-2008

Accounting for IC development/potential is a tricky endeavour for a number of reasons. Firstly – the very concept of IC is a matter of ongoing debate. Secondly – the rigidness of available statistics (usually based on conservative technical and socioeconomic nomenclature) does not help construct an adequate set of variables capable of capturing modern intellectual wealth. Thirdly – the spacial-temporal reasoning is further blurred by the brisk convergence (catch-up) effect of CEE with the "old", pre-enlargement EU (oftentimes referred to as "EU 15"), during which a great deal of technological "leapfrogging" is taking place. As a result, CEE is likely to skip certain development stages particular to EU 15 (a frequently cited example is CEE's sustained boom in cellular telephony against relatively limited landline penetration); or might even undertake innovation in areas yet unexplored by the more established EU economies (cf. Brezis, E., Krugman, P., and Tsiddon, D. 1991). Despite these benchmarking predicaments, the following pan-EU measures, combining diverse IC related phenomena, have been applied to CEE:

- *Enrolment in tertiary education* attests both to the youngness and dynamism of the CEE populations, as well as to the growing importance of human aspects of IC quality in its most basic

form. After all, tertiary education is universally regarded as a formal prerequisite for most value added activities (e.g. research and development) in and outside academia for the 21st century. Participation in university education can thus be viewed as a *forward-looking measure* of an area's future capacity for IC diffusion and, consequently, FDI competitiveness. Feedbacks and synergies between higher schooling and FDI attraction were discussed in a special paper by the Organisation for Economic Cooperation and Development concerning Southeast Asia (OECD 2002).

- *Information technology (IT) expenditure*. Given a widely held conviction as to unhindered (despite recurring volatility in financial markets) expansion of advanced technology at the turn of the centuries, the scale of spending on IT can be interpreted as a proxy for *future technical sophistication* in this critical area, which should help lure FDI. The choice of IT expenditure for IC measurement has been motivated by a willingness to account for the most vital component of modern technological progress, which is recognized as the primary factor driving the development of human civilization (Nolan, P. and Lenski, G. 2005).
- *Communications expenditure*. A broader and more fundamental yardstick of technological development (than IT outlays), as "brick-and-mortar" infrastructural aspects come into play, yet an undisputable link with high technology exists. Communications expenditure can thus be interpreted as a commitment to *comprehensive infrastructure*, whose standards play a key role in a area's propensity to undertake innovation and – consequently – compete for FDI. The choice is consistent e.g. with arguments voiced in the National Intellectual Capital Index constructed for the Arab region under the United Nations' aegis (Bontis 2004). It is of particular notice that CEE has (had) to overcome a painful legacy of infrastructural backwardness caused by prolonged neglect and mismanagement in the communist era.
- *Gross Expenditure on Research and Development (GERD)* is a "total intramural [i.e. domestic] expenditure on research & development (R&D) performed on the national territory during a given period. It includes R&D performed within a country and funded from abroad but excludes payments made abroad for R&D" (UNESCO 2008). Consequently, GERD can be seen as "*IC in the pipeline*"; it strategic ramifications for US macro-economic competitiveness (including IC productivity and FDI allocation) have recently been reviewed by the National Science Board (NSB 2008). Similar (or even more forthright) conclusions can be drawn in respect of emerging markets' GERD intensity (the need to emulate developed economies).
- *Patent applications to the European Patent Office (EPO)* demonstrate, on the one hand, the extent of IC protection in the EU jurisdiction, while, on the other, tendencies in the development of high-profile IC assets (logically, patent applications involve innovation perceived by the applicant as valuable and vulnerable, hence the necessity for legal coverage). Regrettably, no statistically representative and reasonably consistent data on CEE have yet been obtained from the United States Patent and Trademark Office (USPTO), yet the scale of CEE patenting in the US in 2004-2007 is still expected to have been rather insignificant. Patenting can be deemed as a pre-requisite for a *successful value extraction* from IC creation – which, for reasons evident from the aforementioned measures – is a risky and costly exercise. Symbolically, the act of patenting excavates a protective "moat" around intellectual property, i.e. a quasi-monopoly (Singleton 2006).
- *European Court of Human Rights (ECHR)* application statistics provide a benchmark for legal standards with regard to the most fundamental human rights "to life, a fair hearing in civil and criminal matters; to respect for private and family life; freedom of expression, thought, conscience and religion; the right to an effective remedy, the peaceful enjoyment of possessions; and the right to vote; stand for election"(ECHR 2008). Although freedoms safeguarded by the ECHR are rudimentary, numerous applications (to the ECHR) from a given country can be interpreted as a likely challenge to the security of assets being held in the national jurisdiction and, by consequence, a deterrent to IC creation as well as – ultimately – an FDI risk factor. Application of this particular measure to IC benchmarking would perhaps be superfluous if all of the reviewed jurisdictions afforded analogous levels of asset protection. Empirically, emerging economies tend to exhibit varying *availability and effectiveness of legal recourse*, hence the decision to incorporate ECHR data into this study; a brief outline of links between IC (and, broadly, wealth creation) and human rights has been compiled in a report by Prof. Mohamed Ben Ahmed written for the United Nations Economic Commission for Africa, UNECE (Ben Ahmed 2003).

4.1 Enrolment in tertiary education in CEE in 1998-2006

As evidenced by Figure 5, enrolment in tertiary educational programs has been on the sluggish, but steady rise in CEE as a whole during the analysed period, with Poland, thanks – but not exclusively – to its scale, far above its CEE peers. It is worth noting that the continued commitment to tertiary schooling has coexisted with considerable strains in national budgets during the period of post-communist transition. Funding for education and growing capacity in this sector was, to a growing extent, attributable to private sources. Since most of universities and colleges across CEE are still controlled and managed by the state, the scope for commercially driven FDI or FII in this area is limited, although gravity is shifting towards private ownership, including twinning partnerships with international schools.

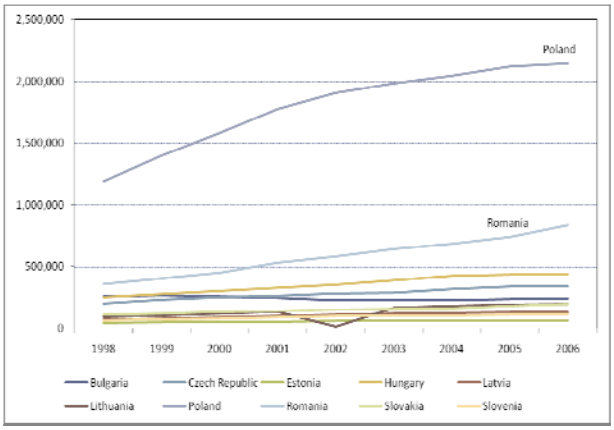

Figure 5: Tertiary education student enrolment in CEE in 1998-2006 *Source: Eurostat 2008*

4.2 IT expenditure in CEE in 2004-2006

Regrettably, the available data set (Eurostat 2008) covering all the surveyed CEE economies spans solely the period 2004-2006, therefore is neither particularly comprehensive, nor up to date. Based on the available data, however, linear growth can be observed during the period. Poland (especially), the Czech Republic and Hungary (the Central European economies) manifested the largest scale and pace of spending on IT, though the rise was far from staggering.

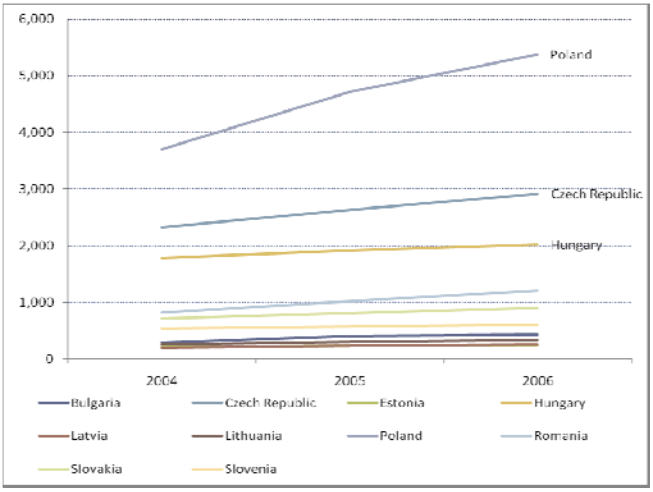

Figure 6: IT expenditure in CEE in 2004-2006 (ECU/€ million) *Source: Eurostat 2008*

4.3 Communications expenditure in CEE in 2004-2006

Similarly to IT funding, CEE as a group showed a steadily growing commitment to expenditure on communications. Unlike IT, however, Poland commanded a clear lead in the entire peer (CEE) group both as regards the scale (quite natural, given size differentials) and tempo of spending. Caveats, again, need be voiced over any conclusions based on such a scant data range.

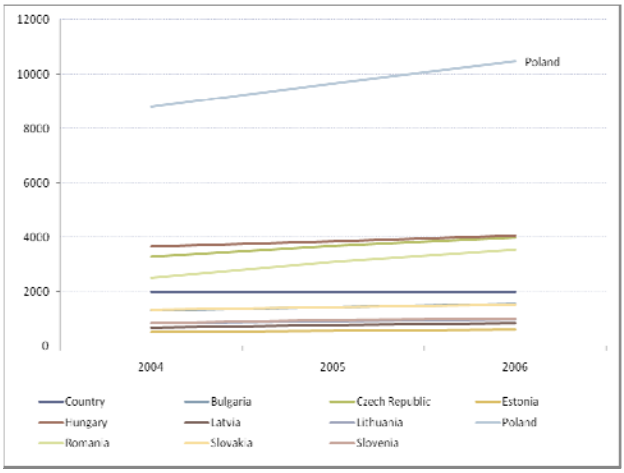

Figure 7: Communications expenditure in CEE in 2004-2006 (ECU/€ million) *Source: Eurostat 2008*

4.4 Gross xpenditure on Research and Development (GERD) in CEE in 1998-2006

In contract to the statistics on IT and communications outlays for CEE, the GERD figures (Eurostat 2008) are reasonably ample and fairly conclusive. CEE posted a concurrent and dynamic increase in gross spending on R&D, with particular acceleration coincident with the pre-accession stage and in direct parallel with the FDI influx. The rise was particularly remarkable, not exclusively due to scale related factors, for the Central European states (the Czech Republic, Poland, Hungary), as well as Slovenia and Romania.

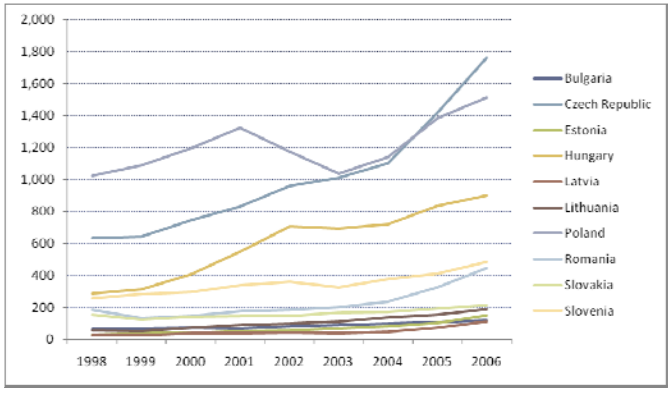

Figure 8: GERD in CEE (individual economies) in 1998-2006 (ECU/€ million) *Source: Eurostat 2008*

Interestingly, the polynomial (order-5) trend line for the CEE peer group fits the surveyed growth in GERD with admirable proximity (the R-squared value amounts to 0.997). The prospect of and the EU enlargement itself, backed by the infusion of foreign investment (in direct and indirect forms), occasioned a steep upswing in GERD beginning in 2004.

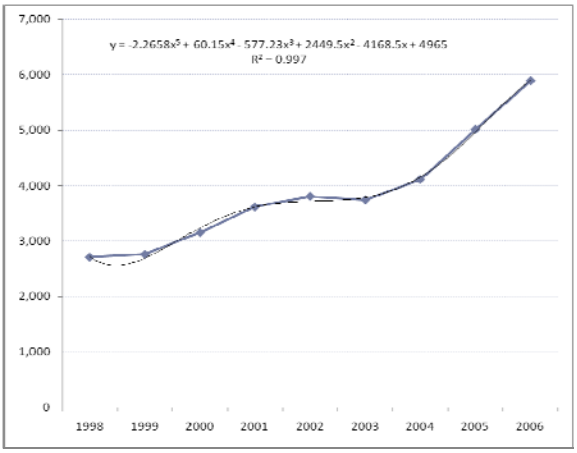

Figure 9: GERD in CEE (in total) in 1998-2006 (ECU/€ million) *Source: Eurostat 2008*

4.5 CEE's Patent applications to the European patent office in 1998-2005

The significance of patent application statistics, as mentioned in the introduction to this paper, is twofold. Firstly, such applications are a proxy for the sophistication of intellectual assets being developed in a certain area (in their absence the rationale for patenting would be nonexistent). Secondly, the gradual integration of CEE economies within the European Community and a growing scale of business interaction amongst individual EU members, have merited a superior standard of protection of innovation on a consolidated (pan-European) scale. It is noteworthy that patent rights are, in essence, territorial and a patent protects against infringement in the jurisdiction of a patent office responsible the given territory. Therefore, the need for effective patent enforcement across national borders, especially by ex-communist states (having a limited background in protecting property, let alone, intellectual assets) seems undeniable.

In the aforementioned context, it is easy to display leaders of patent creation and protection within the CEE peer group. The case of Poland, by far the largest of the accession countries to have joined the EU over the past four years, is evident (it would be surprising, given its sheer size, if it were not somewhere at the top of patent applicants in CEE). The Polish case is, nonetheless, proven by other Central European economies (Hungary, the Czech Republic, and, finally, Slovakia) as well as miniscule Slovenia, by now a Eurozone member with the most compelling record of economic convergence with the "old" EU group.

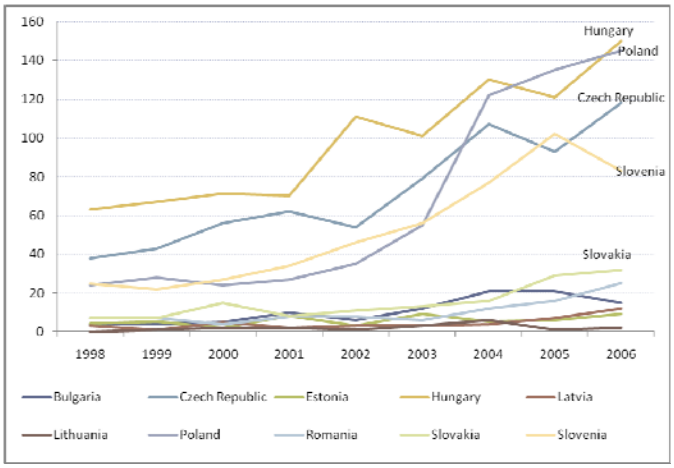

Figure 10: CEE EU members' patent applications to the European Patent Office (EPO) in 1998-2005 s*ource: EPO 2008*

In total, CEE has recorded a substantial increase in patent filings, with noticeable progression prior and during the initial period of EU integration. The trend line, marked by an order-5 polynomial curve (R-squared, quite closely, at 0.9863), begins to level off at year 2006; unfortunately, more recent observations are not yet available.

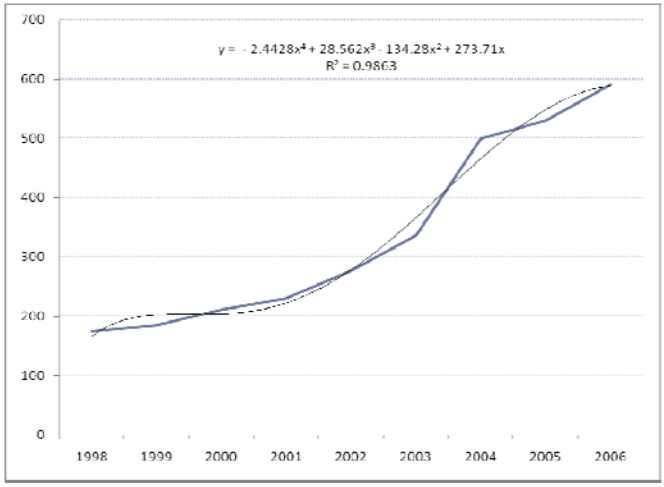

Figure 11: CEE's total applications to the European Patent Office (EPO) in 1998-2005 *Source: EPO 2008*

4.6 Cases pending before the European Court of Human Rights (ECHR)

Standards of asset security, in particular those relating to intellectual property, are extremely difficult to quantify. One of the possible yardsticks can link the riskiness of holding assets in a given jurisdiction to the occurrence of pending legal cases as to their title, especially at EU level (i.e. after all national remedies have been exhausted). Regrettably, sufficiently consistent and extended statistics of this sort (for the CEE peer group) are available neither from the Court of Justice of the European Communities (otherwise referred to as the "European Court of Justice", or "ECJ"), nor from the European Court of Human Rights (ECHR) (ECJ 2008), (ECHR 2008).In the absence of more specific data, general statistics on cases pending before the ECHR and filed by applicants from individual CEE countries have been taken into account. Interpretation is further blurred by the short data series (2005-2007) derived from the currently available ECHR annual reports (ECHR 2008).The number of cases (relating, as aforesaid to the most fundamental human rights) is likely to indicate the functionality of the respective legal systems in CEE. Among the rights safeguarded by the ECHR are "the right to the peaceful enjoyment of possessions", "the right to a fair hearing in civil and criminal matters" and "the right to an effective remedy", which all have a direct impact on the security of assets, notably intangibles. Empirically, issues relevant to the availability of a legal recourse in national jurisdictions have dominated the ECHR's activity for years, if not decades. Judging by the following statistics, the number of CEE cases pending before the ECHR had culminated in 2006 and began to decline in 2007. Any interpretation as to trend fitting based on three observations would, however, be precarious.

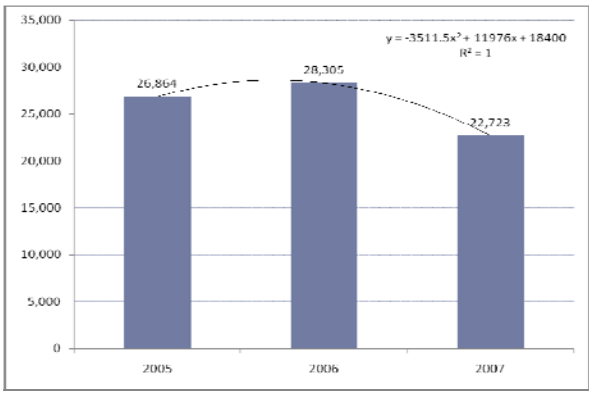

Figure 12: European Court of Human Rights: cases pending in CEE at year-end (2005-2007) *source: ECHR 2008*

Finally, the following breakdown (by CEE country) demonstrates the aggregate number of applications filed with the ECHR (on a per-country basis) in 1998-2007, attesting to likely challenges in respect of effective legal remedies at national level in the CEE states.Poland, in view of its size but also persistent problems with judicial effectiveness (e.g. regarding the length of legal proceedings), commanded an undisputed (and commensurately censurable) lead in this ranking; followed by Romania, the Czech Republic and Bulgaria, where similar problems frequently occur.

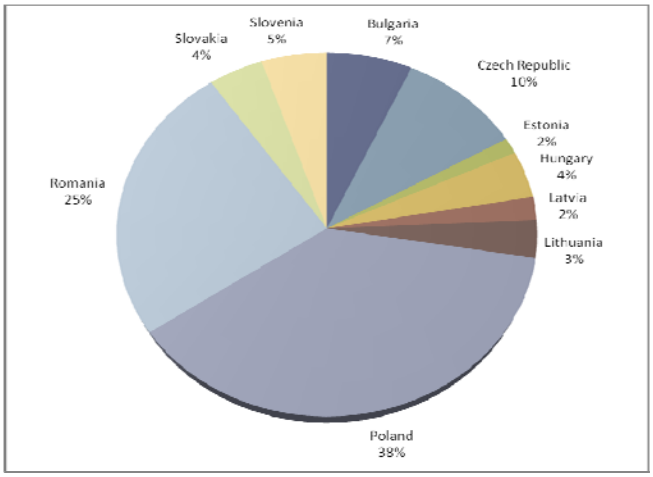

Figure 13: European Court of Human Rights: per-country applications from CEE allocated to a decision body in 1998-2007 s*ource: ECHR 2008*

5. Conclusions

As a result of this brief study, the following tentative conclusions can be drawn with regard to foreign investment and intellectual capital creation in the post-communist EU accession countries of CEE:

- CEE economies recorded a massive *inflow of foreign direct and indirect investments* in the run-up to EU accession, which continued into 2004-2006 and began to ebb in 2007.
- CEE, led by Poland, enjoyed a *steady, linear increase of enrolment in tertiary education* institutions, albeit its tempo, possibly due to limited commercialisation and funding opportunities, slightly decelerated right before and during the accession. The tendency was aggravated by post-accession migrations, which considerably drained the young populations of CEE countries.
- CEE economies, notably Central European states (again, led by Poland), exhibited a *linear growth trend of expenditure on information technology* based on the available data (for 2004-2006).
- A *similar* (to information technology), yet less accentuated growth tendency can be inferred in respect of *spending on communications in CEE* in 2004-2006, with Poland in the lead as to the scale (expected), but also the pace of expansion.
- *Gross Expenditure on Research and Development*, for which abundant data exist, *mirrored the trends of foreign direct and indirect investments*, hence a correlation of foreign funding inputs with GERD outputs can – cautiously – be postulated. The three countries of Central Europe (the Czech Republic, Poland, Hungary) and Slovenia clearly outperformed the CEE peer group with regard to volume and pace.
- *Patent protection statistics*, broadly speaking, *replicated the patterns of foreign investments and GERD*, with the three Central European nations (Hungary, Poland, the Czech Republic) and Slovenia being the most active in applications at the European Patent Office.
- Based on the limited data set (2005-2007), the total of cases before the European Court of Human Rights originating from CEE began to fall beginning with 2007. For 1998-2007, the largest number of applications was attributable to *Poland, Romania, the Czech Republic and Bulgaria*, which – beyond scale related factors – might be indicative of lasting problems with the effectiveness of these countries' judiciaries and, consequently, *heightened risk* of *adequate protection* with regard to *intellectual assets.*

Recommendations applicable to CEE countries ought to encompass commitments to:

- *Legal system enhancement*: the quality of legal remedies in the CEE region is widely perceived as inferior to that of the "old" EU members; the number of applications to international courts is a case in point. Intellectual capital, by the very token of its immateriality, humanism and mobility, is particularly vulnerable to encroachment. Regimes that fail to safeguard property are likely to witness it haemorrhage. This scenario is especially likely in an integrated economic area, such as the EU, where national borders matter increasingly less.
- *Institutional transparency*: this broad category comprises an array of objectives, such as fight against corruption, meritocracy in business decisions as well as increased commercialisation. Success in this area will persuade the creators of intellectual goods and services to continue their creativity and keep employing their skills locally.
- *National strategies*: the critical importance of intellectual assets to the sustainable economic expansion of CEE countries validates the formulation of national strategies on intellectual capital. These ought to include measures of legal protection as well as a variety of economic incentives. Ideally, they should outline specific industries wherein CEE economies can attain internationally viable comparative advantages.
- *Further integration with EU 15*: the CEE economies stand to gain a great deal from seamless integration with the "old" EU members (EU 15) – including broader access to EU structural and cohesion funding. Such funding, as per EU objectives and guidelines, specifically targets upgrades in traditional and modern infrastructure. CEE economies should make every conceivable effort to benefit from these immense opportunities, which would on the one hand facilitate IC creation, whilst on the other help entice and retain FDI. Last (but not least), given the large scale of existing interaction with EU 15 (dominated by the euro) and relative frailness of CEE currencies, adopting the European currency by CEE economies would, in the long term, appear to be a macro-economically sustainable as well as IC- and FDI-friendly exercise.

