

Timo Riihelä, Minna Mattila, Harri Haapaniemi (eds.)

BEYOND THE DAWN OF INNOVATION 2009

Conference Proceedings

Laurea University of Applied Sciences



BEYOND THE DAWN OF INNOVATION

**A CONFERENCE WHERE INNOVATIONS
ARE NOT RESTRAINED**

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**Timo Riihelä, Minna Mattila, Harri Haapaniemi (eds.)
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CONFERENCE PROGRAMME

Foreword

Regional growth does not have to be led by technological innovations alone. Continuity requires the transference of focus to social and process-based innovations, business operations expertise and service-intensive operations using ICT. Innovative solutions enable the birth and development of new enterprises.

Beyond the Dawn of Innovation highlighted not only current research but also the business opportunities, and future perspectives on the development, management, and sustainable deployment of innovative solutions. This International Conference emphasised creativity and innovativeness as sources of competitive edge. Furthermore, it was an important forum for knowledge co-creation and intellectual exchange as the participants created new information and brought their experience in innovation activities for common sharing.

As a result of BDI2009, new innovation platforms are expected to arise among the newly networked participants. Thank you for daring to take the step beyond and explore the fundamentals and essentials of innovation, innovativeness, and creativity. All the published manuscripts have been subject to a double-blind peer review process.

On behalf of the Conference where innovations were not restrained,

Hyvinkää 2009-05-24

Timo Riihelä
Programme Chair

Minna Mattila
Conference General
Chair

I ARTICLES

Quality Systems for Global Business as a Competitive Advantage

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ABSTRACT

This research deals with the impact of the quality process on the economic and financial performance of the organizations. The literature review consisted of the following items: the way the organizations structure may enable (or not) the certification; the implementation of the process of the quality according to the ISO norms and finally, the connection between the quality process in an organization and its economic and financial performance. A model of analysis was built under Deming, Malcolm and EFQM inspiration, considering non financial and financial measures. A questionnaire will be addressed to a relevant mix of certified Portuguese organizations. A connection between the non financial and financial results will enable a ROQ – Return on Quality indicator. This ratio will enable a ranking of the organizations as to quality. This is a continuous improvement process motivated by innovation what results in a competitive advantage of the global market.

Keywords: organization, quality process, ROQ - return on quality

Introduction

Through the last decades the globalization phenomenon has involved a great part of the organizations and their businesses. The big international companies move all around the world searching for more competitive resources and settle in countries that offer more advantages. This is the way the world business found to get the international competitive advantage. All this movement, all these international transactions are in the scope of WTO (*World Trade Organization*) ruled by international agreements. One of them is *TBT - Technical Barriers to Trade* – and considers the need for quality amongst all partners in the transaction so that a plain and direct common language can be built.

The need for certification is an essential assumption of survival for any business competing in the global market, either from the manufacturing or the services point of view. Examples of these are brands like: McDonald's, Zara, Carrefour, NOKIA, ADIDAS. Portuguese organizations are conscious of quality as something necessary to stand in the market which nowadays has been expanding thus becoming global. So a significant growth of Portuguese certified organizations (see Table 1) has occurred mainly in 2004 and 2005.

Table 1. National /International overview – certified organizations ISO 9001

Global	Decem- ber 2004	Decem- ber 2005	Gap %	Decem- ber 2006	Gap %	Decem- ber 2007	Gap %
World	660 132	773 867	17,2	896 929	15,9	951486	6,0
Europe	320 748	377 196	17,5	414 232	9,8	431 479	4,1
Portugal	4 733	5 820	22,9	5 851	0,5	5283	(9,7)

Source: ISO Survey – 2007

In 2007 there was a change of performance in the European market lowering its growth. Consequently Portuguese growth rate fell deeply to (10%) compared to the previous 23% of 2005! One can see that these numbers reflect the state of art of the European economy showing some weaknesses. Nevertheless when reading these numbers one can ask:

-What are the main characteristics of the organizations pursuing a quality management?

-What costs and benefits emerge from quality management?

-What about the effects, in the medium term, of quality management on the competitiveness of the organization?

The general aim of this research is to study the impact of the quality process - a common benchmark in the global business - on the management and its finan-

cial performance of the organizations. Thus, the literature review will consider the following matters – organization, quality process and the relation between them - the quality process and the performance under a management and an economic and financial perspective.

LITERATURE REVIEW

In order to locate the referred subjects, it is important to study the way the structure of the organizations may, or not, enable the implementation of a quality management system. This way the theme organization will be the first to be considered. Once therein, one must consider the scope of application of ISO norms for the quality process. At last, the connection between the quality process set up in an organization and its outcome on the management and economic /financial performance will be considered and entitled quality and performance.

Organization

The way the structure of any type of organization is shaped will be focused on a dual perspective, considering on one hand, the fundamental items of each author and on the other their main ideas - assumptions (Table 2):

Table 2. Organizational structure

Author	Basis	Assumptions
Selznick (1957)	Merely administrative	Clear definition of goals and rules
Perrow (1973)	Open organization	Market is responsible for everything
Mintzberg (1979)	Operational, Strategic, hierarchy, techno structure, support staff	Interaction of these elements according to the type of activity and management
Quinn (1980)	Formal activity planning system	<i>Learning strategies</i> – strategies that can be moulded and adapted
Kanter (1994)	Lean and mean	Globalization process implies a lean and mean structure
Benson et al (1991)	External factors define the structure of the organization	Demand depends on quality and quality needs leadership and support and is connected to the structure of the organization
Germain Spears (1998)	Open system	The market shapes the structure of the organization and has effects on the quality management

Source: own

It can not be said that there is a specific way of structuring an organization that is responsible for its success. It is a multiple mix of elements what may explain it. The organization should be mean and lean. The way it is structured depends at last on the market. For a long time this topic has been considered an important element of analysis. Selznick (1957) considered an organization as something ruled by a formal system of goals and procedures. This way tasks and

empowerment would be officially approved by the management, apart from the structure of the organization. For Selznick in the fifties and for Perrow twenty years later, in the seventies, the way the organizations obtain a hierarchical shape depends on factors like the market, the competitiveness, the law, the work force and the available technologies. But for Mintzberg (1979) any organization is formed by five essential elements: operational, strategic, hierarchy, techno structure and the support staff and its activity depends on their interaction. While for Mintzberg (1979) the definition of the activity seems important to define the appropriate structure, for Selznick (1957) the structure will emerge from social reasons. Yet to give life to this structure, independently of the reasons of its creation, the decision making process will have peculiar characteristics which should help to define a new strategy. One can remember Quinn (1980) when he considered strategy as a *learning process* with an unpredictable scope whereas it has to adjust to the unknown tomorrow. This construction of the decision process is considered, by many authors, as an accrual to the organization management. Yet it can not be considered as confusion or a kind of brainstorming - *muddling* as Linblom (1959) would call it. But something seems to be real: the market force. Benson et al (1991) considered the market as a main reason for designing the context of the organizations. In this approach Kanter (1994) says that the organizations must be lean and mean in order to adapt themselves to its dynamics. Their structure must be adaptative and able to mould itself to the changes motivated by the competitiveness of the market. It is well known that the strategic decisions will contribute to reach the organization goals because they are an important *kind of glue* that unites the structure of the whole hierarchy guiding it towards success (Farhangmehr, 1997). This way, through an effective decision process, the organization Mission shall be achieved. Presently when we talk about globalization we mean quality of transaction, we mean quality of management (Garvin, 1984) we mean quality of the global business as a continuous improvement. Germain and Spears (1998) sum up all these ideas when they say that the quality of management involves not only the structure of each organization but also the market which needs continuous attention, innovation and search.