6. Appendix 1: Foreign Direct Investment (FDI) inflows into CEE countries in 1998-2007 (US$ million)

Country	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Bulgaria	537	819	1,002	813	905	1,419	3,452	3,923	7,507	8,429
Czech Republic	3,700	6,310	4,984	5,639	8,483	2,583	4,974	11,658	6,013	9,123
Estonia	581	305	387	542	284	891	971	2,879	1,674	2,482
Hungary	3,828	3,312	2,764	3,936	2,845	2,470	4,506	7,709	6,790	5,571
Latvia	357	347	411	163	384	360	637	713	1,664	2,173
Lithuania	926	486	379	446	732	179	773	1,032	1,840	1,934
Poland	6,365	7,270	9,341	5,713	4,131	4,225	13,091	10,363	19,198	17,580
Romania	2,031	1,041	1,037	1,157	1,144	1,566	6,436	6,483	11,366	9,774
Slovakia	707	428	1,925	1,584	4,123	571	3,031	2,107	4,165	3,265
Slovenia	218	106	137	369	1,606	181	831	577	645	1,426
CEE Total	19,250	20,424	22,367	20,362	24,637	14,445	38,702	47,444	60,862	61,757

7. Appendix 2:Foreign Indirect Investment (FII) inflows into CEE countries in 1998-2007 (ECU/€ million)

Country	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Bulgaria	97	98	107	109	74	25	213	285	300	351
Czech Republic	3,218	2,715	3,300	4,028	4,057	4,344	6,856	7,603	8,790	9,859
Estonia	260	498	464	456	606	753	1,424	1,010	1,433	1,653
Hungary	n.a.	n.a.	3,238	3,340	3,606	4,439	8,326	11,112	13,986	10,383
Latvia	36	51	42	49	67	98	113	198	252	261
Lithuania	92	107	138	108	106	115	127	269	617	508
Poland	4,257	4,968	5,758	4,905	4,199	5,334	10,033	15,868	17,138	22,457
Romania	n.a.	427	523	568	492	554	647	831	1,157	1,720
Slovakia	87	340	311	454	491	395	339	454	506	514
Slovenia	28,529	38,647	42,822	47,250	25,657	56,594	50,568	73,579	157,501	n.a.
CEE Total	36,576	47,851	56,703	61,267	39,355	72,651	78,646	111,209	201,680	47,706

8. Appendix 3: Tertiary education students in CEE countries in 1998-2006

Count.	1998	1999	2000	2001	2002	2003	2004	2005	2006
BG	260,487	270,077	261,321	247,006	228,394	230,513	228,468	237,909	243,464
CZ	202,291	231,224	253,695	260,044	284,485	287,013	318,858	336,307	337,405
EE	43,064	48,684	53,613	57,778	60,648	63,625	65,659	67,760	68,287
HU	254,693	279,397	305,702	330,549	354,386	390,453	422,177	436,012	438,702
LV	70,233	82,042	91,237	102,783	110,500	118,944	127,656	130,706	131,125
LT	96,371	107,419	121,904	135,923	14,888	167,606	182,656	195,405	198,868
PL	1,191,099	1,399,090	1,579,571	1,774,985	1,906,268	1,983,360	2,044,298	2,118,081	2,145,687
RO	360,590	407,720	452,621	533,152	582,221	643,911	685,718	738,806	834,969
SK	112,837	122,886	135,914	143,909	152,182	158,089	164,667	181,419	197,943
SI	68,126	79,126	83,816	91,494	99,214	101,458	104,396	112,228	114,794
CEE Total	2,659,791	3,027,665	3,339,394	3,677,623	3,793,186	4,144,972	4,344,553	4,554,633	4,711,244

9. Appendix 4: Information technology expenditure in CEE countries in 2004-2006

Country	2004	2005	2006
Bulgaria	298	405	430
Czech Republic	2,332	2,634	2,915
Estonia	212	238	252
Hungary	1,786	1,918	2,027
Latvia	205	237	261
Lithuania	261	307	344
Poland	3,701	4,715	5,375
Romania	818	1,018	1,211
Slovakia	714	808	901
Slovenia	540	576	609
CEE Total	10,867	12,856	14,325

10. Appendix 5: Communications expenditure in CEE in 2004-2006 (ECU/€ million)

Country	2004	2005	2006
Bulgaria	1,321	1,438	1,564
Czech Republic	3,298	3,698	3,999
Estonia	498	555	600
Hungary	3,674	3,857	4,058
Latvia	659	764	841
Lithuania	827	896	970
Poland	8,807	9,661	10,483
Romania	2,527	3,104	3,556
Slovakia	1,337	1,439	1,541
Slovenia	830	944	997
CEE Total	23,778	26,356	28,609

11. Appendix 6: Gross Expenditure on Research and Development in CEE countries in 1998-2006 (ECU/€ million)

Count.	1998	1999	2000	2001	2002	2003	2004	2005	2006
BG	65	69	71	71	81	89	99	106	121
CZ	634	641	744	832	959	1,013	1,100	1,417	1,761
EE	29	37	37	49	56	67	83	104	151
HU	285	309	405	548	706	693	721	838	900
LV	24	25	38	38	42	38	47	73	112
LT	55	52	73	91	100	111	137	157	191
PL	1,023	1,086	1,197	1,323	1,172	1,036	1,139	1,386	1,513
RO	184	134	149	177	184	203	235	327	444
SK	156	126	143	149	148	169	174	194	217
SI	258	284	297	341	360	328	379	413	484
CEE Total	2,712	2,762	3,154	3,619	3,808	3,745	4,115	5,014	5,893

12. Appendix 7: Patent applications of CEE countries to the European Patent Office in 1998-2008

Country	1998	1999	2000	2001	2002	2003	2004	2005	2006
Bulgaria	4	4	5	10	6	12	21	21	15
Czech Republic	38	43	56	62	54	79	107	93	118
Estonia	4	5	2	8	3	9	5	6	9
Hungary	63	67	71	70	111	101	130	121	150
Latvia	3	1	5	2	3	3	4	7	12
Lithuania	0	1	2	2	1	3	6	1	2
Poland	24	28	24	27	35	55	122	135	145
Romania	7	7	4	8	8	6	12	16	25
Slovakia	7	7	15	8	11	13	16	29	32
Slovenia	25	22	27	34	46	56	77	102	83
CEE Total	175	185	211	231	278	337	500	531	591

13. Appendix 8: European Court of Human Rights: cases pending by CEE country at year-end (1998-2008)

Country	2005	2006	2007
Bulgaria	2,251	2,141	1,835
Czech Republic	2,583	3,853	2,976
Estonia	376	467	405
Hungary	1,175	1,277	1,169
Latvia	705	890	650
Lithuania	458	464	420
Poland	7,772	5,125	3,119
Romania	9,533	10,826	8,275
Slovakia	999	1,307	1,176
Slovenia	1,012	1,955	2,698
CEE Total	26,864	28,305	22,723

14. Appendix 9: European Court of Human Rights: applications by CEE country nationals allocated to a decision body in 1998-2007

Country	1998-2007	% of total
Bulgaria	5,021	6.80%
Czech Republic	7,294	9.88%
Estonia	1,027	1.39%
Hungary	3,067	4.15%
Latvia	1,509	2.04%
Lithuania	2,464	3.34%
Poland	27,988	37.90%
Romania	18,406	24.93%
Slovakia	3,227	4.37%
Slovenia	3,838	5.20%
CEE Total	73,841	100.00%

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Measuring Intellectual Capital - An Approach for Management Purposes

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Abstract: Efficient management requires decisions about the companies' objectives, potentials and activities. Performance management systems are an important assistance. Within performance management systems intangibles are only considered in some extent in quantitative manners, although they are undisputedly a determining factor for performance and future prospects of companies. One reason for this deficit is that the bridge from the categorization of intangibles to the measurement in monetary items of the intangibles at large and the distribution of the aggregative value to the single intangibles is methodically not satisfied solved so far. Causal analytical procedures and forecast procedures could achieve such monetary ascertainment for intangibles. Hence, the main feature of this paper is to present a procedure for the measurement of intangibles with regard to consideration of indicators within performance management systems. The measurement procedure is a combination of correlation and regression with the use of indicators and investment theoretical present value methods. From the starting point that the difference between enterprise value and invested capital at fair value is mainly corresponding to the amount of Intellectual Capital not considered in the balance sheet, this difference, called Market Value Added (MVA), becomes the leading item that shall be determined by using DCF-model. Based on the assumption that the information about the effect of intangible factors on planning figures would increase the quality of the planning data, this measurement-model for intangibles considers two aspects. On the one hand, in this calculation I focus the continuation value which is - beneath the discrete planned discounted FCF for a planning horizon about 5 years - one factor in the DCF-model that encompasses the value added for the time after the planning horizon. On the other hand, I am considering relevant indicators for intangibles used for example in the Balanced Scorecard. By means of regression calculation the functional correlation between the underlying indicators for intangibles and the FCF as parameter of company valuation methods, could be determined which in turn could be used as a basis for prognosis of the depending variable (FCF). As the number of value drivers of Intellectual Capital as an independent variable normally is very high, the iterative multiple regression calculation is used. This measurement-model considers two approaches: Both are based on the single regressions of the relevant indicators which are compressed to a multiple regression. One is a multiple regression model without scoring as the weighting factor and the other is a multiple regression model with scoring as the weighting factor. This combined evaluation model based on indicators and DCF-model allows on one hand a future oriented evaluation and on the other hand with the consideration of the relevant indicators a consideration of the basic cause and effect dependencies which is necessary for management purposes.

Keywords: Measurement, Intellectual Capital, management, discounted cash flow, market value added, indicators

1. Introduction

Within performance management systems, e.g. Balanced Scorecard, Intellectual Capital is only considered in some extent in quantitative manners. To improve the decision making referring to investments in Intellectual Capital this paper shows measurement procedures based on causal analytical and forecast methods. Two procedures will be presented, both based on DCF-model focusing the Market Value Added as an expression for the companys' Intellectual Capital and emphasizing the consideration of indicators used within performance management systems. Based on the assumption that the information about the impact of intangible factors on planning figures would increase the quality of the data forecast, this measurement-model for intangibles considers two aspects. On the one hand, this calculation will focus the continuation value which is - beneath the discrete planned discounted FCF for a planning horizon about 5 years - one factor in the DCF-model that encompasses the value added for the time after the planning horizon. On the other hand, the impact of relevant indicators for intangibles on the continuation value will be considered.

Both procedures are based on the single regressions of the relevant indicators which are compressed to a multiple regression. One is a multiple regression model without scoring as the weighting factor and the other is a multiple regression model with scoring as the weighting factor. Before explaining the measurement procedures, definitions and categorization as well as methods of measuring Intellecutal Capital are presented.

2. Definitions and methods of measuring intellectual capital

In theory and practice, the term intangible asset, intangibles, Intellectual capital, intellectual property, knowledge-based asset or often used synonymous (Arbeitskreis „Immaterielle Werte im Rechnungswesen“ 2001). Often, the term **intangible asset** refers to the recognition of intangibles as an asset within financial accounting whereas the other terms primarily express intangibles not considered in the balance sheet as an asset. **Intellectual capital** can be defined as „knowledge that can be converted into value” (Edvinsson/Sullivan 1996). Similar definitions see Intellectual Capital as “intellectual material [...] that can be put to work to create wealth (Stewart 1997). Intangibles, even if not considered in the balance sheet, are generating future economic benefits and hence, are important for the future performance and financial position. Their consideration in management decisions requires an expressive illustration using indicator or financial ratios.

First of all, for internal management purposes it is required to classify the company’s Intellectual Capital in various, clearly separated **categories**. In literature there are a lot of proposals on how to classify Intellectual Capital into categories. *Edvinsson* divides Intellectual Capital into Human Capital, Structural Capital and Relational Capital (Edvinsson/Malone 1997). A more detailed classification into seven categories is done by *Project Team „Intangible Asset“ of the Schmalenbach-Gesellschaft* (Arbeitskreis „Immaterielle Werte im Rechnungswesen“ 2001). As far as required, on the company level a more detailed classification can be made, however three categories should be sufficient in case to avoid common problems of demarcation.

Basically, Intellectual Capital can be measured by using a Top-Down-Approach or a Bottom-Up-Approach (Haller/Dietrich 2001). Using the Bottom-Up-Approach, the items of Intellectual Capital within a company are the starting point of measurement. By contrast, using the Top-Down-Approach the value-spread between the enterprise value and the invested capital (measured at fair value) represents more or less the total value of Intellectual Capital. This amount has to be disaggregated in order to determine the value of the single categories of Intellectual Capital. In accordance with these two approaches there are two precedures for the measurement of Intellectual Capital: deducitve summary procedures and inductive analytical procedures. Main Characteristic of deducitve summary procedures is the focus on the spread between market and book value and the calculation of a total value encompassing all categories of Intellectual Capital (so called one dimensional method). Against it, using inductive analytical procedures Intellectual Capital is measured item by item (so called multidimensional methods) (North/Probst/Romhardt 1998).

Besides, valuation methods can be classified with regards to a monetary valuation resp. a valuation based on indicators and thus not allowing a valuation in monetary terms. In addition, there are mixed valuation methods encompassing a valuation in monetary items based on indicators. The following table (Figure 1) is presenting different methods for Measuring Intellectual Capital.

The decisive disadvantage of the one dimensional methods is the aggregation of all items of Intellectual Capital. Using this method, no further information about nature and characteristic of the single items of Intellectual Capital is provided. Thus, the management does not have any concrete hints for evaluating and decision-making. On the other hand, using multidimensional methods Intellectual Capital is measured item by item.

Independent of the methods mentioned before, monetary methods (valuation methods at costs, market or value-based valuation methods) and non-monetary methods based on indicators can be distinguished. Indicators represent replacement variables for the evaluation of issues that are difficult to measure in money. They represent measurement categories with non-financial contents that allow a quantitative or qualitative assessment (Labhart 1999). The description of Intellectual Capital by indicators can be seen as a first step to capture the Intellectual Capital present in the company; at the same time a trend in development of Intellectual Capital over time becomes visible when comparing with previous years. The valuation methods based on indicators do not give information about the monetary value. Certainly, indicators are widespread within the management of Intellectual Capital, e.g. Balanced Scorecard, Wissensbilanz made in Germany, and they provide informative cognition due to a causal-analytical structure. However, a connection of figures about Intellectual Capital with the management-information-system requires a monetary valuation.

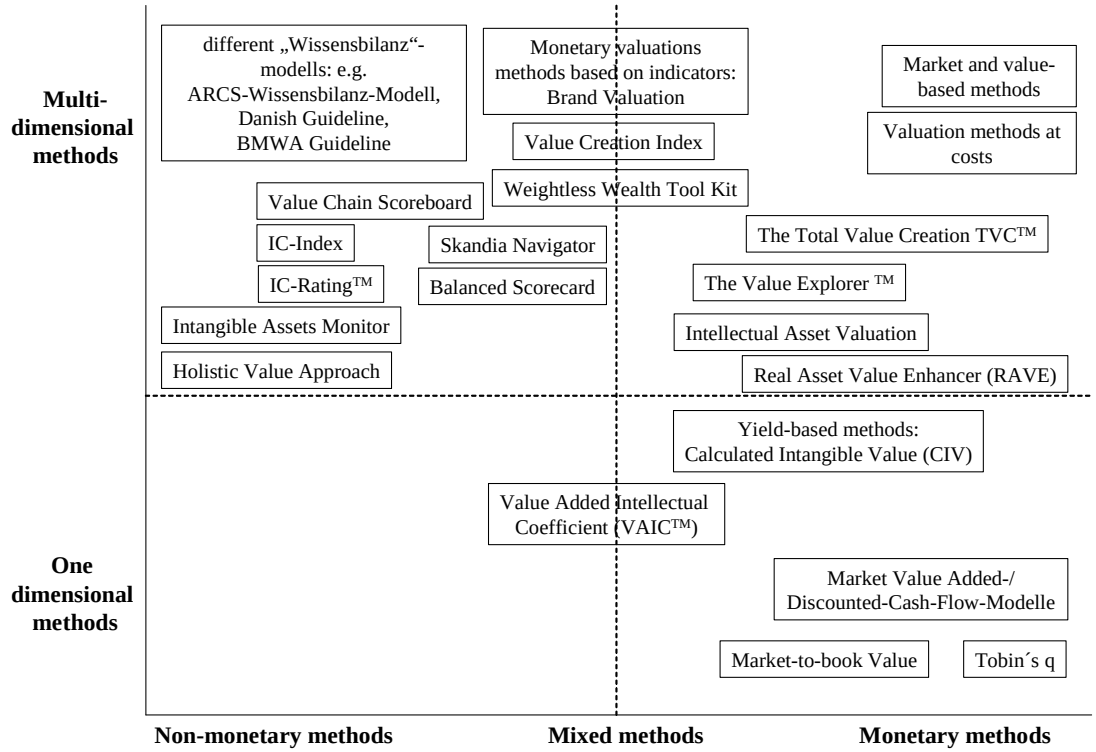

Figure 1: Methods for Measuring Intellectual Capital (excerpt)
http://www.sveiby.com/Portals/0/articles/IntangibleMethods.htm (13.11.2008))

From the perspective of management two main appraisal factors are relevant for performance management ratios: appropriateness for decision-making and influencing behavior. The first one can be explained by the factors relevance and reliability and the second one by the factors compatible with economic incentives and communication. The next table shows that the methods for measuring Intellectual Capital mentioned before do meet the appraisal factors in a different extent.

	one dimensional	mulit dimensional				
	monerary	non-moneraty	monetär			combined approach
requirements			cost based approach	market based approach	value based approach	
Relevance completeness comparability to be qualified for prognosis considering rists	+	+	-	-	+	+
Reliability impartiality correctness unambigously transparency	-	+/-	+	+	-	+/-
compatible with economic incentives not conflict of interests free of manipulation	-	+/-	-	-	-	+
communication understandable cause-effect-chain linkage to financial indicators	-	+/-	-	-	-	+/-
cost-benefit-analysis	+	+	+	+/-	-	-
practicable	+/-	+/-	+	+/-	+/-	+/-

\+ criteria is met
+/- criteria is met partly
\- criteria is not met

Figure 2: Appraisal factors for the use of management ratios

Cost based approaches meet the criteria of reliability but they are not favorable for measuring Intellectual Capital. Market based approaches reflect the fair value of intangibles. However, in most cases an active market is missing. Thus, it is not possible to get an objective value. In contrast, value based approaches are considering the future economic benefit of intangibles which is a relevant aspect. But, these mathematical models are based on several assumptions. Non monetary methods are used very often. They can be used as an indicator for the development in the future. Although non monetary methods can be judged positive although they are not sufficient due to a lack in monetary valuation.

Because of the strong focus into the future, the monetary valuation of Intellectual Capital should be based on investment theoretical present value methods, preferably the Discounted Cash Flow Method (DCF) (Rappaport 1999). Above, it is important to make the cause-effect-chain between intangible indicators and monetary figures more transparent. As a solution a combined approach would be suitable considering both, indicators and a value based approach. Against this background indicator based DCF-methods will be presented.

3. Derivation of the value for Intellectual Capital using DCF models

3.1 Impact of indicators of Intellectual Capital on significant DCF-components

Evaluation of the total Intellectual Capital requires besides the fair value of invested capital the determination of enterprise value as shown in the following graph.

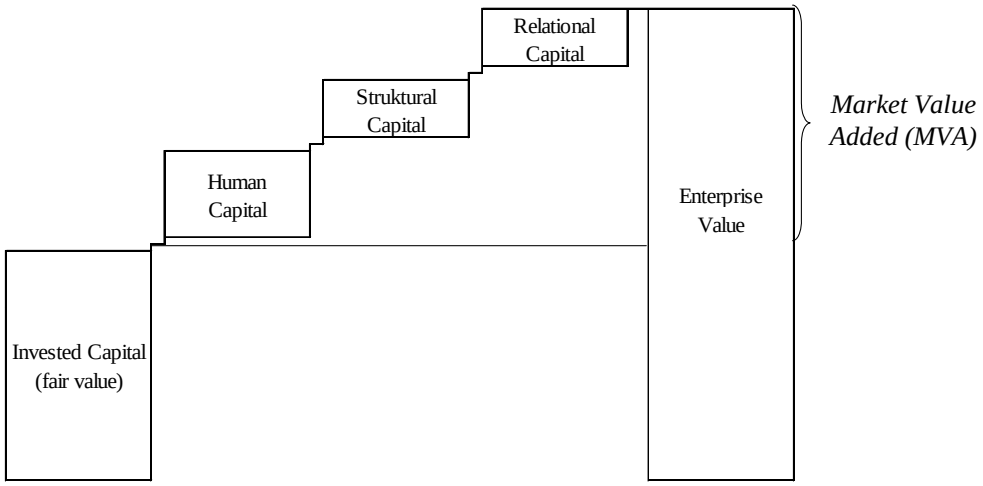

Figure 3: Graphical explanation of the difference between Enterprise Value and Invested Capital

From the starting point that the difference between enterprise value and invested capital at fair value is mainly corresponding to the amount of Intellectual Capital not considered in the balance sheet, this difference, called Market Value Added (MVA), becomes the leading indicator. The MVA shall be determined by using present value methods and then the MVA shall be devided into the categories of Intellectual Capital. Generally, it has to be noted that the derived MVA is a residual amount, mainly depending on the determination of the enterprise value. This means that it is strongly impacted by the setting of parameters and not at least by the appraisal of the person doing the valuation.42 Furthermore, it has to be observed that normally the whole is more than the sum of its parts (Haller/Dietrich 2001), which means there will be an unexplained residual value left. The remaining difference can primarily be explained with existing interdependencies and synergy effects (Hachmeister/Kunath 2005).

The MVA can be calculated either from discounted future Economic Value Added (EVA) based on the profit and loss statement or using the DCF-method based on cash flow data from the difference between expected discounted FCF and the invested capital at fair value (Stewart 1999; Hostettler 2002). Because the DCF method represents the most commonly used method (Lorson 1999), this method will be used within the following calculations.