The way the organization shapes its hierarchical context may enable its success but the quality process associated to a certification may be of a great help if supported by many enablers.

QUALITY PROCESS

As previously mentioned, globalization implies competitiveness from the organizations: from the hairdressers to the teaching institutions, including all the manufacturing or services entities. All these business players need a quality certificate to operate in the market. To get this quality allowance one must become familiarized with some key words such as: standardization process – either of the manufacture area or of the services sector, audits, corrective actions, failure cause and effect model. All these procedures, alive in an organization, must enable some meanness and leanness of the process thus making the management more efficient and effective. Such is the quality process implemented according to an *ISO (International Organization for Standardization)*.

Presently this approach for quality has widened its scope. From the quality of the final product/service it derived to the management of the organizations having a definite goal of continuous improvement. Quality process has been considered for a long time by nominee gurus: Deming (1991), Juran (1989), Ishikawa (1990), Crosby (1998), Taguchi (1999). All of them agree on the fact that the secret for success and innovation as a competitive advantage (Porter, 1986) stands on quality. The principles and the assumptions ruling this process have some differences as can be seen in Table 3:

Table 3. Approach and rules of the quality process

Author	Approach	Rules
Garvin (1984)	Organization engagement	Quality emerges from the interaction of: performance, trust, conformity, time, esthaetics and clients' expectations
Imai (1986)	Kaizen – continuous improvement	One day after the other, improving every day – a cultural revolution from the top of the organization
Juran (1989)	Quality is achieved through communication	Three words for quality: planning, controlling e improvement
Ishikawa (1990)	Cause – effect relation	Fishbone diagram connects the main failures of the process and their effects in order to make the right decision
Taiichi** (1990)	Leanness of the process	Kanban System and Just-in-Time as methodologies to make the operative process more efficient
Deming (1991)	People's involvement and the culture of the organization make quality	14 principles for quality including leadership, philosophy improvement and constant personnel training
Feigenbaum (1991)	Quality depends on the client and the market	Evaluation of quality: costs of prevention and costs of failure
Hammer and Champy (1993)	<i>BPR – business process re-engineering</i>	The organizations must be ready to face the change through the dynamics of their process
Crosby (1998)	Quality is “nill defects”	It is cheaper to do well the first time
Taguchi* (1999)	A very technical perspective of quality: quality control may show off line situations or a loss of operational capacity	Quality has three stages: system design, evaluation of its assumptions and their variation

* this author is mentioned by Ferguson and Dale

Source: own

** this author is mentioned by Womack et al

All these items are responsible for the success of a quality process whether placed in the manufacture sector or in the services one. As before mentioned any quality process looking for certification will be achieved according to a standard form - which can be filled out in any part of the world - named ISO 9001. Its main chapters – below identified with numbers 5,6,7,8 - of this standard are designed in order to grasp the entire organization. It is a common practice to design procedures in the organization to comprehend these items:

Input 0

Output 0

	5 Management commitment Vision, Mission, Strategy	
<u>8 Measurement, analysis and improvement</u>	6 Resources Human Material	8 <u>Measurement, analysis and improvement</u>
	7 Product/Service	

Input 1 (output 0)

Output 1

Once the quality management system is installed, the item number 8 - measurement, analysis and improvement, is the chapter responsible for all the overcoming of the failures and necessary corrections or improvement opportunities accompanied by the respective action. These shall be accomplished in order to guarantee the quality process maintenance.

After auditing the process, this cycle will be closed once again in the beginning of item 8 - measurement, analysis and improvement this time including all the suggestions and corrections of the process. This is the continuous dynamics of the quality process - the output of a process is the input of the next one (output of moment 0 is the input of moment 1).

QUALITY AND PERFORMANCE

All around the world, in this global competing business where all the partners want to take some advantage, many authors have considered this matter of quality. It is curious to note that sometimes they agree but other times they have completely different ideas. The present research aims to identify the kind of organizations looking for certification and its relation to the economic and financial outcomes. As it can be seen through the following description the literature review includes at least the following partners of the world:

AMERICA	EUROPE	AUSTRALIA	ASIA
---------	--------	-----------	------

In America Lau and Anderson (1996) considered a three perspective approach as to the organization: the cultural and philosophic dimension, the strategic and the performance view. They have concluded that the good performance of the organization would be attained only if some indicators of performance were designed and followed on a continuous process with permanent feedback. One may easily see that this process of quality, if seriously undertaken, helps the organization to define clear objectives that may help to achieve a successful strategy and obtain a continuous improvement that at last will result in some accrued benefits.

Wisner e Eakins (1993) decided do study the financial performance of the winners of the “Malcolm Baldrige” American award and came to findings that were a little different from Lau and Anderson. They say that the winners of this prize have good financial results not only due to the certification but also because they have a good product or service, the organization has some size and the market share is relevant. They argue, as well, that quality programmes are a mean of competitiveness that may enable financial success.

In Europe and in order to measure the effects of the quality management, Neergaard (1997) asked Danish companies how they managed quality and concluded that most of them were very familiar with these matters despite not having written procedures. The author stressed that the business planning should to be compared and checked with quality planning and mentioned the interest the organizations should have in identifying the business goals with those of quality.

At this point of analysis, one should remember the cultural reasons already mentioned by Lagrosen (2003) and Hofstede (2001):in the countries which in terms

of culture, are less secure, business planning - starting from the quality department - would take power from the other areas and this innovation would bring some trouble to the organization management.

Lakhal, Pasin and Limam (2005) studied the impact of the management practices on the quality management and on the performance of the organization. They built an analysis model based upon the main literature ideas – management practice, main structures and basic resources, quality of the product, operational and financial performance. Their interesting findings were the following: a main reason explaining the good performance of the organization is top management engagement and commitment – through good management practices; another reason stands in the relation between the practices of the installed capacity and the motivation for the good financial performance.

Quality gurus like Crosby (1979) Juran (1989) and Deming (1982) considered quality essential for the production boom of the time (in the forties) and acknowledged that there was a direct relation between quality and the product. As to the services sector, Chapan et al. (2002) considered more than 20 studies with a connection between quality and performance and concluded that this was a true assumption for the consumer because in services there is a much closer connection to the supplier. Rust et al. (1994) confirmed the ideas of Chapan as to the services and associated them to the financial benefits.

Caruana and Pitt (1995) have considered a sample of 131 service organizations and concluded that quality has a positive effect on performance but they argue as well that it is something that the market compulses the organizations to do.

In Australia and adversely to these arguments Terziovski et al. (1997), after a research carried out, upon 1000 Australian organizations, concluded that there is no direct connection between quality and the financial performance of the organization. They say that certifications of quality just exist for the market. This author agrees with Gore (1994) who says quite the same.

In England, in contrast with all these authors defending the certification, Batchelor (1992) carried out a research upon 600 organizations in the UK and concluded that only 15% of them had some advantages from certification. Furthermore he said that these benefits were internal, thus not having any influence on the market share of the organization.

In an anecdotal and drastic way, Seddon (1997) says that *ISO* has a negative effect on organizations.

In Asia, Chinese authors Wong et al. (2006) considered that there should be a good connection between the accounting measures and the quality goals. In other words, one could say that if the organizations adopt Balanced Score Card (BSC) principles and the accounting measures are ascertained with the quality process, the goals of the organization will be easily reached.

Yet, the general common sense of management knows that a good quality control is a competitive advantage; an effective quality management system helps build a clearer operational process and reinforces the decision making process. These matters will lead to a better labour performance and to reduced costs thus enabling better performance indicators. These will reveal better results (Heras, Casadesus, Dick, 2002). According to these authors the main ideas are as follows (Table 4).

Table 4. The analysis of certification advantages

ISO certification	Quality Management System	Quality improvement	Business performance	Profitability
9000 Serie	Quality management system stresses the consistency of quality	Internal quality diminishes scrap and profits labour force	Reduced costs enable better competitiveness and sales opportunities	The cost of Sales falls and Profits grow

Source: Heras et al(2002)

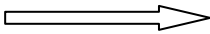
A significant number of authors dealing with quality say that certification is achieved just for market reasons. Citing again Gore (1994) he says that this option is minimalist once it has to be achieved through the lowest cost and the highest enthusiasm. On the other hand, there are some authors (Jhones et al., 1997) who consider certification, on its own, as a previous performance indica-

tor. Yet these organizations show a stronger top management engagement what may enable better results than the others.

The interest considered by the International entities as to this matter should be emphasised. *ISO - International Organization for Standardization*, has issued, in September 2006, the ISO 10014 - addressed to the top management of the organizations considering the economic and financial benefits (in addition to ISO 9004 - continuous improvement).

ISO 10014 is a detailed procedure for certified organizations and it identifies the steps to follow in order to get economic and financial benefits, according to the *Deming cycle Plan Do Check Act*. In sum, its process may be drawn as follows:

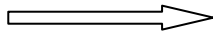
ISO 10014



In flow: the results of the evaluation

The management through *PDCA** will lead to

Out flow: economic and financial indicators



**PDCA – Plan, Do, Check, Act (Deming,1982)* *Source:own*

This ISO 10014 main assumptions are

- Definition of management principles of each clause
- Goal to be reached in each clause
- Deming cycle – *PDCA (plan, do check, act)* – associated to each item (clause)

It was mentioned that the international standard quality rules ISO 9001 helps to install and protect the quality process. Besides it is well known that, the quality management system has performance indicators associated to ISO 9001 implementation; this new rule ISO 10014 has considered a connection between quality and performance. About this subject Table 5 shows some literature re-

view considering the following points of analysis: the subject and its objective by author; the approach considered and its assumptions; the application and results.

Table 5. Performance and Measurement

Source: own

	<i>Bench- Marking</i>	<i>Balanced scorecard (BSC)</i>	<i>EFQM European Model for Quality Man- agement</i>	<i>ABC Activity Based Costing</i>
Au- thors	Karlof and Ostblom (1994); Dale (1999)	Kaplan and Norton (1996)	14 European Countries in the 80's	Johnson and Kaplan (1987)
As- sump- tions	Continuous process of comparison among the best according to good practices – efficient and effective	Strategic objectives defined through performance indicators: financial, client, process and growth	Conceptual framework composed by two motivating factors and consequent utilization within the organization to reach "excellence"	Accounting technique used to identify the activities through cost drivers. The technique <i>ABC – activity based costing</i> needs the <i>ABM – activity based management</i>
Appli- cation	Environment: internal, functional and competitive	In the organization	Self-evaluation of the organization; benchmarking; excellence awards; strategic formulation	Homogeneous activities with a clear output
Bene- fits	Evidence of weaknesses in order to overcome them – continuous improvement	Measure of performance as a measure of management	Positioning of the organization in the market; initiatives for better quality are stressed	More accurate identification of the costs of activities enabling a better and easier profitability indicator

The goals associated to these techniques have a different scope. Benchmarking principles are applicable to any organization, once it is believed that everybody is interested in doing more and in a better way (Karlof e Ostblom, 1994).

Kaplan's (1992) suggestions summarized in the Balanced Scorecard (BSC) will fit perfectly into this quality management scope. Its assumptions are based both on the strategies design conceived to fulfil shareholders' and clients' expectations and their connection to the business process. The excellence of the organization performance will be the outcome of this process (Kaplan e Norton, 1996). Any organization thinking about the implementation of a quality management system will consider these improvement factors. And this issue of innovation and continuous improvement is a global one, travelling all around the world and pushing people all together around a common goal. That is the reason why specific and intensive personnel training as to quality matters should be a prior worry of the top management of the organizations (Dillard e Tinker, 1996). The implementation of BSC will depend on the efficient and effective capability of the human resources capital as well as any measure of performance will depend on it. The *ABC (Activity Based Costing)* costing technique, based on the cost of the activities through the identification of the cost drivers (Johnson e Kaplan, 1987), may be a precious help to the definition of the quality process and activities. Together all these factors can help the organization in search of success.

Recent studies from all over the world confirm these ideas: in Turkey (Tutuncou, KucuKusta, 2007) a research was done considering the relationship between organizational commitment and European Foundation for Quality Management (EFQM) business excellence. The authors concluded: leadership, partnerships and resources, policy and strategy, people development and involvement are the determinants of the organization commitment; in China, Wu and Hung (2007) studied a causal model for linking performance measures and the strategic objectives of the organization and considered the measurement criteria toward each performance perspective of a balance scorecard in cause-related marketing; in Spain a research (Sanguesa, Mateo, Ilzarbe, 2007) done in order to understand the choose of the appropriate Quality Management System for Hospitals. They concluded that ISO 9001 is the most representative tool followed by EFQM and by the Joint Commission. To end up this journey around the world as to quality and change movement associated we must go to Greece. Here Dervisiotis (2007) says that in this global competing business the only way, for an organization to survive and succeed, as a social "species", is to become adaptive to emerging innovative conditions – the new imperative for the 21st century.

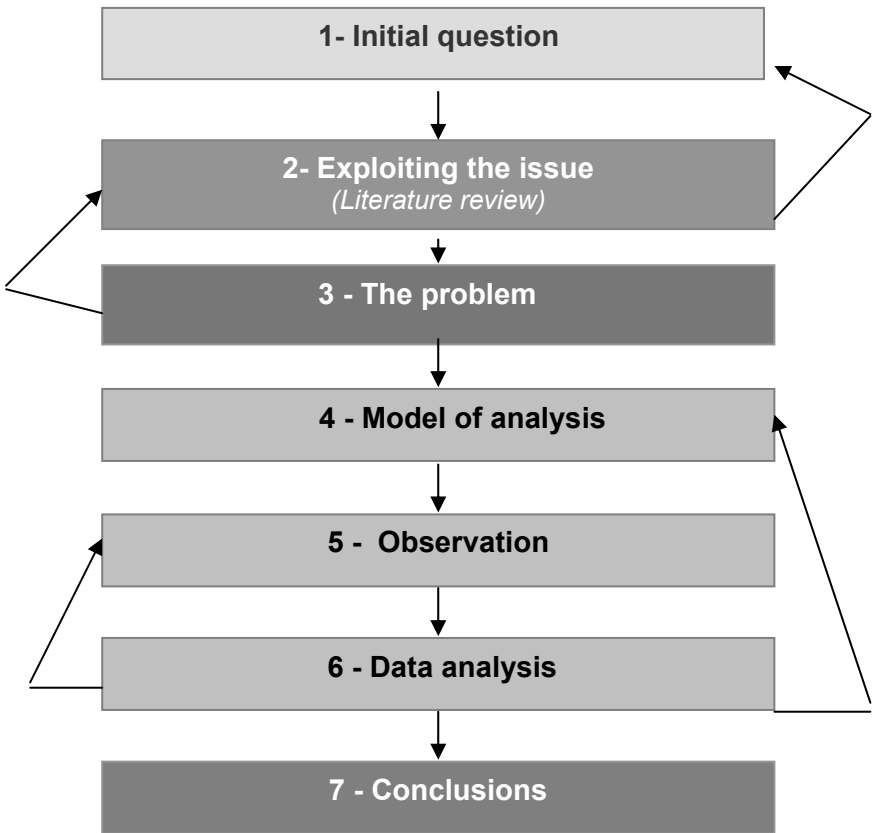
The *European Model for Quality Management* congregating all these ideas will translate the implementation of the Quality Management System (under ISO 9001 or 14001) into results for the organization (its success) and the society. Besides this the Malcolm Baldrige Award, in America, and the Deming Prize, in Japan, these are some good products from quality belonging to the world.