Precisely, for the calculation of enterprise value according to the DCF method besides the discrete planned discounted Free Cash Flow (FCF) for a planning horizon of 3 to 5 years, enters another discounted continuation value as value added for the time after the planning horizon, which is calculated under the assumption of constant contributions from profits (Rappaport 1999). Especially the consideration of the continuation value as a perpetuity is problematic because of misjudgments that can impact seriously the enterprise value and thus the MVA. Therefore it is recommended to consider an upper and lower limit for the continuation value, so that the result is a bandwidth of possible values.

The planning values as well as the continuation value are discounted with the weighted average cost of capital (WACC) to the present value (Hachmeister 1996). On the basis of the planned 5-year payment series, a continuation value and under consideration of a WAAC of 10%, the enterprise value can be calculated. If the invested capital is deducted with a current value of 678 million €, the resulting MVA is an expression for the increased enterprise value.

	5 - year playment series					continuation period
	1	2	3	4	5	6ff.
Free Cash Flow (FCF)	70	60	100	110	120	130 p.a. ff.
present value	64	50	75	75	75	734
						WACC: 10%

enterprise value:	1.072
- invested capital (at fair value)	-678
MVA	394

Figure 4: Calculation of Market Value Added using the DCF-method

The sum of the discounted FCF within the 5-year payment series and the discounted continuation-FCF result to the enterprise value of 1072 Mio. €. After deducting the invested capital about 678 Mio. € the MVA amounts 394 Mio. € at the beginning of year 1.

The strengths of this valuation method that have to be pointed out are the direct derivation from the investment theory and linked to that, the future orientation that allows a complete collection of all Intellectual Capital that can be achieved. Over all, the future oriented valuation methods are afflicted with a multitude of practical problems (Schneider 2001), besides the problem of determination of the continuation value, because of the complex methods used that are depending on many assumptions: the fundamental problems of predictability of profit, the choice of the prognosis method, the prognosis horizon and last but not least the determination of the discount rate. However, these problems are valid not only for the derivation of the MVA, because even the valuations for the fair value measurement and the impairment test, primarily together with measuring goodwill, are based on assumptions. Therefore, in spite of the problems mentioned, nothing argues against use of investment theoretical methods of present value calculation for valuation of Intellectual Capital.

However, it becomes more important to increase the reliability of the provided information to assure objectivity as far as possible, which means that by giving comprehensible parameters an evaluation then should come to the same result when done under the same conditions. The derivation of MVA requires the identification and reliable assessment of relevant payments series in the same way as the reliable determination of a discount rate.

Therefore, information regarding the effect of intangible factors on planning figures would increase the quality of the planning data. The cause and effect associations will in reality not always be determined unambiguously, but it will merely be a network of interdependencies that has to be broken down. Partly it is parameters that can be influenced by the company (endogenous parameters), such as product quality, spending in research & development, and partly it is parameters that cannot be influenced by the company (exogenous parameters), such as economic growth or interest rate. In the following and oriented towards Intellectual Capital only, endogenous parameters are considered. Basically, it has to be kept in mind that investments in Intellectual Capital are not immediately affecting the success of the company but in the course of the next years. Exemplarily a possible cause and effect chain, beginning with the investment in Intellectual Capital to the point of affecting the success, is composed as follows :

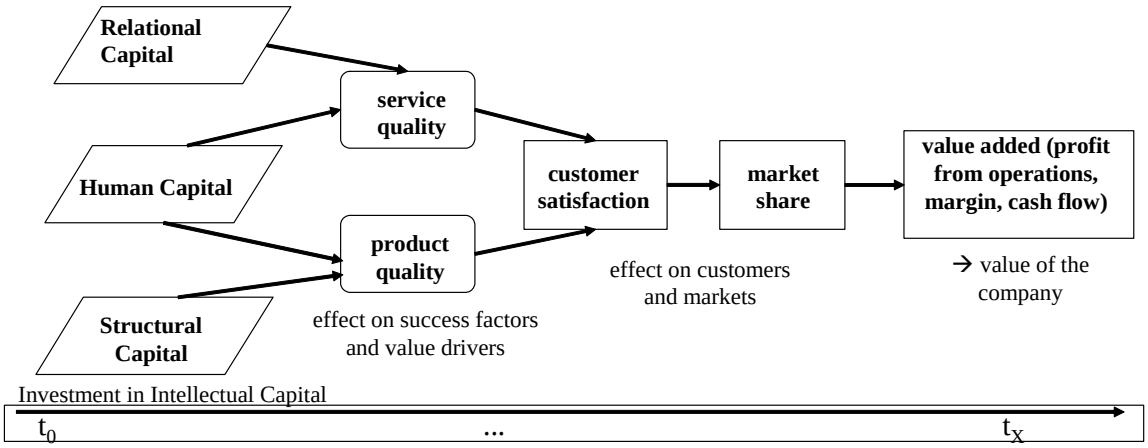

Figure 5: Effect of investments in Intellectual Capital on terms of value added (excerpt)

Human Capital

Free Cash Flow		training costs	degree of goal achievement	Employee Satisfaction
(year)	(in Mio. €)	(in Mio. €)	(Scale 1-10)	(Scale 1-10)
year 0	30	2	4,8	5,8
year 1	70	5	6,3	6,9
year 2	60	6	6,5	7,4
year 3	100	7	7,5	7,7
year 4	110	7	7,6	7,9
year 5	120	8	7,8	8,2
correlation coefficient		0,87	0,95	0,87

Structural Capital

Free Cash Flow		R&D-Expenses	time-to-market	Share of new products in sales
(year)	(in Mio. €)	(in Mio. €)	(Scale 1-10)	(in %)
year 0	30	10	2,5	3,9
year 1	70	15	3,9	4,8
year 2	60	17	4,3	5,1
year 3	100	20	6,5	6,7
year 4	110	20	6,7	6,9
year 5	120	27	6,8	7,2
correlation coefficient		0,86	0,95	0,96

Relational Capital

Free Cash Flow		marketing costs	business networking	Customer Satisfaction
(year)	(in Mio. €)	(in Mio. €)	(number)	(Scale 1-10)
year 0	30	20	5	6,3
year 1	70	40	9	7,9
year 2	60	45	9	7,4
year 3	100	60	12	8,1
year 4	110	70	13	8,3
year 5	120	100	15	8,7
correlation coefficient		0,88	0,98	0,92

Figure 6: Correlation between indicators of Intellectual Capital and FCF

To be able to connect the value drivers of Intellectual Capital with the entrepreneurial success parameters, the effect on the various value components of the profit contribution, that is sales and cost drivers, has to be analyzed. The interdependencies serve as a basis and have to be completed with the degree of influence of value drivers on the success parameter; thereby it has to be considered that there will be partly a direct influence and partly an indirect influence on the success parameter. A vital direct influence is given mostly with Customer Capital, e.g. via customer relationship management, a more indirect influence on the success parameters is true for Human

Capital and Structural Capital. For further analysis because of transparency aspects only the indicators are used, that have a strong interdependency.

From experiences and historic values the significant influence from indicators of Intellectual Capital on entrepreneurial control parameters (in this case the FCF) could be determined by means of correlation calculations. To analyze the correlation in time, the effect on FCF as a dependent variable and the value drivers as an independent variable has to be analyzed observing the timely delay (Lachnit 1992).

For this case study the correlation between selected indicators for different categories of intangibles and FCF is calculated. The FCF refers to the stated year according to the planed figures as listed in Figure 4; the indicators refer to prior years considering the effect of the time delay. Exemplary, the following table shows the correlation of the different indicators.

In the next step, by means of regression calculation the functional correlation between the value drivers, respectively the underlying indicators, and the FCF as parameter of company valuation methods, could be determined which in turn could be used as a basis for prognosis of the depending variable. As the number of value drivers of Intellectual Capital as an independent variable normally is very high, the iterative multiple regression calculation is a suitable method of resolution (Lachnit 1992, p. 163-164). The sum of the different singular prognosis for each indicator is compressed to a multiple prognosis using arithmetic means.

$$\left.\begin{aligned} y_1 &= a_1 + b_1 x_1 \\ y_2 &= a_2 + b_2 x_2 \\ &\dots \\ y_n &= a_n + b_n x_n \end{aligned}\right\} \quad Y = \frac{\sum_{t=1}^{n} Y_i}{n}$$

Figure 7: Prognosis via iterative multiple regression

In this case-study, the singular regression functions for the stated indicators of intangibles are calculated with the help of the method of least squares. The goal of this calculation it the prognosis of the continuation value (FCF) stated in Figure 4 with the help of the underlying indicators. Hence, the value of the indicators for the year 6 is inserted in the regression function. For each regression function a single prognosis-FCF will be calculated. The results are shown in the following Figure 8.

Intangibles	**indicators**	**Parameter (a)**	**Parameter (b)**	**Regressor (x)**	**Prognosis-FCF (y)**
Human Capital	training costs	67,8	12,0	8,0	164,11
	degree of goal achievement	-116,5	29,4	7,8	112,49
	Employee Satisfaction	-193,6	37,7	8,2	115,61
Structural Capital	R&D-Expenses	-31,7	6,4	27,0	139,94
	time-to-market	-13,4	18,6	6,8	112,94
	Share of new products in sales	-63,8	25,3	7,2	118,35
Relational Capital	marketing costs	0,9	1,5	100,0	154,78
	business networking	-24,2	10,2	15,0	129,46
	Customer Satisfaction	-233,4	40,6	8,7	120,28
total of prognosted FCF					1167,95
arithmetic mean of prognosted FCF:					129,77

Figure 8: Derivation of the continuation value within DCF-modell using iterative multiple regression

As stated in Figure 6 the value for the Human Capital indicator Employee Satisfaction is 8,2. Inserting this value in the regression function (y=-193,61 + 37,71x) which is derived by the method of least squares, the prognosis-FCF for this single indicator is 115,61 Mio. €. The singular prognosted FCF moves between 112,49 Mio. € and 164,11 Mio. €. Considering all singular prognosted FCF the arithmetic mean is 129,77 Mio. €. It can be seen that with the use of the iterative multiple regression the FCF can be reliably estimated. The tracebility and realibility of the calculation of MVA is improved.

3.2 Derivation of values for Intellectual Capital using regression function without scorings

Based on the results in chapter 4.1, the monetary value for the different categories of intangibles will be calculated. Assuming that the prognosted FCF based on the singular regression of each indicator gives information about the importance of the respective indicator. At the same time, it is possible to calculate a value for each category of Intellectual Capital. Thus, the total of the prognosted FCF of each intangible category in relation to the total of the prognosted FCF indicates the proportional value of MVA for this category of Intellectual Capital.The measurement procedure starts with the estimation of MVA based on the present values of the 5-year payment series and the prognosted continuaion value. The FCF of the 5-year payment series are known from managements' forecasting; the continuation value (129,77 Mio. €) was estimated with the use of selected indicators of intangibles and applying the iterative multiple regression. Thus, the MVA amounted to 394 Mio. € after deducting the value of the invested capital from the calculated enterprise value (see Figure 4). Based on these results, the proportional value of Human Capital can be derived from the proportional prognosted FCF which is 33,58% (= 392,20/1167,95). The proportional value of Human Capital amounts to 132,31 Mio. € (= 394,0 * 33,58%). The following tables show the calculation of the three categories of Intellectual Capital.

Intangibles	indicators	prognisis FCF	proportional prognosted FCF	monetary value of Intangibels
Human Capital	training costs	164,11	$\frac{392,20}{1167,95}$ = 33,58%	132,31
	degree of goal achievement	112,49		
	Employee Satisfaction	115,61		
Structural Capital	R&D-Expenses	139,94	$\frac{371,22}{1167,95}$ = 31,78%	125,23
	time-to-market	112,94		
	Share of ne wproducts in sales	118,35		
Relatinal Capital	marketing costs	154,78	$\frac{404,52}{1167,95}$ = 34,64%	136,46
	business networking	129,46		
	Customer Satisfacktion	120,28		
total		1167,95	100%	394,00

Figure 9: Derivation of the value of Intangible-categories based on singular prognosis

This procedure has shown a way of calculating the monetary value for the categories of Intellectual Capital based on singular prognosis estimated by using regression functions without the consideration of scoring models. This information is very important, but in this case the significant information about intangibles for management purposes is not shown sufficiently. Hence, the next chapter shows the prognosis of the MVA and subsequent the monetary value of the separate categories of intellectual capital using scorings. In this case, the cause-effect-chain between indicators and monetary value of the intangible categories are revealed.

3.3 Derivation of values for Intellectual Capital using regression function with scoring based present value methods

From the perspective of managing explanations for the value gap between the enterprise value and the capital invested are of great interest. This can be achieved by means of a future oriented monetary evaluation of Intellectual Capital based on the DCF method and differentiation into the categories Relational, Human and Structural Capital. In addition – as shown before – the knowledge of relevant influencing factors, aimed at the vital value of the FCF is of high importance. Therefore a combined evaluation model based on indicator models and value based models, so called scoring based present value models, is the given choice. This allows on one hand a future oriented evaluation and on the other hand a consideration of the basic cause and effect dependencies.

For evaluation of the various categories of Intellectual Capital related to scoring based present value methods, as a starting point the respective influencing factors have to be defined with help of

plausibility considerations. All influencing factors are scalar evaluated with help of a scoring model. For each influencing factor a minimum and maximum have to be determined, spanning the range into 10 intervals. The minimum value is assigned the one scoring point whereas the maximum is assigned ten scoring points. Hence, all characteristics of the relevant influencing factors for the categories of Intellectual Capital have to be transformed in a uniform scale in order to achieve comparability of scoring and improve the significance.

In the next step the influencing factors for the categories of Intellectual Capital, derived from experiences and supported by plausibility considerations, have to be weighed with a factor in accordance with the probability of occurrence respectively depending on their impact for the value added, in order to enter their influence in the calculation (Freyberg 2005). The total weight is fixed at 100%. From multiplication of the weighting factor with the scoring on the scale results the weighed index of each intangible-category (Fischer/Rödl/Schmid 2006).

Human Capital	weighting	Scale	Index	
training costs	5%	7,5	0,37	
degree of goal achievement	15%	7,8	1,17	
Employee satisfaction	20%	8,1	1,62	
			3,16	3,16
Structural Capital	**weighting**	**Scale**	**Index**	
R&D-Expenses	5%	7,3	0,37	
time-to-market	10%	6,8	0,68	
Share of New products in Sale	15%	7,1	1,06	
			2,11	2,11
Relational Capital	**weighting**	**Scale**	**Index**	
marketing costs	6%	7,2	0,43	
business networking	11%	8,0	0,88	
Customer Satisfaction	13%	8,7	1,13	
			2,44	2,44
		Index, total:		7,71
Total weighting: 100%		Index,: max. 10		

Figure 10: Scoring model for Human, Structural and Relational Capital

The use of this evaluation method requires that the coherence between factors of cause for the Intellectual Capital and the resulting MVA can be made transparent using correlations analysis. The correlations factor gives information regarding the strength of coherence. The closer this factor is to one, the stronger is the coherence of both values. In the case study the explanatory content of the sum of all weighed indices of the years 0 until five towards the corresponding MVA of previous years considering the timely delay mentioned before is analyzed.

	Index value	MVA
year 0	6,1	273
year 1	6,3	305
year 2	6,7	318
year 3	7,0	364
year 4	7,1	348
year 5	7,5	372
correlation coefficient		0,91
R^2		0,83

Figure 11: Interrelation between index value and MVA for the past

As a result, a high correlation can be noticed between the Index value and MVA. The coefficient of determination R^2 is 0.83 and confirms the use of the results for derivate the MVA of Intellectual Capital for the year of the prognosis as well as the various categories. With the help of the method of least squares and under consideration of the calculation parameter the regression function can be derived as to be „ Y = -142,35 + 69,63 X “. If X is replaced by the scoring value from Figure 10, which

is 7,71, then an MVA of 394,47 million € is the result. Assuming that the value of the indices is having an impact on the value of the MVA, then from the quotient between the respective calculated value indexes to the sum of the total value indices the value for the individual categories of Intellectual Capital can be deducted as shown below:

	Index value	proportional Index value	Monetary value of Intangibls
Human Capital	3,17	41,05%	161,93
Structural Capital	2,11	27,37%	107,95
Relational Capital	2,44	31,58%	124,58
total:	7,71	100,00%	394,47

Figure 12: Derivation of value for Human, Structural and Relational Capital with the help of the regression function

With help of this measurement approach, based on the relation of the single index value of intangibles to the total of the index value of all intangibles a monetary value for each category of intangibles can be estimated. Following this calculation, the value of Human Capital amounts to 162,04 Mio. € whereas the value of structural capital with 107,77 Mio. € is the lowest of the three categories. But, the result is different to the calculated valued in chapter 4.2 where Human Capital was 132,31 and Structural Capital was 125,23 Mio. €.

This difference is based on the fact that the calculated value of the MVA is highly impacted from the premises and parameters chosen. It has to be analyzed if the previous calculated MVA, which was based on present value models, might be considered as an extreme outlier and by thus has to be adjusted by adding or subtracting to the MVA (Galli 2003). Furthermore, it has to be considered that the significance is considerably impacted from the definition of the scoring model. That way selection as well as to operationalize and the weighting of influencing factors are highly depending on subjective influences. A comparison of this two valuation procedures over a few years of testing should give valuable information and leads to clear perception about the impact of Intellectual Capital on enterprise value. As an advantage of this measurement model, a direct interconnection with company evaluation methods can be made. Then again new values for the regression function have to be entered every year so that, assumed a continuous high degree of correlation, these methods of measurement should lead to dependable results in the long run. All in all, on this basis a future oriented evaluation and the consideration of relevant cause and effect correlations becomes possible.

4. Conclusion

Efficient Management requires the consideration of non monetary indicators, e.g. know how of employees, brand loyalty, customer relationship etc. Basically, non monetary indicators used e.g. within Balanced Scorecard resp. Wissensbilanz are appropriate related to the needs of management. However, to increase enterprise value in the long term it is important to know about the influence of intangible indicators on important financial figures. Knowing this management gets an assistance for complying e.g. with German Corporate Governance Codex (4.1.1 GCGC) whereby the Board of Directors is bounded to increase sustainably the enterprise value. The increased use of value-based measurement systems does consider the more financial aspect measuring the value added. But, using only value-based measurement systems the cause-effect-chain between Intellectual Capital and management ratios is not considered sufficiently. Using both, indicators and financial figures, and comparing the development of both items for a longer period in due consideration of the economic environment may help management to get a better feeling about the value of intangibles.

In this connection, this paper has outlined two interesting approaches of measuring intangibles considering the indicators used in performance management systems and DCF-model used in value-based-management. One is based on mathematical algorithms of correlation and regression. The other takes weightings of relevant indicators into account. Both focus MVA which assumed to be the total of Intellectual Capital not considered in the balance sheet. For management purposes the knowledge about die cause-effect-chain between indicators and FCF is important to assess their impact on enterprise value and hence, on MVA. Using these measurement procedures in companies, the awareness about the companies' Intellectual Capital and their significance for the future

performance and financial position will be substantiated.Both procedures are afflicted with the basic problems of present values which is based on several premise. Besides, both procedures do not result in the same value of the categories of Intellectual Capital. Using both approaches in timing valuable management information will be offered. The integration of these measurement procedures in management information systems is not problematical.

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Applying Intellectual Capital Process Model for Creating a Defensive Protection System to Local Traditional Knowledge: The Case of Mea-hiya Community

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Abstract: The purpose of this paper is to discuss the implementation of intellectual capital process to manage the traditional knowledge of the community. This qualitative research was conducted through an exploratory method in co-operation with the Mea-hiya Community Cultural Council, Chiang Mai, Thailand. A four step-approach IC process was recommended; this was aimed at the successful acquisition of the proposed model.The authors demonstrated the intellectual capital process model's usefulness. Not only does the model encourage the community to formulate strategies from the stakeholders, but it also puts the strategy in practice because it is grounded in the stakeholders' needs and expectations. The process is more quantifiable by having key success factors' indicators measuring the traditional knowledge capital.The discussion leads to the formulation of a defensive protection system. The outcome of the community's traditional knowledge leans toward a local community-based organizational paradigm. Consequently, the Mea-hiya community pointed out the strategy to conserve and protect traditional knowledge by creating a defensive protection system (conserve, transmit, and protect of traditional knowledge).This paper allows practitioners to reflect on a case for implementing an IC process to manage cultural traditional knowledge.

Keywords: Intellectual capital, community, traditional knowledge

1. Introduction

The research presented in this paper is based on an exploratory action research conducted in co-operation with Mea-hiya community cultural council, Chiang Mai, Thailand. The research proposes the implementation of intellectual capital system to develop a process model for the Mea-hiya community. The intellectual capital system provides the process for the community cultural council to manage their traditional knowledge. The intellectual capital process model is selected and tested by action research. In applying the process model, a four step-approach aimed at successful acquisition is recommend. The research challenge is to apply the intellectual capital system to the community's traditional knowledge for the first time in Thailand. Even though intellectual capital system is a business oriented concept and seldom applied to non-business approaches, especially in the traditional knowledge area, this proposal attempts to provide an effective management system and a new perspective which will highlight aspects of the Mae-hiya cultural intellectual capital.

The structure of the paper is as follows: a literature review is presented at the second section. The third section presents the problem definition and introduced Mea-hiya community background. The forth section presents the research framework. The fifth section presents the research results. The six section presents discussion and the last section is the conclusion.

2. Literature review

2.1 Traditional knowledge

Traditional Knowledge (TK) refers to knowledge, capability, experience and wisdoms that have been accumulated, existed, survived or developed in accordance to ecological system, natural surroundings, society and cultures. "*Traditional knowledge is, in turn, a subset of the broader concept of heritage. Indigenous knowledge, being the traditional knowledge of indigenous peoples, is also a subset of traditional knowledge. As some expressions of folklore are created by indigenous persons, there is an overlap between expressions of folklore and indigenous knowledge, both of which are forms of traditional knowledge*" (WIPO 2001).

The global change has lead to new attitudes in which people appreciate the concept of ownership and sole benefits of the ownership. These attitudes have unavoidably expanded to cover the usage of community TK. Many international organizations are taking the issue seriously especially UNESCO and WIPO. Currently, these organizations have expanded its protection scope to cover intangible properties and set up certain international criteria. They propose international obligations by means of convention up to the status of no obligation that may be a guideline, model provisions or mutual

declaration. Indoctrinations and processes of right ownership over national community TK have been developed for year. These international organizations propose 2 protection measures: a) defensive protection measures, including disclosure of information about patent registration, setting-up of TK database, amendment of patent laws; and b) positive protection measures, including international sui generis system, use of model law on traditional knowledge protection as well as forming a central organization or society like an international organization to be particularly assigned to collect fees subject to the exploitation of TK and to fairly share profits among related parties (Chiyasak, Rajchagool, Pinyosinwat, Kesmanee, Apakaro & Yodmongkon 2007).

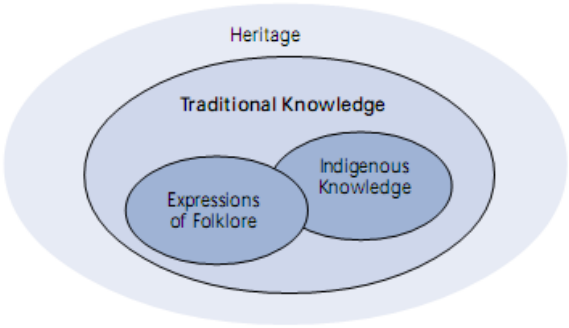

Figure 1: Traditional knowledge

At the initial stage, WIPO proposes a defensive protection of TK, or measures which ensure that the rights over TK are given to the customary TK holders (WIPO 2007). These measures have included the amendment of WIPO-administered patent systems. Some countries are also developing TK inventories that may be used as evidence to defeat a claim to a patent on such TK. In the meantime, since 1989, UNESCO has expanded its protection scope to cover intangible properties and set up certain international criteria, e.g. Recommendation on the Safeguarding Protection of Traditional Cultural and Folklore, as well as other conventions, e.g. Convention for the Safeguarding of the Intangible Cultural Heritage 2003. The conventions aim at ensuring the viability of the intangible cultural heritage, including the identification, documentation, research, preservation, protection, promotion, enhancement, transmission, particularly through formal and non-formal education, as well as the revitalization of the various aspect of such heritage at community, national and international levels as well as multinational cooperation and support (UNESCO 2003).

2.2 Intellectual capital

Intellectual Capital (IC) is defined as the sum of a company knowledge that is contributed to an improved competitive position of the organization by adding value to the defined key stakeholders (Edvinsson 1997; Marr 2004; Stewart 1997). IC has become the newest hot topic in the business community since the 1990s when Skandia the Swedish company suggested an extension of intellectual capital statement to the company's report named the Navigator (McConnachie 2007; Chu, Lin, Hsiung & Liu 2006). Skandia distinguished IC into two categories, the structural capital and the human capital. Structural capital is defined as infrastructure that organizations develop to commercialize their human capital. It includes both direct and indirect support, and for each there are both physical and intangible elements (Edvinsson, & Sullivan 1996). Structural capital includes customer capital (external) and organizational capital (internal). Organizational capital consists of innovation and process capitals. Process capital is the sum of a company's know-how. Innovation capital includes intangible assets and intellectual property which is the source of renewal for the company. Human capital is defined as the collective capabilities of the employees' competence, attitude and intellectual agility (Ross et al., 1997). This asset includes experience, skills, and know-how of the employees.

Today, IC concept is being developed to another level beyond business approach. The new perception is that IC is the basis for wealth in communities, regions, and nations (World Bank 2005). Social values such as connections, relations, and interactions in a networked society must be considered as value added for a community (Jay 2006). Many countries in Europe, America and Asia are acknowledging and attempting to get basis to operate knowledge-based capability and intangible wealth especially in private sector, educational community and governments. These non-profit organizations start to study and research in the field to develop example framework of knowledge

based community (Bueno, Salmador & Rodriguez 2004). Accordingly, the non-profit organization' nature makes it difficult to assess its' value. It is impossible to use traditional financial report to measure cost efficiency. With the unique characteristic, these organizations' value can be assessed and measured by the IC process while other methods cannot (Chu, Lin, Hsiung, & Liu 2005). One of the IC advantages is that this application is suitable for a non-profit organization (Bontis, Dragonetti, Jacobsen & Roos 1999).

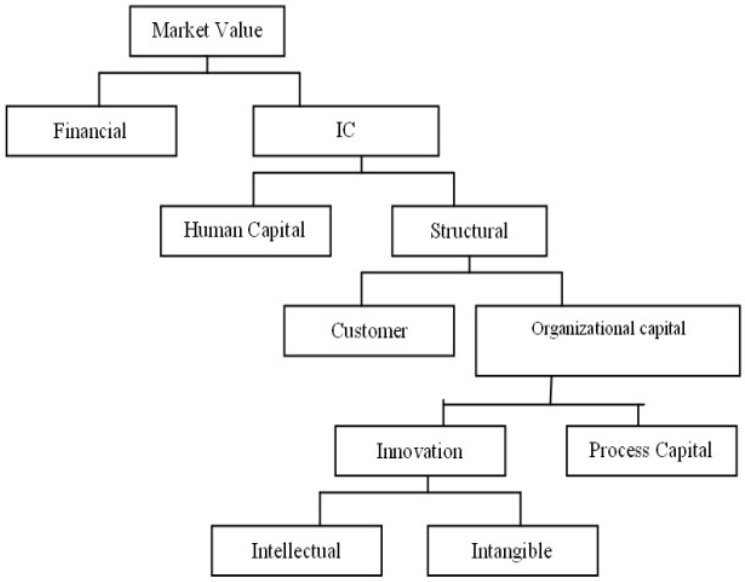

Figure 2: Skandia model. (Source: Roos et al., 1997)

The IC model has been modified taking into account a major component of intangible value called social capital (McElroy 2002). Social Capital refers to connections within and between social networks (DeFilippis 2001). It focuses on the value of relationships between people forming an organization or community which is a core concept in business, economics, political science, and sociology. In the late 1990s, the concept gained popularity, by serving as the focus of the World Bank research program and has become the main subject of several mainstream books. The following are four main approaches to social capital.

Table 1: Main conceptual approaches of social capital (Source: Bueno, Salmador & Rodriguez 2004)

Social Capital Approach	Main Ideas
Economic development theories	Confidence, civic behavior and associativity strengthen the social networks, contributing to the sustainable economic development
Social responsibility and ethics	Social capital expresses the degree of social integration and responsibility with respect to the whole society and its agents and group. It is based on values and attitudes, such as confidence, corporation, safety, principles, ethics, and compromise
Corporate governance	Ethics and corporate governance codes have a positive impact on the creation of social capital, stimulating the solidarity and overcoming market imperfection
IC	Social capital is a component of IC. It is based on a set of values and the subsequent indicators such as confidence, royalty, sincerity, compromise, transparency, solidarity, responsibility, honesty and ethics

Bueno, Salmador, & Rodriguez (2004), propose the evolutionary IC model that had been modified with social capital (Figure 3). The model is based on three main intellectual capital components which

are human capital, structure capital, and relational capital. The researchers pay special attention to the relational capital. The relational capital consists of business capital and social capital. Social capital consists of social integration, while capital refers to the relationship between the organization and its stakeholders. In addition, Bueno, Salmador, & Rodriguez (2004), also categorize social capital into six areas which are "first, solidarity and social cohesion; second, economic development of the environment; third, commitments of efficient corporate governance; forth, commitments acquired with the scientific and technological development; fifth environmental protection; and sixth *defense of cultural and artistic heritage*". Thus, IC process can be applied not only to the business domain, but also to the social domain; in particular to the intangible traditional knowledge.

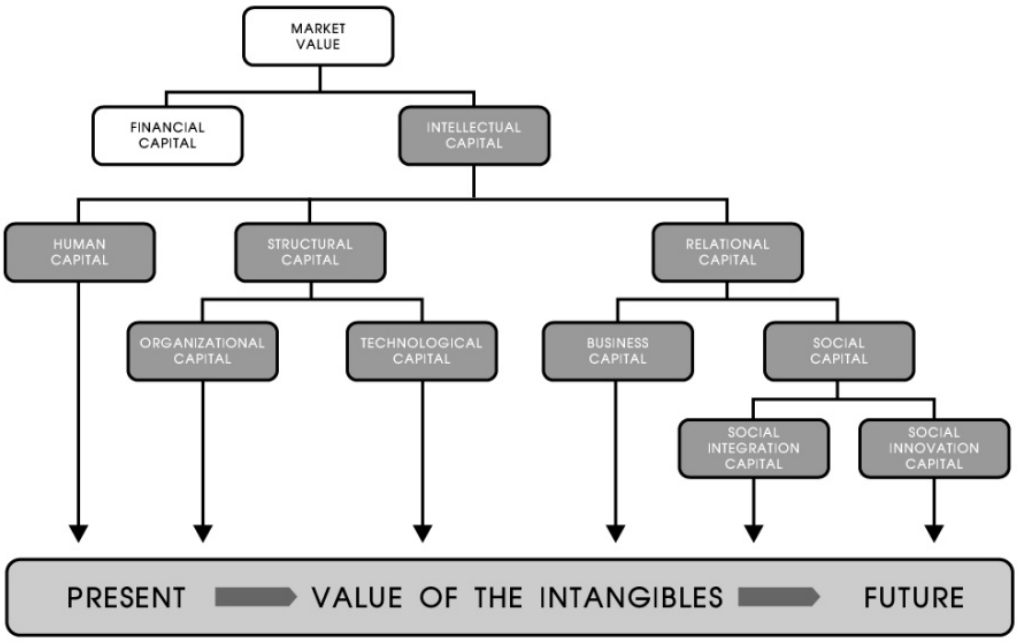

Figure 3: Evolutionary intellectual capital model (Source: Bueno, Salmador & Rodriguez, 2004)

3. Problem definition

Global changes have led some people to adopt a new attitude in appreciating the concept of ownership and sole benefits of the ownership (Convention on Biological Diversity 1992). These attitudes have expanded to cover the usage of the community s' TK. Current disputes are caused by two main factors. 1) Misuse of the community's TK which leads to the disrespect of the TK. 2) Exploitation of community's TK without receiving any permission from the community or sharing it to the community (WIPO 2006).

With her diverse element of community's TK, Thailand is now facing three major disputes. First, from a comprehensive study, it is apparent that Thailand does not have an appropriate law to handle deals with the piracy of TK (Setsirote & Donavanic 2005). Second, the way of life in Thailand has been constantly changed by the three waves of development (the 1960s, the 1970s and the 1980s). These three waves have brought upon a new attitude, lifestyle, and modern beliefs to the local people (Bager 2003). Third, there is a lack of local cultural management to conserve the TK. Local people use story telling as a method of transferring traditional knowledge from generation to generation especially within their family (Chiyasak et al., 2007). Without a standard reference as a guideline, people might interpret and understand things differently based on their experiences. This misunderstanding leads to a misuse of their TK and misleading the people.

3.1 Mea-hiya community

Mea-hiya is an urban community with more than 700 years of history located at 15 kilometers in the southern area of Chiang Mai, Thailand. Since 1980, the wave of development altered the Mea-hiyas' way of life. Here are some examples;

The term of occupation has changed when urban growth draws people to urban work. Agriculture which was considered the main profession had suddenly vanished. Some cultural rituals like the Tan Loua Pha Joew festival have now vanished because it does not fit the modern lifestyle.

While other cultural ritual performances have changed from the way their ancestors performed them because the community does not have a standard reference as a guideline to perform the rituals correctly. Changing the way to perform also causes a misunderstanding particular to the meaning of the ritual. In addition, Mea-hiya community had one big misunderstanding from the public. One of the unique rituals called Leang-Dong which has been performed in Mea-hiya for hundreds of years was disseminated to the public by the outside media. Without an explanation of the reasons behind the ritual, the story caused a stir and was followed by some heavy negative criticism. The central government also came to investigate the incident and the community had to report in clarifying their actions. This incident destroyed the community's reputation badly.

Fortunately, the community has begun to reclaim their social space by creating a community organization in order to take control of their cultural heritage. The Mea-hiya community founded a cultural council to manage their traditional knowledge. The cultural council is supported by the local government. The council objectives are to formulate policies and support cultural activities (Mea-hiya Cultural Council Const. Sec 6). From observation and document study, there are flaws that should be mentioned. Firstly, most of the activities are conducted at annual cultural festivals and rituals (Mea-hiya Municipality 2007). The council is missing the opportunity to conserve, preserve or protect their community knowledge. Secondly, the people in the community haven't really participated fully in managing their cultural activities. The local government has a high influence to manage cultural activities because the government staff handles most of the job. And finally, the council does not have the precise strategies to provide a systematic way to manage their cultural heritage.

4. Research framework

The research framework is to study the implementation of an intellectual capital process model to the Mea-hiya community. The community will be encouraged to reach an initial stage to form a defensive protection system of its traditional knowledge. The research has been identified through exploratory action research conducted in co-operation with Mea-hiya community cultural council. The research is conducted by using qualitative methods such as documentary research, semi-structured interviews, observations, participatory observations, and focus groups. The target samples interviewed have a direct connection or relationship with community traditional knowledge and its significance. The theme for the semi-structured interview questions was created from literature review. A pre-test of the questions examined to four target samples for adjustment. After the interviews, transcriptions of the interview were made as soon as possible. The process model is the suggested means for the management of community traditional knowledge toward a local community-based organizational paradigm. A four step-approach aimed at successful acquisition of the proposed model is recommended.

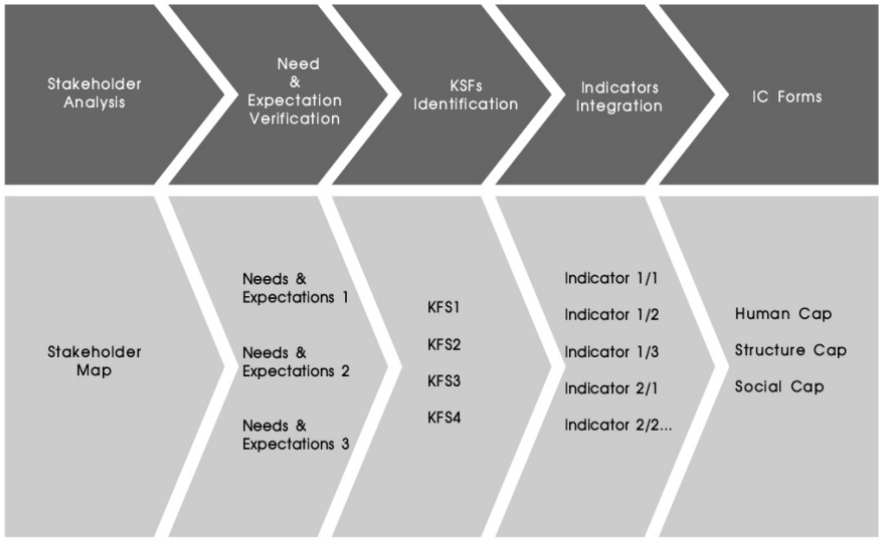

Figure 4: Community cultural management process model

- **Stakeholder analysis.** Stakeholders' identification is the first task of this step. Once the list is complete, it is then prioritized by using power-interest grid (Rachel 2007; Perrot 1996) as analyzing tools. Then, building the stakeholders' map is the next task to categorize the different groups of stakeholders and translate the highest priority stakeholders into a table.
- **Stakeholder need & expectation verification.** The next step is a creation of strategies. The stakeholders' needs and expectations of community traditional knowledge would be the strategy of the community cultural council. The key stakeholders' needs and expectations have to be written into a statement that defines the cultural council's future and identity. Then the needs and expectations are listed and prioritized as strategies.
- **Key success factor identification.** This next step is to translate stakeholders' needs and expectations into action plans which are indicated as key success factors. The needs and expectations found in the previous step must be used to identify the Key Success Factors (KSFs). In each need and expectation, there is no limit to the number of KSFs; however, if there are too many, the stakeholders should prioritize and indicate the most important ones to focus their attention.
- **Indicator integration.** The next step of the process is to measure the achievement of each KSF by putting indicators that reflect its purpose. Appropriate indicators can be selected carefully by the stakeholders if they indentify the true essence of the KSFs.

4.1 Data analysis

Data analysis is based on qualitative approach. The content analysis, thematic extraction and ground theory were used. There will be five stages for analyzing the data.

First, the documents are analyzed. Second, the data form interviewees shall be transcribed and analyzed by content analysis method. In the fist two stages, all text is read line by line and marked margin note. The knowledge & opinion from the participants is analyzed and given systematic coding. Third, the potential themes are identified by grouping examples from the text and then the text is categorized and termed. Fourth, concept maps are created from the transcript to show relationships and correlation between the differences, similarities and the gaps generated in the development process. Then, the maps are interpreted and analyzed to represent the knowledge & opinions of the participants. Finally, the IC process model will be created to indentify and verify the community's strategies, KSFs, indicators and capital forms.

5. Results

5.1 Stakeholder analysis

Seven key stakeholders are identified (Figure 5) and prioritized. Figure 6 presents the prioritizing of key stakeholders who are the most important to the community's cultural domain by using power-interest grid (Rachel 2007; Perrot 1996). A content analysis was used as the method to evaluate the stakeholders. The local government, cultural council, local leader, temple, local philosopher, school and villagers have a high direct relevance to cultural activities in the Mea-hiya community.

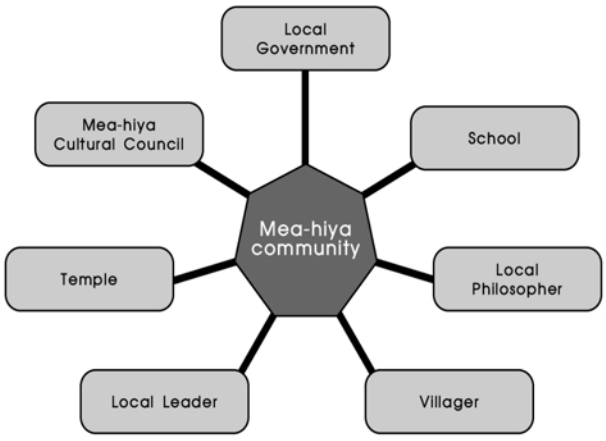

Figure 5: Mea-hiya community key stakeholder

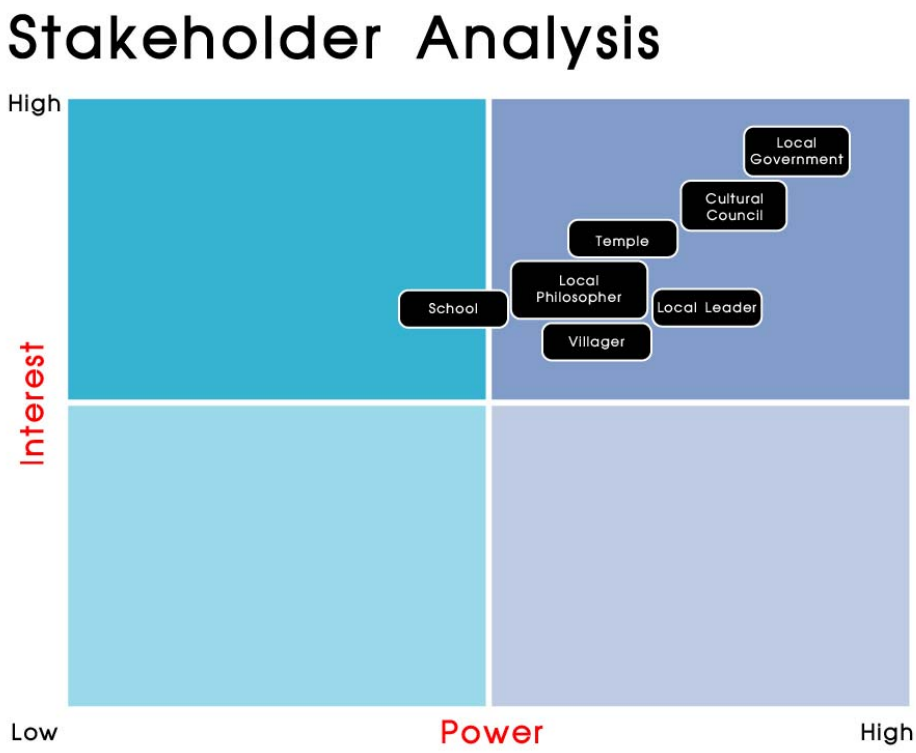

Figure 6: Stakeholder analysis

5.2 Stakeholder need & expectation verification

In order to develop strategies and identify related issues, the stakeholders' need and expectation is needed to verify the representatives of each stakeholder group selected (Table 2). These key stakeholders have a direct influence to the local cultural domain. Each one is interviewed for their need and expectation about the community culture (Table 3). Nineteen needs and expectations are indentified and categorized into five strategies (Table 4).

Table 2: Stakeholders' representatives

Stakeholders	Representatives
LG: Local Government	: the local government prime minister : the deputy chief : the president of local parliament
MC: Mea-Hiya Cultural Council	: the president of Mea-hiya cultural council : the vice president of Mea-hiya cultural council : the secretary of Mea-hiya cultural council
LL: Local Leader	: the sub-district chief : five head men of the village : the president of the house-wife group : the president of the youth association
TP: Temple	: the abbot of Phajee temple : the abbot of Doicome temple : the abbot of Ubosot temple
LP: Local Philosopher	: five local philosophers
VG: Villager	: ten villagers
SC: School	: the principle of Sirimangklajran school : the principle of Donpin school : the principle of Mea-hiya Samukkee school

Table 3: Stakeholder need and expectation

Stakeholders	Needs & Expectation
LG: Local Government	LGN11: To conserve, support and restore the local culture LGN22: Cooperation from citizen (private, household, temple and school)
MC: Mea-Hiya Cultural Council	MCN13: To disseminate the right information to the public MCN24: To conserve MCN35: supporting the youth for cultural development
LL: Local Leader	LLN16: Cooperation (government, villager, school and temple) LLN27: Budget supporting
TP: Temple	TPN18: Cooperation TPN29: Children and school are important "for cultural development" TPN310: To make cultural inventory from local philosopher
LP: Local Philosopher	LPN111: To make cultural writings from people with expertise of that specific field LPN212: Cooperation LPN313: To disseminate the right information to the public
VG: Villager	VGN114: Cooperation VGN215: Budget supporting VGN316: Transfer the cultural knowledge to children
SC: School	SCN117: To make cultural writings from local philosopher and expertise SCN218: Local study SCN319: Focus on the youth

Table 4: Common strategies

Stakeholders' common strategies
S1: To conserve, support and restore the local culture
S2: Community cooperation
S3: Focusing on children and school
S4: To make document from local philosopher and expertise
S5: To disseminate the right information to the public

5.3 Key success factor identification

From the stakeholder's common strategies, the focus group (25 people) is conducted to indentify the strategies' Key Success Factors (KSFs). Ten KSFs are indentified (Table 5).

Table 5: Key success factors

Stakeholders' common strategies	KSFs
S1: To conserve, support and recover the local culture	S1K1: Increase budget S1K2: Policy support S1K3: Constructing a Mea-hiya history center (for learning)
S2: Community cooperation	S2K1: Strong Networking S2K2: Supporting "the Three Generations Center"
S3: To focus on Children and school	S3K1: Local history subject in schools S3K2: Create the youth groups & support activities
S4: To make document from local philosopher and expertise	S4K1: Intensive seminars S4K2: Focusing on local philosopher
S5: To disseminate the right information to the public	S5K1: Strong public relations

5.4 Indicator integration

The key stakeholders selected 30 indicators for the ten strategies (Table 6). Since this community is dealing with non-financial data, selecting the right indicators is very difficult or nearly impossible because the indicators must reflect KSFs drastically. However, in this case, the stakeholders (18 people came to joint the focus group) try to select the easiest and uncomplicated indicators based on their understanding; such as the number of the people who are involved in the activity or the number of seminars. Both examples are easy to count.