An indicator such as *ROQ - Return on Quality* will be the final result of non financial and financial measures aimed to measure the process of quality within an organization meaning some competitive advantage to the market.

METHODOLOGY

Quivy (1998) suggests that these main phases make part of any investigation. This research aims to make the connection between the quality certification process and the financial benefits of any organization. This is the initial question - issue nr 1.

Table 6. Process of investigation (Source Quivy, 1998)



After considering the review of literature (issue nr 2) some authors raised very interesting questions enabling the positioning of the problem (issue nr 3). The above mentioned model of analysis (in Table 7) will congregate the main ideas suggested by the literature (issue nr 4) and the observation (issue nr 5) will allow the collection of data (issue nr 6) able to reveal interesting findings for the issue under analysis (issue nr 7).

Model of analysis

Most relevant literature quotations were used to build some analysis assumptions.

From the chapter *organization* it was clear that the quality process seems to contribute, in some way, to a better hierarchical shaping of the organizations. From the chapter *quality process* the main ideas considered the scope and benefits of the certification of the organizations in the global business. At last the connection between quality certification and the financial performance suggested very interesting questions.

This study intends to identify those who look for quality - what they do and how they do - and connect it to their financial performance.

The means of analysis able to grant adequate information for the proposed research is the inquiry (Yin, 1994). From this inquiry one should get the relevant data for the study. Quivy (1998) suggests that such an analysis should be able to give an answer to questions like: what? who? and how? Following these ideas, the inquiry to be addressed to certified organizations will consist of two parts – one non financial (qualitative) and the other financial (quantitative). As we will see a pre test analysis was done before addressing it to more organizations.

The non financial part will follow the structure of norm *ISO 9001* including in its scope the most relevant authors dealt in the literature review as to:

Quality Management System (point nr 4 of *ISO 9001*)

top management involvement (point nr 5 of *ISO 9001*)

resources (point nr 6 of *ISO 9001*)

product or service (point nr 7 of *ISO 9001*)

measurement, analysis and improvement (point nr 8 of *ISO 9001*)

The non financial part of the model will follow the structure of norm ISO 9001 and will represent 50%. Its component issues have a specific weight (%) of importance (nf1..nf5) and were calculated according to a mathematical model constructed from the Deming and Malcolm Baldrige Prizes; the financial part will represent 50% and consider some indicators like sales growth, ROA and ROI along the years considered before and after the quality certification. These financial measures (f1..f5) are formed by the main indicators referred by the literature (Altman,1968, Beaver e Scholes,1970, Strickney 1990, Singhal 2000, Chow-Chua, 2002, Donnely et al ,1998) and their percentage of incorporation will be equal for all, 20% each, thus, not influencing the final values (Walsh, 2006).

ROQ was constructed on an EFQM basis and will denounce innovation and competitive advantage of an organization as to the others that stand in the market. This indicator will be:

ROQ = 50% NF + 50% F (as seen in table 7)

$$ROQ = 50 \% \sum_{i=1}^5 nf_i x_i + 50 \% \sum_{j=1}^5 f_j y_j$$

Where: xi are non financial variables and yj financial variables

nfi are non financial % weight and fj are financial % weight - corresponding each \sum sum up to 100% (calculated under Deming and Malcolm Prizes)

Table 7. Return on Quality (ROQ)- measured by Non-Financial and Financial factors

Non financial – NF		Financial – F	
%	50%	%	50%
12,5	Quality Management System	20	Sales growth
12,5	Top management involvement	20	Net profits / Sales
20,0	Resources	20	Net Profits / Equity: ROE
22,5	Product/Service	20	Net Profit/Assets: ROA
32,5	Mesurement & Improvement	20	Equity /Total Assets

Source: own

To build this ROQ indicator, data will be collected through an inquiry (questionnaire) to be sent to Portuguese certified organizations. In addition, structured Interviews will be achieved in non certified Portuguese organizations.

Qualitative approach – non-financial measures

The approaches expressed in the Non-Financial items (nf 1..nf 5) consider the key factors revealed by the literature crossed in ISO structure and will be formulated in order to allow an answer according to a scale of relevance as follows:

1 not	2 little	3 enough	4 much	5 very much
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The final value will correspond to the average value obtained by all the answers when signing the one to five of the scale.

Quantitative approach – financial measures

As to the Financial information, the one to five scale will be used as well, but separately, for each type of organization activity and for each indicator. Thus a proper scale of minimum and maximum values for the ratios will be built from 1 to 5; these pattern values will be collected from an official document named “Bo-

letim Estatístico” issued by the “Bank of Portugal”. A sectorial normal distribution will be assumed according to the mathematical concept of the Central Limit Theorem. As an academic example and considering only the “sales growth” if it one compares the benchmark scale defined for the specific sector of activity: before the certification it was 1,5% and after certification it was 4,5%.

sales growth

1 [0-0,01[2 [0,01-0,03[3 [0,03-0,05[4 [0,05- 0,075[5 [0,075- 0,15[
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As it can be seen below in table 8 the financial benchmark alters from score 2 to score 3.

Table 8. Calculation of the Financial measure (before and after certification)

Indica- tor	Benchmark of the sector(for two years be- fore certifica- tion)	Real data (for two years before certifi- cation)	Benchmark of the sector (for two years after certification)	Real data (for two years after certifica- tion)
Sales growth	1[0-0,01[	1	1[0-0,015[	1
	2[0,01-0,03[	2 1,5%	2[0,015-0,031[	2
	3[0,03-0,05[	3	3[0,031-0,053[	3 4,5%
	4[0,05- 0,075[	4	4[0,053- 0,0755[	4
	5[0,075- 0,15[	5	5[0,0755- 0,15[	5

Source: own

After all, this model reveals an advantage for the organization, if the value after certification is superior (accrued value) to the previous to certification. Otherwise it means that the result of certification is nul. ROQ will be formed by two parts: non-Financial and financial part and not exceeding the number 5 - the maximum

value of the Likert scale defined. If an organization gets a final value of 3,5 and another 3,0, it means that the former has a better return on quality than the latter; the items that are responsible for this difference will be clearly seen – the management proceedings or the market evolution.

PRE-TEST INQUIRY

A pre test case study was essayed in a Private Higher Education Institution – a Co-operative named CESPU located in the North of Portugal, having about 3500/4000 students and 400 teachers. Here, the certification Process, documented procedures and Processes interaction have been considered in three main branches – strategic, operational, support - to which, *KPI – Key Process Indicators* were associated.