In addition, the 30 selected indicators are put together and arranged according to the particular outlook of the community intangible capital. Fifteen indicators link to structure capital, twelve indicators link to relational capital and eleven indicators link to human capital (Table 7). Thus, the direction of Mea-hiya community cultural management is to focus majorly on structure capital. The relationship capital and human capital are nearly equal focus.

5.5 Initial stage of a defensive protection system of traditional knowledge

According to the strategy defined by stakeholders, the Mae-hiya community is operated as followed:

The local government has allocated the 2008 annual budget of 25 % to operate on the whole educational and local cultural event. The local government gets a 30% increased budget for education and local arts & culture for the 2009 annual budget (structure capital).

The local government has determined to take the local culture conservation issue as one of the main local strategies. The activities of recovering the tradition, inheriting the tradition and significant local rituals have been established in the annual activity. For instance, the Dum Hua tradition, the Doi Kam mountain worship and Liang Dong ritual are going to be officially held every year (structure capital).

There would be a meeting to gain community's opinions for every cultural activity. The meeting will be hosted by the culture council. Local participants, representatives of the school and temple, village philosophers, local leaders, and local government would gather to share their opinions and make decisions. The local government will provide the support for having the meeting in order to generate cooperation from everyone (relational capital).

Table 6: Indicators

KSFs	Indicators
S1K1: Increase budget	S1K1I11: The increasing percentage of the local government budget S1K1I22: The amount of money that is supported by local private units
S1K2: Policy Support	S1K2I13: The number of cultural public policy S1K2I24: The strategic planning of the cultural policy S1K2I35: The number of projects/activities which relate to cultural policy
S1K3: Mea-hiya history center	S1K3I16: The number of members S1K3I27: The number of media alternatives for studying S1K3I38: The number of subject manual to guide people's learning
S2K1: Strong Networking	S2K1I19: The number of people who involve in the projects/activities. S2K1I210: The number of project/activity that use participation process S2K1I311: The percentage of people that satisfy the projects/activities
S2K2: Support the Three Generation Center	S2K2I112: The number of member S2K2I213: The number of people who are involve in the projects/activities. S2K2I314: The number of project that collaborates with all three generations
S3K1: Local history subject in schools	S3K1I115: The number of students that study the cultural subject S3K1I216: The number of subjects in the school curriculum which can integrate cultural concept S3K1I317: The number of local philosophers who are involve in teaching activities
S3K2: Create the youth groups & support activities	S3K2I118: The number of children who are involve in the projects/activities S3K2I219: The number of activities S3K2I320: The amount of budget
S4K1: Intensive seminars	S4K1I121: The number of seminars S4K1I222: The number of cultural subjects and inventories S4K1I323: The number of local philosophers and experts involve in the activities S4K1I424: The number of training program in cultural subject for the villagers
S4K2: Focusing on local philosophers	S4K2I125: The number of local philosophers that are recognized and admired S4K2I226: A program to look after the well being of local philosophers S4K2I327: The number of cultural inventory that come from local philosopher 's knowledge
S5K1: Strong public relation	S5K1I128: The number of media alternatives partnership S5K1I229: The number of project that collaborates with external organizations S5K1I330: Good image on part of the community

Table 7: Mea-hiya community capital focus

KSFs	Indicators	Capital Focus
S1K1:	S1K1I11: The increasing percentage of the local government budget S1K1I22: The amount of money that is supported by local private units	
S1K2:	S1K2I13: The number of cultural public policy S1K2I24: The strategic planning of the cultural policy S1K2I35: The number of projects/activities which relate to cultural policy	Human focus
S1K3:	S1K3I16: The number of members S1K3I27: The number of media alternatives for studying S1K3I38: The number of subject manual to guide people's learning	
S2K1:	S2K1I19: The number of people who involve in the projects/activities S2K1I210: The number of project/activity that use participation process S2K1I311: The percentage of people that satisfy the projects/activities	
S2K2:	S2K2I112: The number of member S2K2I213: The number of people who are involve in the projects/activities S2K2I314: The number of project that collaborates with all three generations	Structure focus
S3K1:	S3K1I115: The number of students that study the cultural subject S3K1I216: The number of subjects in the school curriculum which can integrate cultural concept S3K1I317: The number of local philosophers who are involve in teaching activities	
S3K2:	S3K2I118: The number of children who are involve in the projects/activities S3K2I219: The number of activities S3K2I320: The amount of budget	
S4K1:	S4K1I121: The number of seminars S4K1I222: The number of cultural subjects and inventories S4K1I323: The number of local philosophers and experts involve in the activities S4K1I424: The number of training program in cultural subject for the villagers	
S4K2:	S4K2I125: The number of local philosophers that are recognized and admired S4K2I226: A program to look after the well being of local philosophers S4K2I327: The number of cultural inventory that come from local philosopher 's knowledge	Relational focus
S5K1:	S5K1I128: The number of media alternatives partnership S5K1I229: The number of project that collaborates with external organizations S5K1I330: Good image on part of the community	

The culture council is planning to revise the content of Liang Dong ritual by setting up a seminar among the ritual's experts; village philosopher, monks and academics. The ritual has been in existence for over centuries but has never been officially recorded. It is believed that the ritual has been distorted from the original one. The essence has then changed, thus misleading the truth to the current generation. Revising and correcting the ritual's content by the experts will validate the ritual to be in the prestigious form for the next generation (structure capital)

The local government has established the "Three Generations Center" to be the place for elders, middle age and youth participating together in any activity. The cultural activity is a part of the three generations for cooperating with each other. There is also an activity for learning how to play the local musical instruments and taking a traditional dancing course that is taught by elders. This center is considered as a place for grandfathers, grandmothers, fathers, mothers and grandchildren to do an activity together; this also includes cultural interests (relational and human capital).

Under the support of the Chiang Mai provincial culture council, the Mea-hiya culture council has arranged and video-taped the Dum Hua tradition (providing water on the hands of revered elders and ask for blessing in Songkran festival) in the Lanna authentic way. The footage is recorded on VCD which is distributed to the school and public. The VCD can benefit the student and local people by serving as a model for learning the original tradition (structure and human capital).

The culture council president, village philosopher and local people have an opportunity to broadcast Liang Dong ritual to the public through the channel 5 television station. This will help create a sense of understanding about the community's background and belief which has been continued for centuries. This also creates a good image for the community as being the preserver of a very long and unique tradition (relational capital)

6. Discussion

This exploratory action research is conducted in co-operation with Mea-hiya community council to develop a new concept of managing traditional knowledge systematically and practically.

First, the key stakeholders are selected. The process allows the community to focus on the right stakeholders who are the most important to the community's cultural domain.

Second, the five precise strategies are settled. The research adapts a new idea to the process. Instead of creating strategies from top down, the stakeholders' needs and expectations of community traditional knowledge would be the key element for creating the strategy of the community cultural council. The strategies which are formed from the community's stakeholder can respond directly to any situation than the strategy that is formed by the central government. According to Riege & Lindsay (2006), in order to develop strategies and identify related issues, an organization should consult with targeted groups of stakeholders. The consultation provides a better environment to facilitate debate and develop more equitable strategies. The organization needs to have a clear and transparent structure and process to keep stakeholders and their consultation focused (Byrne & Davis 1998).

Third, the community can put the strategies into practice. For successful implementation of an IC system, there needs to be a linking of the selected IC measures to the strategies (Shulver, Lawrie & Andersen 2000). The strategies must be used to identify the Key Success Factors (KSFs). The KSFs are a list of must do activities to achieve the strategic goals. This step of the process creates some opportunities to fix the problems within an organization using identified strategies which otherwise would be forgotten due to the focus primarily on their short-term goals (Roos et al., 1997).

Fourth, the process strives to be realistic by having a measuring method in the process. The aim of measuring is to identify the knowledge component of an organization in order to manage them so they can continually improve their performance (Marr, Schiuma & Neely 2004). However, appropriate indicators can be selected carefully by the stakeholders if they indentify the true essence of the KSFs. Rarely does only one proxy provide an accurate measure. According to the research, the 30 selected indicators are put together and arranged. Fifteen indicators link to structure capital, twelve indicators link to relational capital and eleven indicators link to human capital. Most cases more than one indicator is needed to get a clear and correct picture (Roos et al., 1997).

Fifth, the intellectual process model provides an opportunity for the Mea-hiya cultural council to manage TK systematically and practically. Mea-hiya community can reach an initial stage of defensive protection of its traditional knowledge which is related to the objectives of international organizations particularly UNESCO and WIPO. UNESCO and WIPO promote equal rights, identification, documentation, research, preservation, protection, promotion, enhancement, transmission, and exchange particularly through formal and non-formal education in order to promote understanding and respect of each culture (UNESCO 2003).

7. Conclusion

Traditional knowledge is a community heritage and it needs to be managed. By applying the intellectual process, the Mea-hiya community can manage traditional knowledge practically. The community also reaches an initial stage of defensive protection which is related to the objectives of the UNESCO and WIPO "each party shall endeavor to ensure the widest possible participation of communities and individuals that create, maintain and transmit such heritage and to involve them actively in its management" (UNESCO 2003). The IC process responds to this requirement directly.
From a knowledge management approach, the intellectual process model deals with the allocation of cultural resources (capital form) and encourages learning, participation, and forming the awareness to the community's cultural heritage. The stakeholders' knowledge and experiences are exchanged and new knowledge is created during their participation in the process. In addition, the implementation of some community rules and regulations will allow the community to appreciate their cultural heritage value and to recognize the guideline mutually arranged by themselves in order to conserve, transmit, and protect the community's cultural heritage. Therefore, it is suggested that the local communities should continually promote community learning, which will result in the efficient management of the community's cultural resources.

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Knowledge and Trust Issues for Intellectual Capital Measurement

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Abstract: Trust in intellectual capital has become an increasingly important factor. External trust such as trust between business and customer(B to B and B to C), business and supplier, and trust between customer to customer, also internal trust such as trust between employees vertically and horizontally is seen as crucial to the expansion of intellectual capital in a business. Although there is an interest in measuring and reporting the relationship between intellectual capital and business performance and some measurement models have been proposed, in most of these models such as BSC, Skandia, IC audit, Intangible asset monitor, MVA and EVA, Knowledge and an asset produced by the knowledge are assumed as the fundamental sources of wealth and the role of trust has not been investigated. The concept of trust indicates business component faith to the shared knowledge between them. The key to success in business is obtaining and maintaining the trust (internal and external) of the participants in the markets. Trust also affects on knowledge sharing and in order to increase knowledge sharing, the participants must have good faith to the shared knowledge resources. Otherwise, participants are more likely to share knowledge with the business competitors. In this paper, we extend the value of intellectual capital from the knowledge to "knowledge and trust" as the two important variables in intellectual capital. Sustainable business performance will be discussed and demonstrated the platform of this sustainability can be created by the knowledge and trust. Additionally, most current intellectual capital measurement models are assessing the business performance in static environment. However, the intellectual assets consist mainly of dynamic elements. Knowledge and trust are dynamic elements and we should discuss them in a dynamic environment and in a specific time slot. Therefore, in this paper variables are analysed in dynamic modelling systems. Also, in current business performance models most of the data resources are internal where external data resources are also important. We point out in this paper that improving external variables such as trust within customers can affect on business performance.

Keywords: Knowledge, trust, Intellectual capital measurement, business performance

1. Introduction

Trust and trust technology have come into the account in intellectual capital measurement. External trust such as trust between business and customer(B to B and B to C), business and supplier, and trust between customer and customer, also internal trust such as trust between employees vertically and horizontally is seen as crucial to the expansion of intellectual capital in a business. In this paper, trust and knowledge sharing will be discussed as two basic variables in intellectual capital. Also, the role of trust in different kinds of intellectual capital measurement models will be discussed.

1.1 Trust

Mayer defines trust as "the willingness of a party [trusting agent] to be vulnerable to the actions of another party [trusted agent] based on the expectation that other [trusted] will perform a particular action important to the trusting, irrespective of the ability to monitor or control that other party."(Mayer 1995). Three dimensions of trust identified are ability (expertise, information, competence, expertness, dynamism), integrity (fairness in transaction, fairness in data usage, fairness in service, morality, credibility, reliability, dependability), and benevolence (empathy, resolving concerns, goodwill, responsiveness) (Bhattacherjee 2002).

Trust plays an important role in determining the success of business. Trust affects on both internal and external data where in the external data resources trust improves the business performance in different ways and in all parts such as suppliers, customers, between customers and branding. In a relation between suppliers and mother organisations, trust is the basis of just in time (JIT) method to decrease inventory cost. Also trust affects on a way of paying (such as credit card payment), price mitigation and many other issues. Trust between customer and organisations can decrease promotion cost and customer replacement cost and increase income. In the same way, trust between organisation and customer can transfer between customer to customers and the level of trust between customers is a key factor in this issue. The new methods of promotion now are using this section to improve promotion effectiveness. In the internal resource data, trust also plays a very important role where in vertical view trust is important to leadership and in horizontal view trust is

important for knowledge sharing and team working. As a result, level of trust in different parts of business should be put in business performance methods and it plays a key role.

The concept of trust is related to different and various fields including philosophy, sociology, business, computing. The notion of trust involves having confidence in the other parties; hence, having an expectation without risks will not result in loss. In business contexts, an individual is dealing with a business enterprise that has advantages over them, in the forms of scale, resources, information and expertise. Sole traders have an evident economic incentive to maximise their profit at the expense of the other party. In the case of corporations, it has been institutionalised through the legal requirement that directors and employees make decisions based on the best interests of the organisation, not of the parties it deals with. As a result, trust in the context of business is not grounded in culture, but is merely what a party has to depend on when no other form of risk amelioration strategy is available.

Trust can be founded in different ways. The most common way is a direct relationship. Some other ways such as direct experience (like a prior transaction), referred trust (trust provided by someone else), signifiers or images of trustworthiness (like brand effect) affect on trust level. In this paper we will focus on data transaction between trusting and trusted agents and will consider the role of trust level in making intellectual capital in data transaction between agents (increasing market capital, social capital and human capital with increasing trust level in data transaction).

1.2 Knowledge and knowledge sharing

There is no universal definition of knowledge and knowledge management. Knowledge is a combination of the data and information being made by human thought (Smith, 2005). Knowledge management is the process through which organisations generate value from their intellectual and knowledge-based assets (Santosoz, 2005). The impact of knowledge and knowledge sharing is part of this research's objective. Figure 1 shows an overview of knowledge sharing and similarity of the shared knowledge with original knowledge.

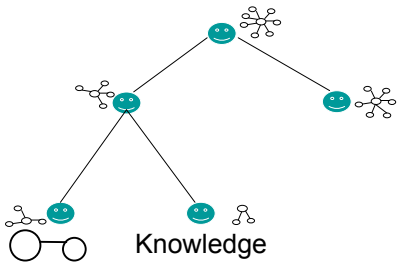

Figure 1: Overview of knowledge sharing similarity

An ontology can be applied to evaluate quality of sharing knowledge by checking its similarity in a knowledge transformation between agents. Also as most uses, ontology can be used to represent fact and relations on the domain of knowledge.

1.3 Trust in intellectual capital

Sudarsanam et. al. define intellectual capital as "the group of knowledge assets that are attributed to an organisation and most significantly contribute to an improved competitive position of this organisation by adding value to defined stakeholders" (Sudarsanam et. al., 2003). Although measuring intellectual capital is very important to manage business and maximise growth, these kinds of assets remain outside mainstream discussion in business, economy, and policy and are rarely reported in financial statements. It is necessary to improve the quality of information on intellectual capital measurement to contribute to the decision making process of corporate managers, investors, and policy makers. Intellectual capital in this research is consists of Social capital, Human capital, and Market capital and the role of trust in these three capital has been investigated in this part of the paper.

1.3.1 Social capital

The idea of social capital and its role in economic development has been increasingly growing. Fukuyama describes social capital as an ability of people to work together for common purposes in groups and organisations (Fukuyama, 1995). Putnam indicates that "social capital is features of social life-networks, norms, and trust-that enable participants to act together more effectively to pursue

shared objectives. He adds social capital, in short, refers to social connections and the attendant norms and trust"(Putnam,1995). Deardorff's Glossary of International Economics identifies social capital as the networks of relationships among persons, firms, and institutions in a society, together with associated norms of behaviour, trust, cooperation, etc., that enables a society to function effectively (http://www-personal.umich.edu/~alandear/glossary/s.html). As it is seen in different definitions trust is the basic variable in social capital and Coleman claims that it is reasonable to argue that widespread trust and trustworthiness are themselves an important part of the normative dimension of social capital (Coleman, 1988).However, many studies have focused on trust which most people in a community or nation have to each other to measure of social capital. In recent years with some new kinds of communication tools especially virtual communication tools, effects of social capital on economic such as e-commerce, politic and society such as e-communities have increased. As e result, the measurement and computation of trust to secure interactions between autonomous agents is crucial for the success in new digital environment. Social capital is going to play a main role in digital environment and make an integrated approach between social science and computer science to evaluate role of trust in developing digital environment as well as traditional environment. In sum, social capital is on the basis of trust and more researches are required to investigate the role of trust in intellectual capital and the effect of trust in business performance.

1.3.2 Human capital

Human capital in knowledge-based economy is the most important part of economy that gives a competitive advantage to organisations. Bontis defines human capital as the summary of individual knowledge stock of organisation's employees (Bontis, 2001). Roos claims that human capital can be generated by employee's competence including skills and education, attitude i.e. employee's behaviour, and intellectual agility i.e. innovation (Roos, 1997). Hudson defines human capital as a combination of genetic inheritance, education, experience, and attitude about life and business (Hudson, 1993). The human capital theory is grounded in the notion that individuals are investors and they invest similar to physical or financial assets in education in order to achieve higher incomes or obtain promotion in the years to come. Additionally, when a company employs people, they bring their embedded knowledge to the business and the company creates value with their knowledge. Business can improve human capital in different ways, including employee development, sharing of best practices, and product innovation. In real world, few organizations achieve all of objectives in human resource development due to poor communication and lack of effective knowledge sharing. Within the knowledge management (KM) literature, trust is often presented as one of the most important elements for successful KM practices (Ford 2003). Sveiby considers trust essential for knowledge sharing and suggests meetings among members of project groups, to promote dialog and pleasant work environments, which contribute to trust (Sveiby 2002).

In sum, trust is a key element in knowledge exchange and knowledge sharing which contribute to improve human capital. The level of trust within community can be lead to success or fail in education programs, increase or decrease experience sharing (to improve skills) and also create innovative environment.

1.3.3 Market capital

Bontis states that customer capital is the knowledge embedded in the marketing channels and customer relationships (Bontis, 1999). Market capital is the summary of value that can be created by knowledge sharing between market components. It depends on the density of knowledge sharing and trust level between the market components. Market value is related to external image of organisations among market components as shown in Figure 2, such as suppliers, customers, non-customers (i.e. society) and other related parts. The image can be affected on market components expectations to buy or sell products and services. It affects on the market share, promotion cost, and introducing new products to market. Overall, it directly affects on income and net profit. As seen in Figure 2 the market components could form different relations.

The main key factor in this kind of investment is trust. Several studies have shown that trust have a positive influence on the behaviors and attitudes of a company's customers and channel partners. Trust encourages higher customer commitment and loyalty and more collaborative, cooperative, and interactive exchange relationships (Jap and Anderson 2003).However, customer trust is influenced not only by the actions of an organization and its representatives but also influenced by other market component dealings such as customer to customer connections. Although scholars have assessed

the influence of trust between market components in the business context, in intellectual capital business performance models the role of trust and importance of trust in business performance measurement is still have not been investigated thoroughly.

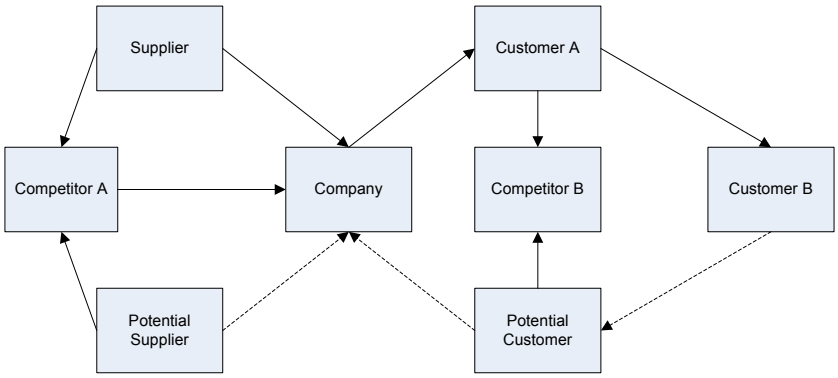

Figure 2; Relations between market components

1.4 Related work in business performance measurement

The relationship between intellectual capital and business performance has been investigated since early 1990's and some models have been proposed.

1.4.1 Balance Score Card (BSC)

Balance Score Card (BSC) model was one of the business performance measurement methods presented to change traditional aspect about business performance. The BSC was proposed in the early 1990s in performance management framework by Kaplan and Norton (Kaplan and Norton, 1992). The BSC aims to consider four perspectives shown in Figure 3 including (1) learning and growth, (2) internal business process, (3) customer as the major stakeholders in a business, and (4) value creation in financial. The BSC extends traditional measurable tangible in traditional financial perspective of an organisation with clients (customer capital), internal business process (structural capital), and leaning and growth (human capital) (Kaplan and Norton, 1992). This method is one of the methods measuring knowledge asset in organisations and considers intangible assets in the business performance. Also BSC relates organisation strategies with core competencies that are very important to the business success.

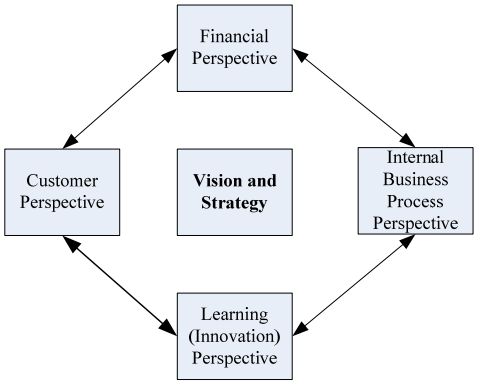

Figure 3: Balance Score Card (BSC) model

The four perspectives are used to capture the essence of the organisation's strategy materials and to reflect achievement of strategic objectives. New generations of the BSC are more strategic relevance and relating to target setting as well as validation of strategic objectives.

1.4.2 Skandia navigator model

Skandia is the first company that included intellectual capital in its traditional financial report to its shareholders in 1994 (Bontis, 2000). This model like BSC focuses on intellectual capital and has a new accounting taxonomy including financial, customer, process, renewal and development, and human capital. This model highlights the importance of human capital and defines knowledge as a core competitive advantage in knowledge based economy. The model proposes some indices to

measure and assesses knowledge, skill, and innovativeness. Another part of this model is structural capital that includes organisational processes, procedures, technologies and information sources. Customer capital includes value of relationship with customers, suppliers and market, and organisational capital.

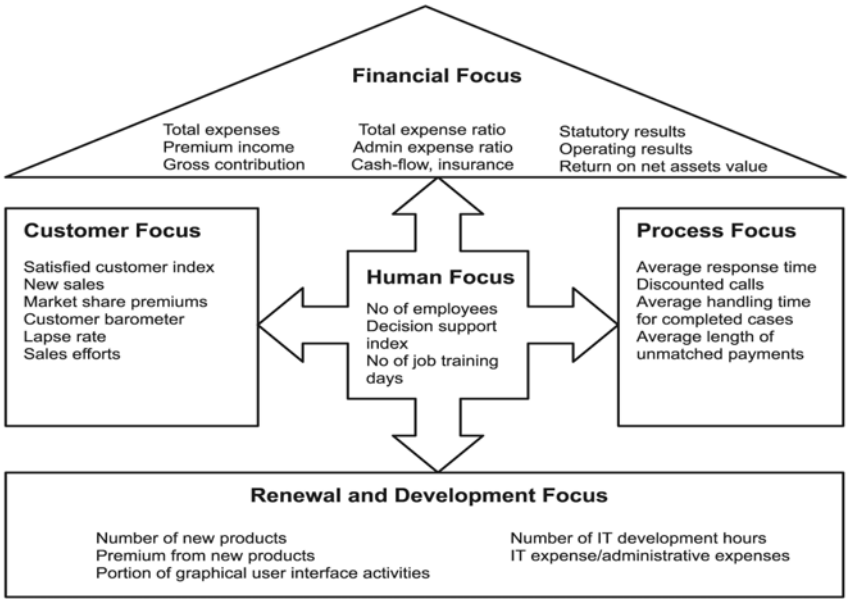

Figure 4: Skandia navigator model (Baker, 2001)

As can be seen in Figure 4, indices use direct counts, dollar amounts, percentages and even survey results. Edvinson and Malone encourage monetary measurement to produce an overall intellectual capital value of an organisation (Edvinson and Malone, 1997). Their examination found 21 indices in which they believe the indices can act as intellectual capital measurement for a fiscal year (Bontis, 2000).

In the Skandia Navigator model, a suitable taxonomy is created to measure intangible assets. It is impressive for recognising customer capital and human capital. A unique understanding of intangible assets is necessary for the organisation to choose appropriated and valid metrics. Roos claims that generic standards for measuring intellectual capital across industries are growing (Roos, 1997). The model measures indices only at a given snapshot in time and can not present dynamic entities of an organisation. Also the model can not measure the impacts of the different parts of intellectual capital (Roos, 1997).

1.4.3 IC audit model

This model focuses on intellectual capital including market assets, human assets, intellectual property assets, and infrastructure assets. Brooking defines intellectual capital as the combined amalgamation of these four assets (Brooking, 1996). Market assets include brands, customers, and distribution channels. Human assets include employee's knowledge, problem solving capability and skills. Intellectual property assets include the assets that can be calculated in financial terms such as copyright, design rights, etc. Infrastructure assets include technologies, process and methodologies. The implementation of this model starts with a questionnaire of 20 questions to check whether the organisation needs to develop new area of intellectual capital or not. The aim of this model is to calculate a dollar value to intellectual capital by using the following methods:

- Cost based approach takes into account the replacement cost
- Market based approach takes into account the market value
- Income based approach takes into account the income produced by the asset.

The model uses monetary approach to measure intellectual capital and this approach is more sensible for managers. However, the checklist of this model does not have a consensus across different industries. The model tries to change the qualitative results of the questionnaire to actual dollar value which is the main weakness. The assets value cannot be measured in the model. There

are many subjective questions while the model aims to measure objective indices. Also dynamic entity of the intellectual capital is not mentioned in the model.

1.4.4 Intangible asset monitor

Sveiby proposed a conceptual framework based on the following three intellectual capital categories shown in Table 1 (Sveiby, 1997).

- Competence of employees (education, experience)
- Intangible assets related to internal structure (management, structure, systems, software)
- Intangible assets related to external structure (brand, suppliers, and customers relations)

This model claims people are the only true agents in business and all aspects of internal and external assets are embedded in human actions. Sveiby believes that the internal structure is part of traditional accounting measurement and external structure assets are not included in the traditional financial systems (Sveiby, 1997).

Table 1: Intangible asset monitor model (Bontis, 2000)

Visible Equity (book value) = Tangible Assets – Visible Debt	Intangible Assets (Stock Price Premium)		
	External Structure (e.g. brands, customer and supplier relations)	Internal Structure (e.g. management, legal structure, manual systems, R&D, software)	Individual Competence (e.g. education, experience)

External components include customers, stakeholders, suppliers and creditors. They are usually interested in a company's position in market versus changes of the company. Internal components are more related to information systems management, trend changes and control figures. Additionally, internal components are being used as a tool by managers. Sveiby identifies three measurement indicators including (i) growth and renewal, (ii) efficiency, and (iii) stability for each of the three intellectual capital categories (Sveiby, 1997). However, implementation of this model needs to be specific an organisational culture. Also the model does not support financial feedback systems. Lynn argues that for many organisations, making a business case means creating financial results thus this model needs to specify culture of organisation and needs a highly successful reporting system on intellectual capital (Lynn, 1998).

1.4.5 EVA

EVA was introduced by Stern Stewart (Stewart, 1997) as a comprehensive performance measurement that uses traditional accounting variables such as budgeting, financial planning, goal setting, performance measurement and incentive compensation to account for all the value that can be added or lost (Bontis, Jacobsen, Dragonetti and Roos, 1999). The model is on a basic rule that economic value added is the net result of all managerial activities (Strassman, 1999). The model compares the cash that a firm's investors start of the company with the present value of the cash. EVA depends on the cost of capital and increases when average cost of capital is less than the return on net assets. In general EVA can be calculated by the following formula:

EVA = Net sales – Operating Expenses – Taxes – Capital Charges

Although the model is on the basis of the financial theories, it can not measure intellectual capital specifically. Moreover, managers can not understand exactly what the company's intangible resources are, what the exact definition of the intellectual capital is and how to improve them.

2. Knowledge and trust issues

According to the literature review on different kinds of the business performance models and its measurement, it is understood that trust importance in intellectual capital and the role of trust in business performance in intellectual capital related models have not been investigated in detail. Trust is the most important issue to create relationship, knowledge sharing, make value in knowledge sharing and should be discussed in all kinds of intellectual capital. As it is seen in this paper, social capital, human capital and market capital are all based on trust and it can be assumed that trust is a structural variable in intellectual capital measurement. Additionally and importantly knowledge itself

cannot lead to a success, as knowledge sharing and knowledge flow is of prime importance in an organisation and knowledge sharing is depends on trust between trusted and trustee agents in specific knowledge context and specific time slot. The main important issue that none of the current models has discussed is the role of trust in intellectual capital. In social capital, market capital, and human capital, trust level between agents has a high impact on business performance. There is a big gap in the current models on the trust issue. The main factors in this research are to define a consensus meaning of the intellectual capital and to define a role of trust and knowledge in the business performance. A developed framework is required to measure embedded trust between employees, employers, customers, and suppliers. Additionally, most current models measure the business performance in a static environment. However, knowledge and trust have dynamic entity and the framework should develop in dynamic environment.

3. A new model in intellectual capital based business performance measurement

3.1 Basic model

On the basis of the literature review, one of the main gaps is a lack of trust and knowledge value in intellectual capital measurement. As a result, in this framework trust and knowledge are the basic variables to measure intellectual capital value as shown in Figure 5.

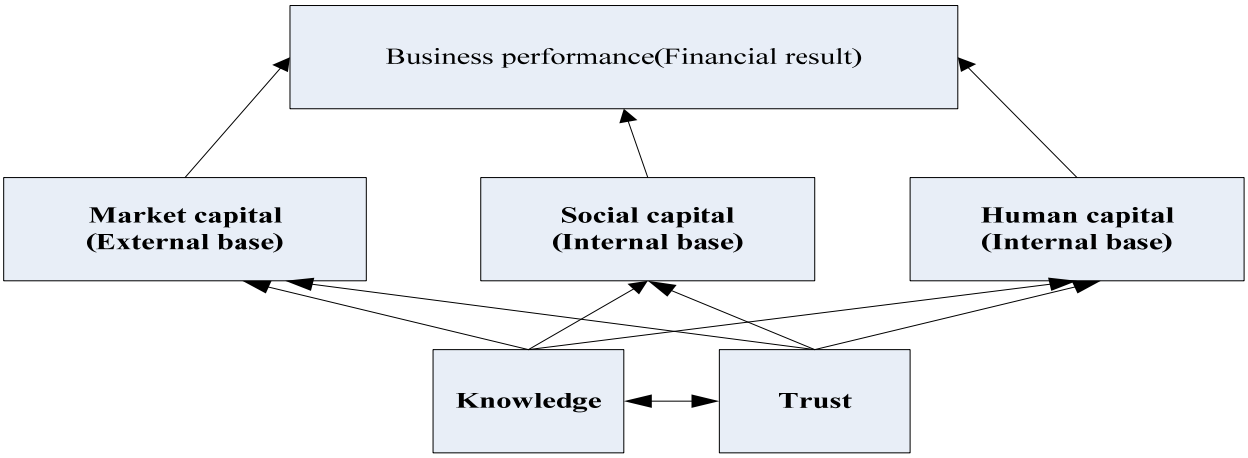

Figure 5: The basic variables to measure intellectual capital value

Social capital = f (trust, knowledge& knowledge sharing)

$$= (\alpha s * TL) + (\beta s * KL) + (\gamma s * KS) + \lambda h \qquad \text{(equation 1)}$$

αs, βs, γs: Dependency level of social capital to trust, knowledge and knowledge sharing
λ is a fix number, TL: trust level, KL: current knowledge depending on education, skill, innovation, KS = knowledge sharing effectiveness (calculated by an ontology similarity comparison)

Human capital = f (trust, knowledge& knowledge sharing)

$$= (\alpha h * TL) + (\beta h * KL) + (\gamma h * KS) + \lambda h \qquad \text{(equation 2)}$$

αh, βh, γh: Dependency level of human capital to trust, knowledge and knowledge sharing

Market capital= f (trust, knowledge& knowledge sharing).

$$= (\alpha m * TL) + (\beta m * KL) + (\gamma m * KS) + \lambda m \qquad \text{(equation 3)}$$

αm, βm, γm: Dependency level of market capital to trust, knowledge and knowledge sharing

Business performance = f (Social capital, Human capital, Market capital)

3.2 Conceptual framework

In the framework, intellectual capital's effect on strategic and scenario planning is discussed in dynamic environment and business PCDA cycle is evaluated as shown in Figure 6. As it is seen in the figure, knowledge and trust have dynamic entity and their effect on intellectual capital can be changed in period of time.

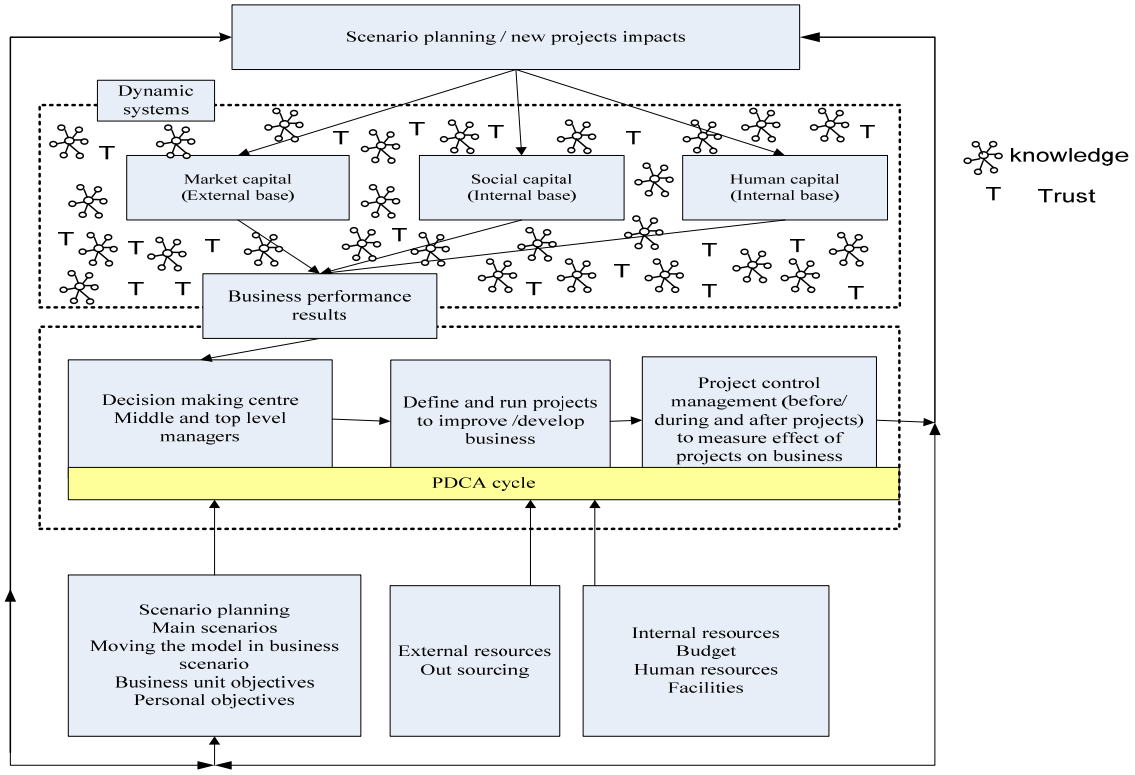

Figure 6: Overview of a conceptual framework for intellectual capital based business performance

3.2.1 System dynamics

System dynamics is a methodology for studying and managing complex feedback systems, such as one finds in business and other social systems (Harris and Williams, 2005). Bill Harris and Bob Williams have identified some key features of system dynamics as below (Harris and Williams, 2005):

- Dynamic systems model the problem, issue, or evaluation questions, not the whole program or real world.
- It is assumed that most problems have endogenous causes.
- It is assumed that events are part of patterns, which are generated by structures.
- Selection of the problem boundary is a vital step.
- Extent in time and space is generally more important than details.

3.2.2 PCDA cycle

PCDA Cycle was proposed by Deming (Demings, 1986), in order to,

- Plan to improve the operations
- Do changes designed to solve the problems
- Check whether the small scale or experimental changes are achieving the desired result or not.
- Act to implement changes on a larger scale if the experiment is successful.

4. Evaluation and future work

The criteria used for evaluation and validation of intellectual capital based business performance are book value and market value. The difference between the two values is intellectual capital value

which is divided into three capitals i.e. social, human and market capitals. On the basis of equations in this paper (equations 1, 2, 3), human capital, market capital and social capitals are measured accordingly.

For our future work, trust level and knowledge sharing will be simulated in digital ecosystem environment. In the simulated digital ecosystem, trust and knowledge sharing variables can be set and their effect on the intellectual capital can be shown and investigated further. Trust and knowledge sharing can be analyzed in normal distribution or any other distributions.

5. Conclusion

This paper introduced a new approach to evaluate business performance on the basis of trust and knowledge sharing. The new approach tried to measure intellectual capital in the dynamic environment and market capital, human capital and social capital as the main intellectual capital. Knowledge and trust as well as knowledge sharing investigated as the key variables to measure intellectual capital and initial model proposed to create a linkage between intellectual capital and business performance. The model is projected to validate by simulated data and more researches are required to define the coefficients in equations of intellectual capital measurement.

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Activating Potential IC: Effective Addition to Active Labour Market Policy in Rotterdam?

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Abstract: In Rotterdam, the average educational level of the population is lower and unemployment and inactivity are significantly higher than elsewhere in the Netherlands. Therefore the economic performance of Rotterdam lags behind other parts of the country. This suggests that some potential human and intellectual capital in Rotterdam remains unused. This situation raises various questions, two of which are addressed in this paper. First, we illustrate the benefits of activating this unused potential and closing the intellectual capital gap between Rotterdam and the national level. Second, we discuss policy scenarios aimed at developing and making better use of human and intellectual capital in Rotterdam, or in general terms at local or regional level. We identify two types of situations in which human or intellectual capital are not sufficiently developed or used: (a) when individuals reach an educational level below their capacities, and (b) when individuals able to work do not participate in the labour market. Obviously, those situations overlap at least partially. Improving the average educational level of the population is an important way to activate unused potential IC, because a better educated population is not only able to perform higher-skilled jobs, but is also more likely to participate in the labour market. Raising the average educational level has economic and non-economic effects on society. In this paper the potential benefits of investment in education are estimated. This estimation is based on three possible effects of an increase in the average educational level: improvement of the average earned salary, improvement of the average probability to find a job and positive non-economic effects, for instance on health and criminal behaviour. Raising the average educational level has large potential benefits, but costs must be made in order to realize these benefits. We compare the costs and benefits of investment in education with more traditional forms of active labour market policy (ALMP), such as subsidized employment, mediation, etc. In the cost-benefit analysis, we pay particular attention to the variation that occurs in the results as we make different assumptions about the effectiveness of policy and the relation between education and economic performance. We also devote some attention to important implementation aspects. These concern, among others, the need for endurance and a long-term perspective, as investment in education takes time to pay off.

Keywords: Investment in education; cost-benefit analysis; human capital; local and regional development

1. Introduction

This paper is based on a research project commissioned by the Economic Development Board Rotterdam. The study analysed the economic importance of unused capacity in Rotterdam. The results were presented begin 2009, as part of an advice to the municipality of Rotterdam.

The EDBR initiative was based on evidence that in Rotterdam an important part of the capacities of the population remains unused. Compared to the Netherlands and even in comparison with other big cities the participation grade and the average educational level in Rotterdam are lower, the long-term unemployment rate is higher, and the proportion of early school leavers is higher as well. Rotterdam also lags behind the rest of the Netherlands in terms of economic performance and welfare. This raises the question how the potential of the population of Rotterdam can be fully developed and used. Based on the EDBR study, this paper presents the potential benefits of investing in education, and describes the costs and benefits of different policy scenarios to raise the educational level and participation of the population in Rotterdam.

In section 2 we define and measure the nature and magnitude of the unused (or underused) potential human and intellectual capital in Rotterdam. Section 3 presents the maximal benefits that could be realised if the gap in educational level between Rotterdam and the Netherlands would be closed, by means of a static comparison between this desired and the present situation in Rotterdam. In section 4, the dynamics of activating unused potential are studied. We describe a few policy scenarios, along with their costs and benefits and with recommendations for implementation. In section 5 we summarise the main conclusions of the paper.

2. Unused potential in Rotterdam

In our approach we use a relatively straightforward method for the measurement of the gap in intellectual and human capital between Rotterdam and the Netherlands as a whole. The measurement is based on the definition of various situations in which the potential of individual remains underused. First we discuss the definitions, then we present the figures.

2.1 Definitions

We identify different situations in which the potential of individuals is not (fully) transformed into human and/or intellectual capital.

First, when individuals reach an educational level below their capacities, potential remains unused. Individuals concerned are:

- Early school leavers: They leave the school system before obtaining an official Dutch 'start qualification' (a qualification which can be obtained after minimally 12 years of education). This group has a vulnerable position in the labour market, with a high risk of unemployment and work in insecure jobs. It is however worth noting that part of early school leavers reintegrate the school system after a short period of absence.
- People whose formal qualifications remain below their capacity: They have the potential to attain a higher educational level than they actually reached, but for a number of reasons they have not succeeded in this. This phenomenon is quite difficult to measure, as data on people's ability are not available.

Whatever the qualification level, potential also remains unused if people actually able to work do not participate in the labour market. This is the case for:

- The inactive population (at working age) and part-time workers: Inactivity and part-time work are unused potentials as people do not participate in the labour market, or participate less than they could. In addition, human capital theory argues that people's skills deteriorate as they are not used. Research has shown that periods of inactivity have a negative effect on an individual's career (in terms of chances to find a job, status and remuneration) (Róman 2005). Inactivity and part-time work partly reflect the preferences of individuals, but can also be involuntary, as in the case of discouraged workers.
- The unemployed: Unemployment seems an obvious form of unused potential. However, short-term unemployment can be considered as simply reflecting the time needed by employers and job-seekers to find each other. Long-term unemployment can be regarded as unused potential. It often reflects a mismatch between people's qualifications (insufficient, obsolete) and employer's demand.
- People working below their qualification level: If high-skilled employees are working on low-skilled jobs, their potential is obviously underused. When this is only temporary, for instance in the case of young workers who need to acquire some experience, it can not be regarded fully as unused capacity. Work below one's qualification level is however a waste of potential if it persists for a long time.

2.2 Measure of unused potential

Individual potential is, by definition, difficult to measure, since it is not observed. A straightforward approximation is to measure the occurrence of the phenomena described above for both Rotterdam and the Netherlands. Since the institutional and cultural context is roughly the same in Rotterdam and the rest of the Netherlands, there is no *a priori* reason why the participation grade and educational level in Rotterdam should be lower. Rotterdam has got a higher share of low-qualified people and citizens with migrant background. Additional efforts might be required to help them develop their full potential. In our measurement we consider the participation grade and educational level at national level as the potential aim which Rotterdam could attain. We note that the same method can be applied when Rotterdam is compared with other big cities.

Table 1 presents the Rotterdam and national figures for the concepts described in section 2.1. The national figures in the last two rows are scaled to local level. The difference between measures at local and national level indicates the gap between Rotterdam and the Dutch average.

In the right column the difference is expressed in terms of the number of persons to be reached. The figures indicate that it is necessary to upgrade the qualification level of almost 22,000 persons, bring almost 24 000 persons (back) to the labour market, and enable more than 6 000 persons to work at their actual qualification level.

Table 1: Size of unused potential in Rotterdam (based on 2005 data)

	Start: Situation in Rotterdam at present	Aim: Situation in the Netherlands at present	Potential to be developed (number of persons)
Too low educational level			
Percentage of early school-leavers	8.0%	4.0%	1 650
Percentage with middle qualification level	36.2%	41.3%	20 900
Percentage with high qualification level	25.1%	25.2%	550
Unused potential on the labour market			
Unemployment rate	10.6%	6.5%	10 850
Participation rate	64.5%	67.6%	12 850
Percentage of part-time workers	34%	37%	no action needed
Work below qualification level			
- secondary education	22 000	18 100	3 900
- higher education	7 000	4 600	2 400

(Source: SEOR's calculations, based on CBS-data (Statline); the year 2005 is the most recent year for which all relevant information is available.)

3. Static analysis: The benefits of having Rotterdam's potential better used

In this section, we calculate the economic benefits that can be realised if all unused potential described in the preceding section is activated. This means that more people have a higher educational level and/or more people participate on the labour market than in the present situation.

3.1 Method

Education takes time to pay off. Therefore the method requires a long term perspective. We need to calculate the total benefits of having a better educated and more participating population over the total length of the period in which this population works. Using the net present value method these benefits are discounted to their value in the starting year.