Table 9. Certification Process and key Process Indicators

Processes	Contents	Key process indicators
Strategic <i>(procedures)</i>	Quality: documents-issue, revision, updating; satisfaction of stakeholders; financial activity planning; Quality Management Review	- Inquiry about stakeholders satisfaction >80%; - ROA >5%; - Effectiveness
Operational <i>(procedures)</i>	Students inflow Structuring and development of education activity – planning, organizing, directing, controlling	- Nr Entries: year n > year n-1; - students and teachers' satisfaction, performance evaluation >75%
Support <i>(procedures)</i>	Library MIS (department) HRM (department) Financial (department) Maintenance (department) Quality (department)	Library - user's satisfaction >80% MIS : user's satisfaction as to the services of this department >80% HRM : nr of training hours year n > year n-1; effectiveness of this training Financial : acquisition orders response in accurate time to the need Maintenance : repetition of the same repair order: year n < year n-1 Quality : rate of non conformities year n < year n-1

Source: own

MIS – Management Information Systems; HRM – Human Resources Management

To assure the maintenance of a quality management system these indicators have to be evaluated, according to a time schedule. At this stage one can remember the principles of BSC (Kaplan) and confirm its applicability.

To test the feasibility of the above mentioned model a questionnaire was drawn. It consisted of the main issues of the literature and of the financial indicators. The results emerge from the application of a Likert scale (50% for the non financial measures + 50% for the financial ones). Non financial measures have a direct application but the financial indicators must be calculated, within each specific branch of activity as to the adequate financial benchmark applicable. Data was collected, from 2007 one year after the certification which occurred by the end of 2006.

Non financial – NF		1	2	3	4	5
%	50%	Value				
nf1- 12,5%	Quality Management System	0,410625				
nf2- 12,5%	Top management involvement	0,25				
nf3- 20,0%	Resources	0,636				
nf4- 22,5%	Product/Service	0,9				
nf5- 32,5%	Mesurement&Improvement	1,1375				
NF	Final score value	50% x 3,34 = 1,66(7)				

NF) Value for the Non Financial Measure = 1,67

Financial(fj) data: 2007		Activity higher education institution					
% 50%							
*benchmark		1 (7,5)	2	3 4, 5	4	5 15,1	
F1- 20%	Sales growth (2007/2006) VA- LUE	X					
	*benchmark	1 (0,05)	2	3 5,4	4	5 12,9	
F2- 20%	Net profits / Sales VALUE	X					
	*benchmark	1 0,18	2	3 4,79	4	5 20,3	
F3- 20%	Net Profits / equity VALUE	X					
	*benchmark	1 (0,014)	2	3 3,33	4	5 12,0%	
F4- 20%	Net Profit/Assets VALUE	X					
	*benchmark	1 24,65	2	3 38,6	4	5 62,9%	
F5- 20%	Equity /Total Assets VALUE	X					
Final score value		50% x 4,4 = 2.2					

**benchmark calculated according to the Central Limit Theorem from data collected of the Bank of Portugal Indicators*

F) Value for the Financial Measure 2,2

$$\text{ROQ} = \text{NF} + \text{F} = 3,87$$

FINDINGS

Findings revealed, for 2007, a final value of 3,87 as a “Return On Quality” indicator, composed by the sum up of the non financial measures and the financial measures (1,67+2.2).

In a scale of one to five, this means a quality satisfaction rate (3,87 out of 5) of about 77%. If we apply the same questionnaire to the year 2005 (year before certification) we get the following values: non financial values 0,9 and financial values 2,3 totalling 3,2. In a scale of one to five, this means a quality satisfaction rate (3,2 out of 5) of 64%. From this pre test case, one may say that quality had some real benefits on the management issues. In fact, the non financial indicator improved a little, what may mean that the application of ISO 9001 helped a little the management function of the organization. As to the financial ratios it can be seen that the quality impact did not result in the same way and the market had a good explanation on it.

After the end of this study one should be able to isolate the effects of the management practices from the market ones in order to explain success.

It is well known that it is very important to get other results from different organizations. These will allow some interesting conclusions about the sharing of this final score and the respective understanding of the gaps seen under the two lights - the non financial and the financial.

At last the sustainability of this indicator ROQ may be a good explanation for a differentiation factor – as Quality - that may constitute a competitive advantage of the organizations in the global market.

It would be very interesting, as well, and it would grant and allow some depth of analysis, to reply this questionnaire in other countries, so that, the conclusions might have a meaning for the global competition we are in.

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Managing Social Networks Innovation: a Case Study of Hospitals

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ABSTRACT

Innovation outcomes are very dependent on the structure of the relational networks of organizations. Therefore, the management of innovation will benefit from knowing the capabilities and potential of their current networks. Social network analysis offers a wide array of tools able to measure network positions, cohesion, etc., which taken together describe the actual and potential innovation capacities of organization. In this paper, we illustrate how the use of social network analysis tools can help the managers of national healthcare systems and hospitals to manage the relational networks with other hospitals in order to keep innovative and to benefit from the innovations. The paper presents an empirical study of the relational network of the hospitals belonging to the Catalan healthcare system, using mechanisms to map subgroups and tools to identify central actors and other characteristics of the networks related to the innovative capacity of the hospitals and the system.

Keywords: Innovation; healthcare system, networks management

INTRODUCTION

The importance of healthcare is growing in all countries worldwide. There is evidence that developed countries have gradually increased the proportion of Gross Domestic Product invested in improving their healthcare system. This has happened in the OECD countries as health expenditure increased, on average, 3.6% per year since 2003 (OECD, 2009).

The aim of healthcare is to increase value for patients (Porter and Teisberg, 2006). In order to reach this objective changes in the structure and organization are required and innovation can help in it. Innovation, defined as new methods, organizational structures, processes, and new forms of collaboration across suppliers, includes technology, but the greatest opportunities are new types of strategies, organizational structures, facilities, processes, and partnerships (Freeman, 1982; Drucker, 1985; Porter, 1985; Andreasen, 1997; Peters, 1998; Dosi, 2000; Porter and Teisberg, 2006). The Oslo Manual of the OECD (2005) defines innovation as the implementation of (a) a new, or significantly improved, product (good or service); (b) a new, or significantly improved, process; (c) a new method of marketing and (d) a new organizational method whether it is in business practice, work organization or external relations.

Regarding partnerships, Tidd et al. (2005) pointed out some of the reasons for firms to collaborate: to reduce the cost and risk of technological development or market entry, to achieve scale economies in production, to reduce the time taken to develop and commercialize new products, to promote shared learning. These motives can be classified into three issues: technological, market and organizational. Also, they present different forms of collaboration such as licensing, strategic alliance, joint venture and networking.

This last form, innovation networks, is the focus of this study. Network members can develop internally but with few of the difficulties of collaboration, and are the response to the uncertainty of technology and markets (Tidd et al., 2005). There are innovation networks at all levels: global, national, regional, local, organizational, etc.

A social network can be defined as a set of persons, organisations of other entities connected by a significant set of relationships (Wellman, 1997). Taking into consideration this definition and that different kinds of networks (Wasserman and Faust, 1994) and nature of links (Granovetter, 1985) can exist; new concepts around the theory of social network have been generated. Social capital is one of these new concepts that helps to understand how from the existing interactions between actors who belong to a network knowledge can be created. Social capital can be defined as a set of resources embedded in a social network, and all the accessible resources from the same network (Nahapiet and Goshal, 1998), and can be found as another form of capital in an organization (Lin, 2001).