A higher educational level of the population has three kinds of positive social and economic effects. First, gross income is higher, because better-educated workers earn on average a higher wage. A lot of research has been done on this kind of returns to education (for an overview, see Card 1999 and Heckman et al. 2006). Second, the average probability to participate in the labour market is higher, so more people will actually earn an income. Third, a higher educational level of the population has important non-economic effects, for instance in the form of better health standards, less criminality, etc. Attempts to measure the monetary value of those non-economic effects suggest that they are substantial (De Koning et al 2003, In 't Veld et al 2006, Ecorys 2006). We take all three kinds of benefits into account in our calculations: they all translate into a higher total gross income.

We have to subtract two kinds of costs from the higher total gross income. First, in a situation where the population has got a higher education level, the educational expenses are higher than at present in Rotterdam. Second, as people stay longer in education, opportunity costs have to be taken into account, i.e. students do not earn the income which they could have earned by working. Similarly, when calculating the effect on income of a higher participation on the labour market, we have to take into account the social benefits that people got in the old situation. Therefore the monetary benefits are the difference between the income earned by working and the income received while not participating.

2005 is the starting year in our calculations, because it is the most recent year for which all relevant data are available. To calculate the total of future benefits, we have estimated the number of years that people with a higher educational level or who participate more than in the present situation in

Rotterdam will be able to work on average. Based on a weighted average of the age of the working, unemployed and inactive population, we estimate this period at 25 years. However, we have also calculated the net present value of social economic benefits over a period of 10 years, as this might be a more realistic horizon to measure effects of policy measures. Consistent with comparable social net present value calculations we assume a 7% long-term nominal interest rate and a nominal increase in wages of 6% per year.

Here, we are not considering the *process* of increasing the educational level of the population and reintegration of people on the labour market. We only consider the hypothetic situation in which the gap between Rotterdam and the Netherlands simply would not exist. The static calculation is therefore based on some important implicit assumptions that will have to be modified as we consider the effects of an *investment* to activate unused potential in Rotterdam:

- First, every participant really achieves the educational level aimed for within the regular time-span.
- Second, as a person achieves a higher educational level, the chance to get a job is automatically equal to the average chance at this new educational level.
- Third, everyone who gets back to work from unemployment or inactivity finds a job with a remuneration corresponding to his educational level.
- Fourth, as an individual's educational level increases, one would expect that the kind of work done and the corresponding wage increase at the same rate. This is not, however, a realistic assumption, because wage is not fully determined by education: ability and other personal characteristics also play a role. We therefore assume that only 60% of the higher wage can be attributed to the higher educational level.

3.2 Results

The results of our calculations are presented in Table 2 and 3. Table 2 contains the net present value of different types of policy intervention, whereas table 3 contains costs and benefits per inhabitant of Rotterdam. The benefits of a higher educational level of the population appear to be a useful complement to the benefits of a higher participation. The maximal potential benefits of activating unused potential are substantial, as they represent about 20% of the GDP of Rijnmond (greater Rotterdam).

Table 2: Net present value (NPV) of upgrading educational level and stimulating participation (in million Euros)

	over 10 years	over 25 years
Investment in education		
NPV of upgrading educational level	921	3,220
Active labour market policy (ALMP)		
NPV of reducing unemployment	2,115	4,669
NPV of increasing participation	2,793	6,165
NPV of increasing occupational level	651	1,438
Total NPV of ALMP	5,559	12,271

Table 3: Net present value per head of upgrading educational level and stimulating participation, over 10 years (in Euros)

	upgrading educational level	active labour market policy
Total population in Rotterdam	596,407	596,407
Additional income per head	1,301	11,245
Loss of work-income per head	-1,076	-
Loss of social benefits per head	- 239	-1,924
Direct costs of education per head	- 947	-
Non-economic effects per head	2,504	-
Total NPV per head	1,544	9,321
Total NPV per head per year	154	932
NPV per participant	42,954	185,279

4. Dynamic analysis: Alternative policy scenarios, cost-benefit analysis and implementation

Our calculations indicate that activating unused capacity can deliver high economic benefits. However an important question is how to activate and develop this unused human and intellectual capital in Rotterdam. It is impossible to present a blueprint of best practice, as this requires a thorough ex-ante evaluation, policy design and implementation plan. Therefore we concentrate on three issues: (a) the need to direct policy at the causes of the problems at hand; (b) the possible contribution of education and active labour market policy, indicated by costs and benefits of alternative policy scenarios and (c) some conditions concerning the implementation process.

4.1 Background of unused potential

In order to find effective solutions to a problem, it is essential to define its causes. Factors that contribute to the accumulation of unused potential can be found in four different domains. First, the educational system may not always be able to develop the full potential of individuals, as is particularly visible in the case of early school-leavers. Second, the situation on the labour market and the expectations of employers have an influence on the size of long-term unemployment and inactivity. Third, the social environment strongly influences attitudes and success at school and on the labour market. Last but not least, characteristics of an individual, be it 'hard' demographic factors or 'soft' factors such as motivation and self-confidence, are also crucial in explaining underachievement and non-participation.

It is striking that individuals in one of the various situations listed in section 2.1, be it early school-leaving, long-term unemployment or involuntary inactivity, whose potential remains unused, all seem to have a number of common characteristics: they have no qualifications, or those are too low or obsolete for the labour market; they have had bad experiences at school and/or in the labour market, which harmed their self-confidence and motivation; and their social environment is not stimulating them to make the best out of their talent.

We concentrate here on policy scenarios aimed at empowering individuals through developing their potential. First, it is essential to help people get the qualifications they need on the labour market; second, in order to ensure that individuals can make good profit of the education and training they get, it is important to offer them individual support and to actively help them overcome the distance separating them from the labour market.

4.2 Description of different policy alternatives

We examine three possible policy scenarios, which comprise education and active labour market policy in different proportions.

The first scenario is the 'education scenario'. In this case, the focus of policy is on upgrading the educational level of the population and preventing early school leaving. People are stimulated to take part in education. Active labour market policy is only used complementary. Part of the investment is used to reinforce social structures at neighbourhood level, in order to maximize the results of the investment in education. Because it takes time to attain a higher education level, the first results of this policy scenario are only visible after 2 or 3 years.

The second scenario, the 'participation scenario', focuses on active labour market policy. The priority in this scenario is to bring people back into the labour market. (Short term) training is used as a supporting device, in addition to subsidies, intermediation, etc. Part of the investment is used to stimulate employers to take an active part in the reintegration process. The reinforcement of social structures is an important point in this scenario too. Reintegration measures are in general shorter than educational programmes, so that the results of this scenario should become visible at short term.

The third alternative is the 'combination scenario', in which educational investment and active labour market policy are combined. The aim is to raise the educational level of the target group and to structurally improve their position on the labour market. Because this implies substantial investments both in education and in active labour market policy, the costs per participant are higher than in the other scenarios.

4.3 Cost-benefit analysis

We now turn to calculating the relative costs and benefits of the policy scenarios.

4.3.1 Method

We calculate a net present value again, but this time in a more traditional sense. We consider the *investment* which has to be made by Rotterdam in order to upgrade the educational level of its population and increase the participation rate. Unlike in our previous calculations, we now take into consideration that policy is not 100% effective and that the target group has specific problems and therefore cannot be regarded as an average worker. On the basis of evaluation studies we modify the assumptions made in the static analysis:

- First, we assume that not all participants, but only 40% really obtains the qualification they aimed for within the regular time-span. This rate is a bit higher than the success rate observed in education at present, but we assume that the additional support offered will increase the success rate.
- Second, we assume that people whose educational level is upgraded have a 5%-lower chance to get a job than those who attained this level in a 'regular' way. This is equivalent to an increase by 11 to 19% in the chance to find a job when a participant increases his level of education by one level. This assumption is made because not only education, but also other characteristics influence the chance to get a job. Probably, the characteristics of those who benefit from additional support differ from those of regular workers at the same educational level (e.g. motivation, self-confidence, social capital).
- For similar reasons, we assume that people who get back to work after being unemployed or involuntarily inactive earn a wage which is 10% lower than the average for the occupational level at which they work.
- We further assume that active labour market policies increase the chances of participants to find a job by 10%. These 10% add up to the effect of education in the 'combination scenario'.
- Our assumption that a wage increase can for 60% be attributed to the rise in educational level remains unchanged.

We base our calculations on an investment of 60 million Euros per year, corresponding to roughly 10 percent of the actual policy expenditure in Rotterdam in the relevant area. This is the amount that would be needed to close the gap between Rotterdam and the Netherlands within 10 years, if policy is 100% effective. In reality, the amount needed to close the gap will be higher, but it is not realistic to assume such a huge investment: this would mean a rather unrealistic increase of the educational capacity by more than 25 to 35 %.

As in the preceding section, we assume a nominal increase in wages of 6% per year and a 7% long-term nominal interest rate.

4.3.2 Results

The results of our calculations are presented in Table 4. On the basis of available statistical information we estimate that the costs of education are on average 7 500 Euros per person per year of education. The policy costs per participant per year comprise the costs of reinforcing the social structures in neighbourhoods and of active labour market policies. These estimates are based on actual data on the costs of ALMP and salaries of social workers. The average costs per participants per year are the sum of both kinds of costs. To calculate the average total costs per intervention, we have to know the average length of an intervention. Upgrading somebody's education level can take up to 5 years (in the case of higher education), whereas active labour market programmes rarely last more than one year. The average duration is weighted by the number of participants in different kinds of measures / educational programmes. The number of participants that can be reached per year is given by the amount invested per year (60 million Euros) divided by the costs of an intervention per participant per year for education and the average cost per intervention for ALMP. The number of participants that can be reached over a period of 10 years is computed on the same basis, taking into account the outflow out of educational programmes of unsuccessful students and the different durations of different types of education.

The total costs of a scenario are the total costs of education and policy over the 10 investment years, discounted to their present value. The total benefits of a scenario are the total increase in gross income over the 25 years following the investment, taking into account that less social benefits are paid out, discounted to their present value. The sum of both gives us the Net Present Value of a given policy scenario after 25 years.

Table 4: Assumptions, key figures and net present value and break-even point for different policy scenarios

	Education scenario	Participation scenario	Combination scenario
Assumptions			
Chance of obtaining higher qualification within regular time	40%	-	40%
Translation rate of higher education into higher wage	60%	-	60%
Increase rate in the chance to find a job	11 to 19%	10%	21 to 29%
Key figures			
Costs of education per participant per year (Euros)	7,500	-	7,500
Policy costs per participant per year (Euros)	800	7,500	3,000
Average costs per participant per year (Euros)	8,300	7,500	10,500
Duration of an intervention	1 to 5 years	6 months to 1 year	1 to 5 years
Average duration of an intervention	3 years	9 months	3 years
Average costs per intervention (Euros)	24,900	6,000	31,500
Number of participants per year	7,372	10,000	5,744
Number of participants during 10 years	28,644	100,000	22,334
Investment length in years	10 years	10 years	10 years
Present value and break-even point			
Costs during 25 years (Euros)	499 million	451 million	494 million
Benefits during 25 years (Euros)	872 million	585 million	841 million
Net present value after 25 years (Euros)	373 million	134 million	347 million
Net present value after 10 years (Euros)	-276 million	- 140 million	-278 million
Break-even point	17 years	18 years	17 years

The results clearly indicate that the costs of active labour market policies (in the 'participation scenario') are lower, and the net present value after 10 years therefore higher, than in the scenarios aimed at developing the human and intellectual capital of the population through education. The net present value after 25 years shows, however, that investing in human and intellectual capital is a strategy that pays off more in the long run. Non-economic effects of activating all unused potential have not been taken into account in this cost-benefit analysis. When these are taken into account, the break-even point of the different scenarios shifts back to 12 to 15 years.

4.3.3 Sensitivity analysis

The results presented in the preceding sections rely on a number of assumptions. In this section, we examine what happens when some of these assumptions are modified. We concentrate on the 'education' and 'combination' scenarios, because they are the most relevant in the context of human and intellectual capital development.

Table 5: Sensitivity of the Net Present Value (NPV) of different policy scenario to changes in the assumptions

		Education scenario		Combination scenario	
	Assumption	NPV (in million Euros)	Break-even point (in years)	NPV (in million Euros)	Break-even point (in years)
Chance to obtain higher qualification within regular time	25%	-338	21	-339	22
	65%	-186	13	-192	14
Discount rate	5%	-279	15	-283	16
	9%	-271	18	-273	19
Reduction in chances of participants in measures to find a job relative to non-participants	-10%	-311	19	-304	18
	0%	-240	15	-253	16

We observe that our results are most sensitive to a change in the assumed chance to obtain a higher qualification within the regular time. This is not surprising; it illustrates that the potential benefits can

only be reached when policy really succeeds in raising the average educational level. This conclusion highlights the challenges that face any policy design in this field. It demands a thorough and durable implementation plan. We highlight some of the necessary conditions below.

4.4 Implementation

First, because of the long-term character of investment in education, and because many different institutions will be involved in the implementation of policy (education, employment service, social services, etc.) it is essential to have a problem-owner who is responsible for overall implementation and coordination. This problem-owner should also ensure continuity in implementation, i.e. it should guarantee that projects are conducted for sufficient time to show results and get structural financing.

Second, because different instruments have different effects and those effects are dependent on a wide range of factors, it is important to create space for experiments (trying out different instruments). After testing different instruments, after some time, it should be possible to identify the best solution and to give priority to it.

Third, a pre-condition for the identification of the 'best' solution to a problem is that the implemented projects and measures are strictly monitored and evaluated. In this perspective, targets should be clearly defined at the beginning, and the institution responsible for evaluation should be named. The criteria to decide whether an instrument should be further implemented or not should also be clearly defined *a priori*.

5. Conclusion

We have shown that unused human and intellectual capital in Rotterdam is a huge potential, the activation of which could have substantial effects for the city's economy. In particular, upgrading the educational level of the population proves to be a strategy which in the long run pays more than stimulation of participation on the labour market. The path to full activation of unused potential is, however, a long one: it requires important investments, which bear visible fruits only after 15 to 20 years, a time-span far beyond the horizon of most policy makers. A long term perspective, endurance, continuity, proper implementation and strict monitoring and evaluation are required, along with the commitment of all stakeholders. At least one of them should take responsibility for coordination and continuity.

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The SECI Model and the Learning Curve Phenomenon

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Abstract: This study investigates the relationship of the SECI (i.e. socialization-externalization-combination-internalization) modes of knowledge conversion with the learning curve phenomenon within software development process. We specified an ANCOVA learning curve model with slope control variables corresponding to different modes of knowledge conversion (i.e. externalization, combination, internalization). The ANCOVA learning curve model is estimated utilising a data sample of 3104 observations obtained by the ISBSG Repository CD 10. The learning rate seems to be affected by different modes of knowledge conversion in different directions. The research findings of this study are consistent with previous research initiatives as far as concerns that SECI modes of knowledge conversion affect organizational but they reveal that knowledge flows and stocks (i.e. externalization and combination) might have negative effects on the rate of performance improvements within team based production environments.

Keywords: Learning curve phenomenon, learning rates, SECI, software developer teams

1. Introduction

The theory of organizational knowledge creation developed by Nonaka and his colleagues (Nonaka 1994, Nonaka and Takeuchi 1995, Nonaka *et al.* 2000, 2001a, 2001b) has a paradigmatic status within knowledge management literature. Their theory is founded on the SECI spiral model of knowledge creation process, which recognizes four modes of knowledge conversion: tacit to tacit (socialization), tacit to explicit (externalization), explicit to explicit (combination) and explicit to implicit (internalization). Through SECI process, an individual's tacit knowledge is crystallized as a part of the knowledge network of an organization (Nonaka 1994).

Prior empirical studies investigated the relationships among knowledge processes and organizational performance in order to identify knowledge enablers and processes for improving organizational performance. Becerra-Fernandez and Sabherwal (2001) developed a contingency framework including attributes of performed tasks and associated them with SECI model. Gold *et al.* (2001) analyzed the relationship of infrastructure and process capabilities with organizational effectiveness. Choi and Lee (2002) found that dynamic knowledge management style emphasizing on both knowledge reusability through information technologies and knowledge sharing through informal discussions among employees result in higher performance; the passive knowledge management style is less effective. Lee and Choi (2003), also, investigated the relationship between seven learning enablers (collaboration, trust, learning, centralization, formalization, T-shaped skills and information support), the SECI model, organizational creativity and performance. They concluded that knowledge creation process is positively related with organizational creativity, which is positively related with performance. Becerra-Fernandez and Sabherwal (2003) examined the perceived effectiveness of knowledge management processes across different organizational levels. They concluded an upward impact in perceived effectiveness of knowledge management processes, from individual to group level, as well as from group level to organizational level. Recently, Tsai and Li (2007) collected evidence that knowledge creation process (including SECI model) is mediator between new venture strategy and firm performance.

Despite the aforementioned research initiatives, there is not sufficient evidence for the relationship of SECI modes of knowledge conversion with the learning curve phenomenon observed in knowledge intensive production environments. Learning activities have been observed in various production environments (Argote and Epple 1990, Benkard 2000) demonstrating that performance improvements in the input-output productivity ratios are a consequence of the growing stock of knowledge. This is known as learning curve phenomenon and its simplest known specification is:

$$y = a x^{-b} \quad (1)$$

where y is the cumulative average number of direct labour hours input; x is the cumulative number of units of output; a is the working effort required for the production of the first unit; and b ($0 < b < 1$) is the learning rate or elasticity.

We focused on the knowledge intensive production environment of software development due to the fact that the productivity behaviour of developer teams is correlated to learning curve effects (Kemerer 1992). We associated specific instances of software development process with the SECI modes of knowledge conversion in order to rationalize their effects on the learning outcome. Empirical evidence obtained by a data sample retrieved from International Software Benchmarking Standards Group repository (ISBSG 2007), indicates that the SECI modes of knowledge conversion have significant effects on the learning rate in different directions. This is, partly, inconsistent with the prior, empirically verified, positive or neutral relationship of the knowledge creation processes with organizational performance. A possible explanation is that this study focuses on the learning curve phenomenon, which emphasizes on the exploitation aspect of learning at operational level, whereas previous studies emphasize at the exploration facet of knowledge creation at strategic level.

2. Problem statement

Software development is an identical production process for examining the relationship of SECI modes of knowledge conversion with learning curve phenomenon. It is a cognitive process which transforms the collective knowledge of organizational teams to intangible products (McGrath 1984, Uschold 1998). Adopting the semantics of the SECI model, the knowledge creation process behind learning curve can be rationalised on the basis of quantifying the effects of different modes of knowledge conversion on the rate of performance improvements. Lapré *et al.* (2000) note that the transfer of different types of knowledge received little attention within learning curve empirical research. SECI model is an explicit typology of different modes of knowledge conversion process. In the absence of relevant empirical evidence associating SECI model with learning curve phenomenon on the performance of the software developer teams, the following research question emerges: Can we obtain empirical evidence of learning curve phenomenon in software development as it is affected by SECI modes of knowledge conversion in order to provide insights for managing learning curve dynamics through SECI-based knowledge management practices?

3. Theoretical framework - Statement of Hypotheses

Software development is a problem solving process (Uschold 1998) performed by developer teams. Software community has recognised the problem solving perspective of software development with the formulation of Function Point Analysis (FPA) as a productivity measurement methodology. FPA analyses the component problems (Function Points/FP) of a software project defined in meaningful terms to the users of the software program (IFPUG 2006). The problem solving aspect of software development justifies its association with learning (Fiol and Lyles 1985, Kolb 1984, Sterman 1994: 293) and it allows associating programming behaviour of developer teams with the learning curve phenomenon.

In the case of developer teams, effective problem solving depends on team characteristics (Ancona and Galdwell 1992, Boehm 1981, Brooks 1993, Carmel and Sawyer 1998, Curtis *et al.* 1988) and the collective ability of team members to facilitate the socialization mode of knowledge conversion (i.e. originating *Ba*) in order to share symbols and shape common mental maps for guiding their future behaviour. This implies that the observed improvements on team performance due to learning depend on the quality of the human capital (i.e. team characteristics) and the ability to improve it by socializing team members' tacit knowledge within a specific context defined by the task characteristics.

Despite the importance of learning curve effects on the performance of the software developer teams (Raccoon 1995); few studies provide sufficient empirical evidence. Pendharkar and Subramanian (2007) using a cross sectional data sample of 40 observations estimated an effort-experience learning curve specification for Computer Aided Software Engineering tools (CASE tools), where the explanatory variable is developer team's experience in years. However, several empirical studies tested the hypothesis that learning is a function of calendar time rather than cumulative output (Lieberman 1984, Rapping 1965, Sheshinski 1967) proving that calendar time becomes statistically insignificant once cumulative output is included in the analysis. Consequently, the log linear model of Eq. (1) has emerged as standard empirical approach. Further, adopting the cumulative number of Function Points as the explanatory variable facilitates the interpretation of the learning curve phenomenon as a result of the problem solving physiognomy of the software development process and the rationalization of its relationship with SECI modes of knowledge conversion in a more rigorous way than the calendar time specified effort-experience learning curve model. In the absence of relevant evidence for the log-linear specification of Eq. (1) for software developer teams, the following hypothesis should be tested:

H_1: In the performance of tasks by software developer teams, the cumulative average of direct labour input and the produced volume are exponentially associated according to the learning curve equation.

Hypothesis H_1 implies not only that learning curve phenomenon is observable on the performance of the software developer teams but it is attributed to the team dynamics to stimulate the socialization mode of knowledge conversion between team members resulting to performance improvements.

To examine the effects of internalization on rate of performance improvements, we will focus on CASE tools. A CASE tool represents a form of explicit knowledge incorporated within application programming software that establishes certain guidelines for the problem solving frameworks of the developer teams. To obtain the benefits of CASE tools, developers should modify their programming philosophy by incorporating the predetermined explicit knowledge into their individual mental models (Guinan and Bostrom 1986). Thus, the use of CASE tools at the development process triggers an internalization process of tacit knowledge by team members and, thus, it causes fluctuations on their performance. If the presence of CASE tools at the development process has significant effects on the rate of productivity improvements the following hypothesis may be accepted:

H_2: In the performance of tasks by software developer teams, the internalization process of tacit knowledge affects the rate of productivity improvements.

The impact of externalization and combination mode of knowledge conversion on the dynamics of the learning curve phenomenon will be assessed by their ability to generate reusable explicit knowledge residues that cause lagged effects on team performance. Externalization requires the expression of tacit knowledge and its translation into explicit forms of organizational memory. Combination involves the conversion of explicit knowledge into different patterns of explicit knowledge. Both modes of knowledge conversion emerge by the dynamic interaction of different organizational subunits within organizational processes. It is rather difficult to define explicit processes occurring during software task performance that correspond to externalization or combination mode of knowledge conversion.

Software development is supported by methodologies, which include software artefacts (i.e. models, documents, code, etc.) for drawing guidelines to respond effectively to development problems in a variety of applications domains and programming environments. Methodologies are meta-models of the problem-solving related knowledge and represent forms of explicit knowledge formulated through time either from the experience gained by the organization or transferred inside by the industry.