Two forms of social capital can be found on literature: bridging social capital (Burt, 1992; Freeman, 1979) and bonding social capital (Coleman, 1988; Granovetter, 1985). On one hand, bridging social capital depends on the position of actors occupy in the network. This kind of social capital is exclusive of each actor and is indicative of his/her capacity to access new information and opportunities that can be relevant to his/her competitiveness. On the other hand, bonding social capital is referred to the level of cohesion that exist in the social network; in this sense, high levels of cohesion will help the development of common rules and values for all the members of the network, facilitating the access to information for everybody in the cohesive group.

Knowledge creation, in turn, will depend on the absorptive capacity of the social network, which was defined by Cohen and Levintal (1990) as the abilities of an organization to recognize the value of new knowledge, assimilate and apply it. In this context, the position of actors will be determinant for their capacity to ac-

quire and assimilate new knowledge with advantages in terms of timeliness, promptness, exclusivity and quantity of new knowledge accessed; while network cohesion will facilitate the coordination and control of knowledge exchange in social networks, and therefore, will determine the development of capacities to transform and exploit the new knowledge obtained. Jointly, these capacities of social actors and networks will be determinant for the generation of innovations.

Taking into account this conceptual background, the aim of this paper is to show how different measurements and applications of social network analysis tools are useful to understand the main structural patterns of networks and actor positions and therefore for managers to take action in order to get better organizational configurations in terms of innovative capacity. In order to attain this aim, a case study has been used. In particular, the social network of hospitals in Catalonia (Spain) has been analysed by considering the links existing between each one of the hospitals in terms of organizational partnerships.

METHODOLOGY

Data collection

The methodology used for data collection is the case study, as it permitted knowing in detail each organization under study (see i.e. Probert *et al.*, 1999; Stanton *et al.*, 2004; Reijonsaari *et al.*, 2005; Stefanou and Revanoglou, 2006). Data belongs to a more wide-reaching project in which different innovations implemented in Catalan hospitals that belong to the Public Hospital Network in Catalonia (Spain), were analyzed. The Catalan healthcare system model is mixed, with public and private hospitals, but with the particularity that the private hospitals provide free medical assistance to population in agreement when cases are derived from the public network, which pays the expenses incurred by public patients.

In the questionnaire, managers were asked about technical, organizational and service innovations already implemented and those planned for the future. Regarding organizational issues, the questions were about different innovations such as the creation of alliances with other hospitals, its information system, telemedicine, quality management system and process reengineering.

Regarding the sample, 47 hospitals were visited; all of them members of the public network, but 10 additional organizations were later detected and included in the final sample. The individual hospitals are classified according to the levels

of complexity of diagnoses and treatments carried out in them. In the Catalan Healthcare System, law defines four categories. The first one includes isolated hospitals in which few specialties are treated. In the second level, hospitals cover the most usual requirements of patients. Hospitals in the third level or category can cure and lead to recovery practically any health problems. Finally, the high technology hospitals can also treat very specific diseases demanding very specialized technology (Generalitat de Catalunya, 1999). In our sample, 8 hospitals are in the first level, 17 in the second, 18 in the third, 7 in the high technology level and 7 other organizations, adding a total sample of 57 participants.

Data analysis

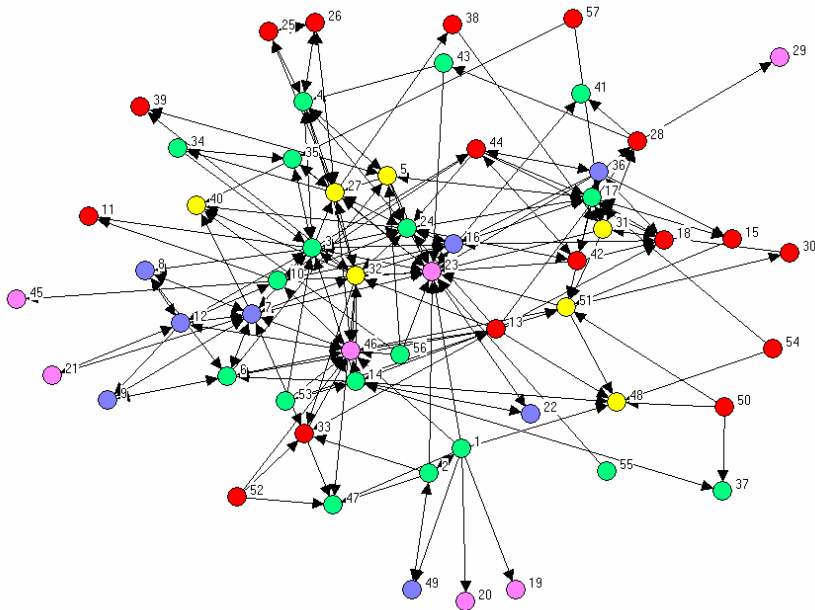
Data was analysed using social network analysis techniques. Social network analysis is extensively applied in the academic literature (Scott, 1991; Wasserman and Faust, 1994). The representation of the networks is postulated as an essential element in social network analysis, and has been considered in the publications of a great number of authors such as Knoke and Kuklinski (1982), Scott (1991), Hanneman (2001) and Molina (2001). Specifically, graphs and matrices are the tools used to represent information about patterns of ties among social actors (Hanneman, 2001). Graphs, also called sociograms, “use a labelled circle for each actor in the population we are describing, and line segments between pairs of actors to represent the observation that a tie exists between the two” (Hanneman, 2001). Sociograms allow the representation of the strength of ties between actors, their position in the network, as well as other elements such as the existence of a central actor (Hanneman, 2001). Matrices allow representing the relationship between actors among rows and columns, using commonly a binary code (Molina, 2001), etc. In order to analyse data for the present research both sociograms and matrices have been used.

Two properties of networks were considered as relevant: position and cohesion. Regarding position, the “degree of centrality” is referred to the number of direct contacts that an actor maintains with the other actors of the network (Freeman, 1979). Another view of actor centrality is based on “closeness”; the idea of this measure is that an actor is more central if it can interact with all others quicker than the rest (Wasserman and Faust, 1994). Freeman (1979) also mentions the relevance of “betweenness” that is the extent to which the actor is positioned on the shortest path between other pairs of actors in the network. Regarding cohesion, it is another property of social networks that affect directly the existence of integrated coordination and control in the network or group. Density of the net-

work is one measure used to determine the level of existing cohesion in the analysed network. However, we might not be as interested in knowing the cohesion of the whole network but the cohesion in subgroups of the network, particularly when the network is prone to be partitioned in ‘autonomous’ groups. In order to do this, we use the algorithm “factions”. Factions’ concepts imply that actors are grouped in base of their equivalence in terms of their same profiles of ties to other actors (Hanneman, 2001).

FINDINGS

The results obtained the pattern of the relational network of the Catalan Hospitals belonging to the Healthcare System based on links related to exchanging images via telemedicine, sharing professionals, etc. The sociogram (figure 1) depicts the existing relationships between Catalan hospitals, showing the different categories or levels (L) of complexity defined above, as well (colour of the dots). Although, the reading of the network graph might seem dense, the calculations show a global density of 7.24% and this result means that only exist the 7.24% of possible links.



L1: blue; L2: red; L3: green; L4: yellow; Others: purple

Figure 1: Sociogram by typology of hospitals

Specifically, we can observe that some actors concentrate a major number of contacts than others; this means that these actors have advantaged positions and this situation helps them to be more punctual in order to arrive to new knowledge. This concept is measured through the algorithm “degree of centrality”. As we can see in the table 1, actors with a higher out-degree are: 32, 3, 7, 13 and 24, that means that these actors have more links with other actors that have been originated by themselves; and actors with a higher in-degree are: 23, 46, 3, 24 and 17, which are relevant actors receiving a more number of links from other actors of the network. It is interesting to mention that there is a major variety in terms of typology of actors that has a higher out-degree than actors that has a higher in-degree.

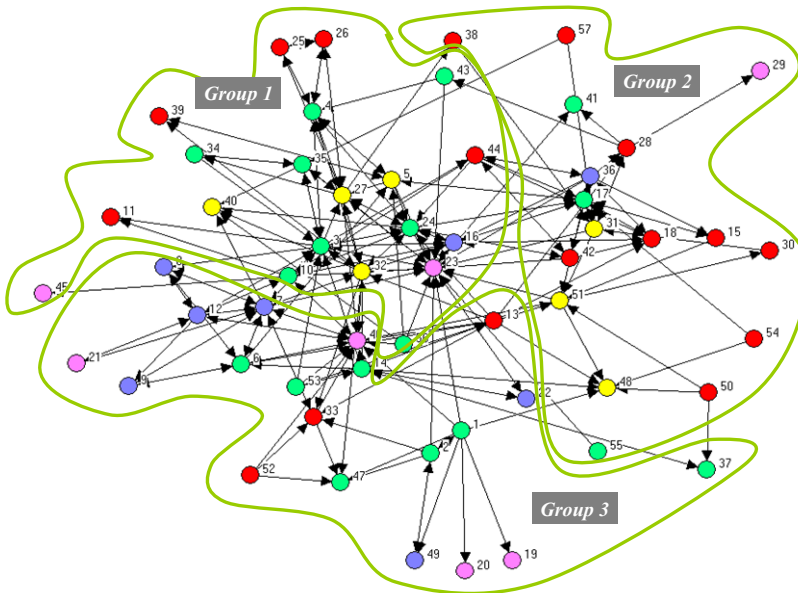
We can also observe that there are actors who play a role as intermediaries of information between one part of the network to another one. The power of intermediation is measured through the algorithm “betweenness centrality”, and we can observe that actors 23, 17, 3 and 27 play this role. It is relevant to highlight that 23 are Research Centres and Institutes and 27 is a High Technology Hospital (L4), this puts in evidence the relevance of this kind of actors in healthcare system network.

Table 1: Centrality measures (degree of centrality and betweenness)

	1	2	3	4		1	2
	OutDegree	InDegree	NrmOutDeg	NrmInDeg		Betweenness	nBetweenness
32	12.000	6.000	21.429	10.714	23	493.762	16.031
3	11.000	11.000	19.643	19.643	17	337.073	10.944
7	11.000	9.000	19.643	16.071	3	311.661	10.119
13	10.000	2.000	17.857	3.571	27	278.505	9.042
24	10.000	11.000	17.857	19.643	7	229.147	7.440
27	9.000	9.000	16.071	16.071	24	224.919	7.303
36	8.000	4.000	14.286	7.143	14	191.486	6.217
14	8.000	4.000	14.286	7.143	46	178.181	5.785
17	8.000	11.000	14.286	19.643	16	176.935	5.745
10	8.000	5.000	14.286	8.929	31	168.641	5.475
1	8.000	1.000	14.286	1.786	51	162.615	5.280
12	7.000	6.000	12.500	10.714	32	159.338	5.173
42	7.000	3.000	12.500	5.357	22	148.067	4.807
16	6.000	8.000	10.714	14.286	10	130.460	4.236
44	6.000	3.000	10.714	5.357	5	128.810	4.182
4	6.000	8.000	10.714	14.286	28	106.075	3.444
5	6.000	5.000	10.714	8.929	4	100.915	3.276
23	5.000	20.000	8.929	35.714	36	94.903	3.081
35	5.000	4.000	8.929	7.143	12	69.496	2.256
6	5.000	6.000	8.929	10.714	35	67.948	2.206
2	5.000	2.000	8.929	3.571	6	63.472	2.061
51	5.000	6.000	8.929	10.714	44	61.785	2.006
46	4.000	14.000	7.143	25.000	2	49.000	1.591
53	4.000	0.000	7.143	0.000	13	44.873	1.457
31	4.000	5.000	7.143	8.929	33	32.006	1.039
28	4.000	3.000	7.143	5.357	42	28.213	0.916
56	4.000	0.000	7.143	0.000	38	27.326	0.887
33	3.000	5.000	5.357	8.929	43	17.258	0.560
26	3.000	3.000	5.357	5.357	18	16.165	0.525
50	3.000	0.000	5.357	0.000	1	10.400	0.338
8	3.000	4.000	5.357	7.143	37	10.217	0.332
25	3.000	3.000	5.357	5.357	41	3.980	0.129
18	3.000	6.000	5.357	10.714	8	3.761	0.122
52	3.000	0.000	5.357	0.000	30	2.750	0.089
9	2.000	3.000	3.571	5.357	39	2.224	0.072
34	2.000	2.000	3.571	3.571	34	1.908	0.062
43	2.000	1.000	3.571	1.786	15	1.278	0.041
15	2.000	2.000	3.571	3.571	9	0.450	0.015
54	2.000	0.000	3.571	0.000	19	0.000	0.000
39	2.000	2.000	3.571	3.571	40	0.000	0.000
22	2.000	2.000	3.571	3.571	26	0.000	0.000
57	2.000	0.000	3.571	0.000	25	0.000	0.000
21	2.000	2.000	3.571	3.571	29	0.000	0.000
55	1.000	0.000	1.786	0.000	20	0.000	0.000
38	1.000	1.000	1.786	1.786	21	0.000	0.000
41	1.000	2.000	1.786	3.571	11	0.000	0.000
30	1.000	1.000	1.786	1.786	47	0.000	0.000
37	1.000	2.000	1.786	3.571	45	0.000	0.000
49	1.000	2.000	1.786	3.571	49	0.000	0.000
19	0.000	1.000	0.000	1.786	50	0.000	0.000
20	0.000	1.000	0.000	1.786	48	0.000	0.000
45	0.000	1.000	0.000	1.786	52	0.000	0.000
47	0.000	5.000	0.000	8.929	53	0.000	0.000
40	0.000	5.000	0.000	8.929	54	0.000	0.000
48	0.000	6.000	0.000	10.714	55	0.000	0.000
11	0.000	2.000	0.000	3.571	56	0.000	0.000
29	0.000	1.000	0.000	1.786	57	0.000	0.000

Regarding the low degree of global density, we decided to study the networks subgroups approach, using the faction's technique to check if the network has a core-periphery and/or if it has horizontal subgroups or fractions. Factions, as we mentioned above, group actors in the basis of similarity in terms of who they are tied to (Hanneman, 2001). In this case, nor core-periphery was found but we found three 'parallel' factions (figure 2). The density within each subgroup (group 1: 22%; group 2: 13% and group 3: 15%) is higher than the results of global density (7.24%). This result reinforces that flows of information and knowledge

are more prominent intra-groups than between groups (Asheim and Gertler, 2005).