Methodologies developed in house correspond to the outcome of an externalization process, which synthesizes the tacit knowledge gained by the software developer teams to explicit representations. The effectiveness of the above externalization process is determined by the reusability of the explicit methodological meta-models for future problem solving cycles of the software development process. Developing useful explicit knowledge enables developers to improve their performance and it affects the rate of improvements. Focusing on methodologies developed in house allows examining the hypothesis:

H_3: In the performance of tasks by software developer teams, the externalization mode of knowledge conversion affects the rate of productivity improvements.

Methodologies acquired outside represent a portion of domain explicit knowledge incorporated within the existing organizational knowledge base. Usually, methodologies acquired outside are properly modified according to organizational characteristics, structure, programming philosophy and, thus, trigger a process of reorganizing explicit knowledge to different form that is expected to enhance the programming abilities of the organization. Thus, methodologies acquired outside may be considered that represent a combination mode of knowledge conversion that influences the rate of performance improvements that allows testing the following hypothesis:

H_4: In the performance of tasks by software developer teams, the combination mode of knowledge conversion affects the rate of productivity improvements.

Table 1 summarises the research hypotheses and Figure 1 is a graphical representation of the research context of this study.

Table 1: Summary of Hypotheses

Mode of Knowledge Conversion	Hypothesis	Explanation:
Socialization	H_1: $y = a x^{-b}$	Learning curve phenomenon emerges by the ability of the developer team to improve its Human Capital by socializing team members' tacit knowledge during task performance.
Externalization	H_2: Methodology (In-house)	Methodology represents meta-models of the problem-solving related knowledge, namely, forms of explicit knowledge formulated through time utilizing organizational experience. The effects of externalization mode of knowledge conversion process on learning curve phenomenon are evaluated by the reusability of the externalized knowledge incorporated within methodology developed in house.
Combination	H_3: Methodology (Acquired)	Methodologies acquired outside are properly modified (according to organizational characteristics, structure, programming philosophy etc.) and, thus, trigger a process of reorganizing explicit knowledge to different form that is expected to enhance the programming abilities of the organization (combination).
Internalization	H_4: CASE Tools	To obtain the benefits of CASE tools, developers should modify their programming philosophy by incorporating (e.g. internalization) the predetermined explicit knowledge into their individual mental models.

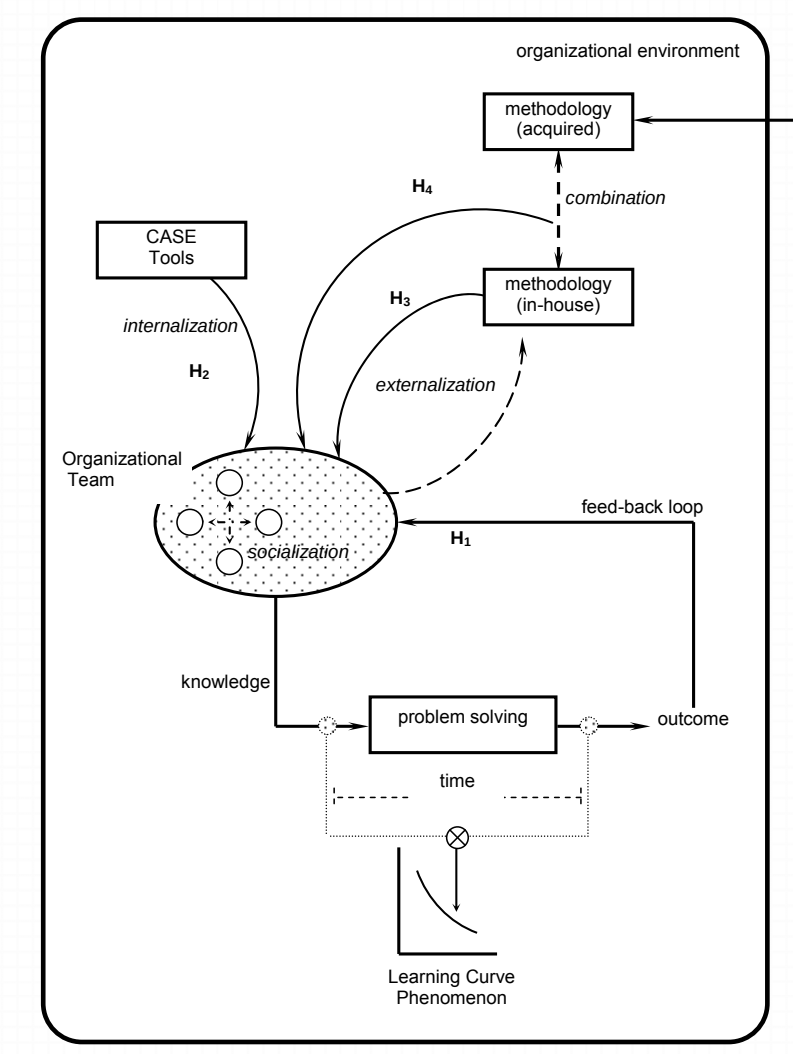

Figure 1: SECI Modes of Knowledge Conversion and Learning Curve Phenomenon in Software Development Process

4. Data and methods

The data obtained by the Repository CD 10 of the International Software Benchmarking Standards Group. Amongst the 4106 projects included in ISBSG Repository CD 10; 295 cases characterized by a lack of credibility or integrity were eliminated (i.e., projects that rated C or D by the ISBSG quality rating system). In addition, 707 cases using measurement methodology other than the IFPUG standard were excluded.

The data sample includes cross-sectional observations for the productivity and cumulative output of different developer teams recorded when the project development has been completed. Despite the fact that the mainstream learning curve empirical research focuses on time series or panel data, several empirical studies have utilised cross-sectional data for examining the effects of various factors on the improvements of output-input ratios (Joskow and Rozanski 1979, Sheshinski 1967). Further, Penharkar and Subrammanian (2007) argue that under the assumption of independent and identical distribution (iid) of programmer's experience and identical learning curve specification for different programmer's, cross-sectional dataset can be used for learning curve estimation purposes. Within the context of this study, the learning curve phenomenon on the performance of developer teams, specified with the Eq. (1), is caused by their experience and learning capabilities. Developer team's experience and learning capabilities represent its human capital, which is a psychometric variable with independent and identical distribution across the population of the developer teams; given task characteristics. The assumption of identical learning curve specification for different developer teams will be tested using Ramsey' s RESET (Ramsey 1969), CUSUM and CUSUMQ (Brown *et al.* 1975) specification tests for the estimated learning curve regression model. Ramsey' s RESET test could detect specification error in an equation which error in an equation gave satisfactory values for all the more traditional test criteria (e.g. goodness of fit, test for first order serial correlation, high t-ratios). CUSUM and CUSUMQ tests find parameter instability across the sample population.
To test hypothesis H_1, Eq. (1) will be estimated using the ordinary least-squares (OLS) method. The logarithmic transformation of Eq. (1) allows regression analysis using the least-squares criterion:

$$\ln(y_{PDR}) = \ln(a) - b \ln(x_{FP}) + e \qquad (2)$$

where e is the disturbance factor. In Eq. (2) the dependent variable is the natural logarithm of the Project Delivery Rate, $\ln(y_{PDR})$. Project Delivery Rate (PDR) is calculated by dividing the total working effort consumed by a developer team to complete a project with the cumulative number of FPs and it measures the productivity achieved by the developer team at the development of a specific project. The independent variable is the natural logarithm of the cumulative number of FPs required to complete the project (x_{FP}) and it measures the total production output of the developer team.

Empirical research has identified increased variability on the learning curve estimations attributed to static scale economies and dynamic learning effects (Argote and Epple 1990). In order to control the effects of scales of economies on productivity fluctuations, it is assumed that while the intercept coefficient of the estimated learning curve model depends on many factors, its slope coefficients depend only on the factors associated with learning (i.e. organizational forgetting, employee turnover, transfer of knowledge etc.). Consequently, the economies of scale have been associated with the intercept coefficient of the estimated learning curve models. Assuming that the working effort consumption is separated to k successive ordered and equal classes of increasing working effort consumption; the intercept coefficient can be defined as follows:

$$\ln(a) = \ln(a)_1 + \sum_{i=2}^{n} \ln(a)_i \, D_i \qquad (3a)$$

where D_i is a control variable used to donate that a specific project is classified at the i^{th} class of working effort consumption and $\ln(a)_i$ the corresponding differential intercept coefficient. Control variable for the first class of working effort consumption is not defined to avoid the dummy-variable trap.

A two-stage ad hoc clustering methodology was employed to derive a more precise specification of the Eq. (3a). Initially, observations were clustered using the working effort distribution to five cluster memberships. The range of working-effort distribution classes was determined at 2000 h, which approximates a person-year. In general, a project consuming less than one person year could be considered as a small one (Section 1a – Table 2). The second stage of clustering involves one-way ANOVA for the mean productivity by cluster memberships in order to delimit the relevant ranges for working effort consumption, within which mean productivity does not differ significantly. In a labour intensive industry, such as software development, this is an indicator of stable economies of scale

between successive cluster memberships, and, therefore, the remedial variability of productivity within cluster memberships could be examined with respect to the learning curve hypothesis. Using the natural logarithm of Project Delivery Rate as a productivity measurement variable, we performed various multiple-comparisons post hoc tests of the mean productivity value. None of the ANOVA multiple-comparisons tests diagnosed significant differences in the mean productivity between third and fourth cluster membership (Section 1b – Table 2). These cluster memberships were merged (Section 1c – Table 2). Thus, to incorporate the effects of economies of scales on the productivity behaviour, the OLS model of Eq. (3a) is modified as follows:

$$\ln(y_{PDR}) = \ln(a)_1 + \sum_{i=2}^{4} \ln(a)_i \, D_i - b \ln(x_{FP}) + e \qquad (3b)$$

Where Di (i = 2, 3, 4) are dummy variables used to denote the working effort cluster membership of the project.

Table 2: Cluster Memberships and One-Way ANOVA Tests for Mean Productivity (natural logarithm of PDR) by Cluster Memberships of Working Effort Consumption

1.a. Initial Cluster Membership			
Cluster Membership	Working Effort (h)	**Frequency**	Percentage
1	0-2000	1649	53
2	2001-4000	574	18
3	4001-6000	283	9
4	6001-8000	152	4
5	> 8000	446	14

1.b. One-Way ANOVA Tests for Mean Productivity (PDR) by Cluster Memberships of Working Effort Consumption				
	Sum of Squares	df	Mean Square	F
Between Groups	608.190	4	152.047	163.905
Within Groups	2872.947	3097	0.928	
Total	3481.137	3101		

Multiple Comparisons		
Cluster Memberships		p-value
(I)	(J)	
1	2	<0.01
	3	<0.01
	4	<0.01
	5	<0.01
2	3	<0.01
	4	<0.01
	5	<0.01
3	4	>0.20
	5	<0.01
4	5	<0.01

1.c. Final Cluster Membership			
Cluster Membership	Working Effort (h)	**Frequency**	**Percentage**
1	0-2000	1649	53
2	2001-4000	574	18
3	4001-8000	435	13
4	> 8000	446	14

Notes: Tests for multiple comparisons under the assumption of equal variances: Tukey' s Honestly Significant Difference (HSD) Test , Least Significant Difference (LSD) Test, Bonferroni Test, Sidak Test, Gabriel Test, Hochberg Test. Tests for multiple comparisons under the assumption of unequal variances: Tamhane Test, Dunnett T3 Test, Games-Howell Test. The final cluster membership is presented at the section 1.c.

The learning rate b can be assumed that it is affected by different modes of knowledge conversion. In the previous section, SECI modes of knowledge conversion have been associated with the presence of CASE tools and methodology (developed in-house or acquired outside) in the development process. Therefore, to test the significance of the effects of SECI modes of knowledge conversion on the learning rate, the latter can be specified as:

$$b = b_0 + b_{CASE} D_{CASE} + b_{METH\_IN} D_{METH\_IN} + b_{METH\_OUT} D_{METH\_OUT} \qquad (4)$$

where:

b_0 : portion of learning rate b that is unrelated with CASE tools and methodology.

b_{CASE} : differential learning rate for the CASE tool.

b_{METH_IN} : differential learning rate for the methodology developed in house.

b_{METH_OUT} : differential learning rate for the methodology acquired outside.

D_{CASE} : 1 if CASE tools are used during task performance; otherwise 0.

D_{METH_IN} : 1 if methodology developed in house is used during task performance; otherwise 0.

D_{METH_OUT} : 1 if methodology acquired outside is used during task performance; otherwise 0.

To test the remedial research hypotheses the OLS model of Eq. (3b) is expanded as follows:

$$\ln(y_{PDR}) = \ln(a)_1 + \sum_{i=2}^{4} \ln(a)_i \, D_i - b_0 \ln(x_{FP}) - b_{CASE} D_{CASE} \ln(x_{FP}) - b_{METH\_IN} D_{METH\_IN} \ln(x_{FP}) - b_{METH\_OUT} D_{METH\_OUT} \ln(x_{FP}) + e \quad (5)$$

With ANCOVA model of Eq. (5), we can test whether differential slope coefficients differ with the presence of CASE tools or methodology in the software development process. Finally, the learning curve literature imposes specific restrictions for the estimated learning rates coefficients. The model specified by the Eq. (1) requires the values of the learning rate b to range between -1 to 0. As a result, the specified model of Eq. (5) should be tested for the following linear restrictions:

$$b_0 + b_{CASE} + b_{METH\_IN} + b_{METH\_OUT} = 0$$

$$b_0 + b_{CASE} + b_{METH\_IN} + b_{METH\_OUT} = -1$$

5. Results and analysis

Table 3 reports the regression results for Eq. (5) using the White's heteroscedasticity-consistent variances and standard errors (Greene 2003, Gujarati 2003). The estimated model was fitted as straight line on logarithmic coordinates, and the adjusted R^2 is 62%. The differential intercept coefficients are reported statistically significant with a positive sign for all cluster memberships indicating that the economies of scales are present in the software industry. Ramsey's RESET test did not diagnose any specification error in the estimated equation. CUSUM and CUSUMQ plots show that the cumulative sum of recursive residuals goes inside the area between the two 5% critical lines illustrating parameter stability across project size re ordered observations. Based on the specification tests, it seems that Eq. (5) is an identical learning curve specification for different developer teams.

The reported positive sign of the differential intercept coefficients indicates the presence of diseconomies of scales. Leaning rate b and the intercept ln(a) are statistically significant illustrating the presence of learning curve phenomenon in the case of software developer teams. The coefficient of the cumulative output is reported with the expected negative sign and it is also significantly different from -1. Based on the Wald test, both linear restrictions for the slope differential coefficients are rejected. This finding allows concluding that the sum of slope differential coefficients satisfies the theoretical restriction that the learning elasticity should range from -1 to zero.

Apart from the aforementioned learning curve hypothesis, the statistical results of Table 3 provide sufficient evidence to conclude than the presence of specific instances on the software development process such as CASE tools and methodology affect the rate of productivity improvements. The differential slope coefficients for CASE tools and methodology (developed in-house/acquired) are statistically significant with opposite signs. Considering the semantics postulated in Section 4, the above finding indicates that the rate of performance improvements is affected by different SECI modes of knowledge conversion.

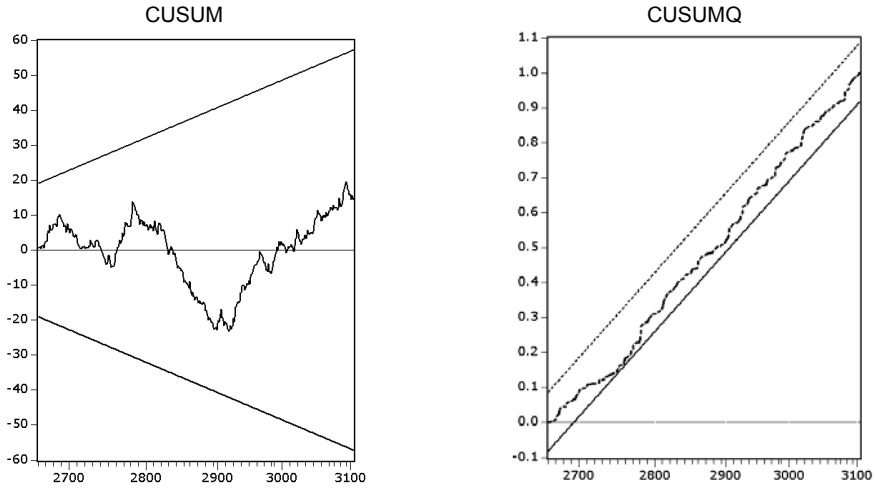

Figure 2: CUSUM and CUSUMQ tests

The estimated negative sign of differential slope coefficients for the combination or externalization mode of knowledge conversion indicates that they have negative effect on the rate of performance improvements of the average industrial developer team. The selection of programming methodology as control variable for the above modes of knowledge conversion emphasizes on outcome (i.e. stock explicitly documented knowledge) and not on the process that creates this knowledge. Thus, one may pose alternative explanations of the negative effects of programming methodology on the rate of productivity, such as the inability to internalize documented knowledge. However, the positive effects of internalization (i.e. CASE tools) on the observed learning curve phenomenon of the software developer team narrows substantially the significance of such alternative explanation for the negative effects of programming methodology on the learning rate. Another possible explanation of the negative effects of programming methodology on the rate of productivity could be the lack of motivation to adopt it during software development. Becerra-Fernandez and Sabherwal (2001, 2003) argue that externalization and combination affect the perceived knowledge satisfaction and effectiveness of knowledge management policies positively, which implies that developers might be motivated of incorporating documented knowledge within their own mental models.

Table 3: Results of Regression Analysis for ISBSG Cluster Membership

	$\ln(a)$	$\ln(a)_2$	$\ln(a)_3$	$\ln(a)_4$	b_0	b_{CASE}	b_{METH_IN}	b_{METH_OUT}
$\ln(x_{pdr})$	4.845***	1.300***	1.863***	2.464***	-0.663***	-0.015*	0.032***	0.025***
	(0.056)	(0.031)	(0.059)	(0.043)	(0.016)	(0.006)	(0.005)	(0.008)

Adjusted R^2:	0.624		
F:	733.396***	Wald Test for the restriction	
Durbin-Watson:	1.991	$b_0+b_{CASE}+b_{METH\_IN}+b_{METH\_OUT}= 0$:	1056.306***
Number of Observations:	3104	Wald Test for the restriction $b_0+b_{CASE}+b_{METH\_IN}+b_{METH\_OUT}= -1$:	447.261***
Akaike Info Criterion:	1.977		
Schwartz Criterion:	1.991		

Ramsey's RESET test	
Specification:	F:
$\ln(x_{pdr})^2$	0.421
$\ln(x_{pdr})^2 + \ln(x_{pdr})^3$	0.357

The dependent variable is the logarithm of project delivery rate (pdr) calculated as the ratio of total working effort to the cumulative number of Function Points (FP). Variables $\ln(a)_2$, $\ln(a)_3$ and $\ln(a)_4$ are differential intercept coefficients indicating that the working effort consumption of the project either ranges from 2000h to 4000h, 4000h to 8000h, or more than 8000h respectively. Variables b_{CASE}, b_{METH_IN} and b_{METH_OUT} are differential slope coefficients indicating the presence of a CASE tool (D_{CASE} =1) and/or the presence of a programming methodology tool either developed in-house (D_{METH_IN}=1) or acquired (D_{METH_OUT} =1) at the development phase of the project. * p-value < 0.05, ** p-value < 0.01 and *** p-value < 0.001.

The above findings seem to be contradictory with previous research as far concerns the expected directions of the effects of externalization and combination on the rate of performance improvements. A possible reason lies on the different critical theorising of learning effects on performance implied by the context of this study. Tsai and Li (2007) and Lee and Choi (2003) confirmed a positive relationship between SECI modes of knowledge conversion and organizational performance. Our findings suggest that socialization and internalization accelerate productivity improvements whereas combination and externalization have negative effects on the learning rate. In tension to Choi and Lee (2002), knowledge reusability through information technologies within team based knowledge intensive production environments results to higher performance when triggers an internalization process (e.g. CASE tools) but it reduces the rate of performance improvements when it represents the outcome of a combination or externalization mode of knowledge conversion (e.g. methodology). However, Tsai and Li (2007) examined the relationship of SECI with organizational performance within the context of implementing new venture strategy and Lee and Choi (2003) used organizational creativity as mediating variable between SECI and organizational performance. Thus, both studies emphasize on the exploration aspect of learning that promotes organizational ability to enact with the external environment or the internal processes within the context of implementing new strategies or facilitating organizational creativity. Emphasizing at the exploration aspect of knowledge at strategic or organizational level implies that the explicit knowledge is a source of inspiration for future actions either as a reference for drawing guidelines or questing current practices. On the other hand, current study focuses of the learning curve phenomenon of organizational teams that relies on the exploitation aspect of organizational learning. In that case, explicit knowledge defines a stricter context for directing the production process and, thus, it may cause disruption on the rate of performance improvements because either it is in tension with the knowledge profile required to response effectively at software development or it prevents developer teams of exploring more efficient alternatives for the development problems.

6. Discussion

This study illustrates that knowledge conversion may have negative effects on the learning rate. Adler and Clark (1991) based on the problem solving oriented perception of Argyris and Schön (1978: 29) for organizational learning argue that first-order and second-order learning may disrupt the learning process behind learning curve. Alternatively, the knowledge based perspective of organizational learning (Nonaka *et al.* 2001a) advocates that understanding the dynamic nature of knowledge conversion and creation process will enable to improve organizational performance. Even adopting the knowledge based rationalization of the learning; empirical finding indicates that specific types of knowledge flow may disrupt the learning process behind learning curve. The above empirical finding may trigger further theoretical and empirical research within the discipline of organizational learning. The inspiring strategic message of many organizational theorists (Argyris and Schön 1978: 29, Fiol and Lyles 1985) is that learning is equated to increased organizational performance. Besides the fact that organizational performance is affected by a lot of factors, the possibility that learning may result to negative effects on the performance should not be ignored. Theoretically, this might require defining organizational learning independently from organizational performance and then decoding the mechanisms of organizational learning in order to justify why something learned is not manifested as improved performance. Empirically, the relationship of learning with performance improvements might be investigated comparatively through different organizational levels (i.e. strategic, tactical and operational) to clarify the reasons leading to different directions of learning effects on performance at different organizational levels. This may enable current organizational learning research to formulate a more coherent perspective of the learning effects on performance at different organizational levels (individual, team, organizational).The empirically verified relationship of SECI modes of knowledge conversion with the learning rates of organizational teams provides insights for visualising the effects of knowledge management on team performance in terms of learning rate fluctuations caused by specific managerial actions targeting on different modes of knowledge flows that underline production workflow. Nevertheless, our conclusions are limited within team based production workflows within short term time frames. Learning curve phenomenon concerns the observed performance improvements when the long-term effects of scale economies on productivity variability have removed. The effects of learning on performance may differ through time that is factors disrupting learning process, now, may facilitate learning in the long run.

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