L1: blue; L2: red; L3: green; L4: yellow; Others: purple

Figure 2: Sociogram with three factions

Further analysis proves that each group is correlated to a different geographical area of the region under study, Catalonia. The first group is located in and around the metropolitan area of the capital Barcelona and a part of Central Catalonia; the second group correspond to the North-eastern part of Catalonia; and finally the third group takes the more Western territory that comes from the Western Pyrenees down south to the South of Catalonia (figure 3). We can also observe from figure 2, that groups 1 and 2 concentrate all high technology hospitals (L4). The majority of level two hospitals (L2) are located in group 2; while most of level one hospitals (L1) are in group 3. In this group there is also a great number of L3 hospitals, as well as in group 1.

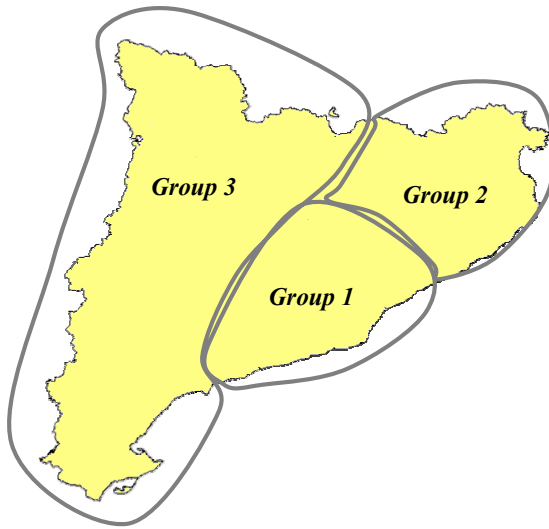


Figure 3: Map of Catalonia

This situation is quite logical, if we take into account that hospitals, especially those from L2 and L3, try to be in contact with the hospitals that are closer in terms of geographical distance in order to complement their health services. This case is well illustrated in group 3 regarding the L1 hospitals located in the border areas of the region. These hospitals, depending on their geographical situation, have contacts with other hospitals situated out of the region, such as in France, Aragon or Valencia; because they are closer than hospitals situated in the other areas of Catalonia. This allows them providing a faster service, crucial in emergency situations.

It is also logical that the main number of L4, that means high technology hospitals, is situated in groups 1 and 2, because these groups include Catalonia's capital (Barcelona) and their metropolitan area. In this case we can say that the new medical techniques and technologies in Catalonia are mainly in hospitals situated in Barcelona. This fact attracts other Catalan hospitals to maintain links with L4, mostly from L3, in order to be capable to give response to the possible health needs of users.

Examining centrality measures for each subgroup, we can see the most relevant actors in each subgroup. In consequence we can see that actors from L4 are key actors in group 1 and 2 in terms of degree of centrality, betweenness and closeness (tables 2 and 3). These results reflect the important task that high technology hospitals develop as transmitters of new knowledge to the other members of the network. In group 3 this role is developed by hospitals classified

in L3 (table 4), but still some links between these hospitals and L4 hospitals in group 1 and 2 can be observed.

Table 2. Centrality measures group 1

	1	2	3	4	1	2	1	2	3	4		
	OutDegree	InDegree	NrmOutDeg	NrmInDeg	Betweenness	nBetweenness	inFarness	outFarness	inCloseness	outCloseness		
32	8.000	3.000	44.444	16.667	27	49.217	16.084	40	69.000	342.000	26.087	5.263
24	8.000	7.000	44.444	38.889	4	40.850	13.350	23	77.000	71.000	23.377	25.352
3	7.000	7.000	38.889	38.889	24	40.450	13.219	11	77.000	342.000	23.377	5.263
27	7.000	9.000	38.889	50.000	3	34.767	11.362	27	78.000	65.000	23.077	27.692
4	6.000	8.000	33.333	44.444	23	20.417	6.672	4	79.000	65.000	22.785	27.692
10	6.000	2.000	33.333	11.111	32	20.267	6.623	24	80.000	62.000	22.500	29.032
35	5.000	3.000	27.778	16.667	10	17.200	5.621	3	81.000	65.000	22.222	27.692
5	5.000	3.000	27.778	16.667	5	16.250	5.310	16	84.000	71.000	21.429	25.352
16	4.000	5.000	22.222	27.778	16	10.917	3.568	32	87.000	63.000	20.690	28.571
25	3.000	3.000	16.667	16.667	35	8.967	2.930	35	87.000	70.000	20.690	25.714
23	3.000	10.000	16.667	55.556	34	1.617	0.528	25	89.000	75.000	20.225	24.000
26	3.000	3.000	16.667	16.667	39	1.083	0.354	5	89.000	75.000	20.225	26.866
56	3.000	0.000	16.667	0.000	26	0.000	0.000	26	89.000	75.000	20.225	24.000
34	2.000	2.000	11.111	11.111	11	0.000	0.000	34	89.000	342.000	20.225	5.263
43	2.000	0.000	11.111	0.000	25	0.000	0.000	45	90.000	77.000	20.000	23.377
39	2.000	2.000	11.111	11.111	40	0.000	0.000	10	92.000	69.000	19.565	26.087
11	0.000	2.000	0.000	11.111	43	0.000	0.000	43	95.000	76.000	18.947	23.684
40	0.000	4.000	0.000	22.222	45	0.000	0.000	43	342.000	59.000	5.263	30.508
45	0.000	1.000	0.000	5.556	56	0.000	0.000	56	342.000	60.000	5.263	30.000

Table 3: Centrality measures group 2

	1	2	3	4		1	2		1	2	3	4
	OutDegree	InDegree	NrmOutDeg	NrmInDeg		Betweenness	nBetweenness		inFarness	outFarness	inCloseness	outCloseness
36	6.000	4.000	35.294	23.529	17	69.500	25.551	48	86.000	306.000	19.767	5.556
42	5.000	2.000	29.412	11.765	31	52.500	19.301	17	90.000	111.000	18.889	15.315
17	5.000	8.000	29.412	47.059	36	39.000	14.338	51	93.000	118.000	18.280	14.407
44	4.000	2.000	23.529	11.765	51	33.000	12.132	31	94.000	113.000	18.085	15.044
31	3.000	5.000	17.647	29.412	28	26.500	9.743	41	97.000	306.000	17.526	5.556
51	3.000	5.000	17.647	29.412	30	3.000	1.103	29	97.000	306.000	17.526	5.556
28	3.000	2.000	17.647	11.765	42	2.500	0.919	18	99.000	116.000	17.172	14.655
15	2.000	2.000	11.765	11.765	15	1.000	0.368	36	99.000	110.000	17.172	15.455
50	2.000	0.000	11.765	0.000	29	0.000	0.000	28	101.000	120.000	16.832	14.167
18	2.000	4.000	11.765	23.529	41	0.000	0.000	15	101.000	119.000	16.832	14.286
54	2.000	0.000	11.765	0.000	38	0.000	0.000	30	104.000	123.000	16.346	13.821
38	1.000	0.000	5.882	0.000	44	0.000	0.000	44	110.000	114.000	15.455	14.912
30	1.000	1.000	5.882	5.882	48	0.000	0.000	42	110.000	111.000	15.455	15.315
57	1.000	0.000	5.882	0.000	50	0.000	0.000	50	306.000	112.000	5.556	15.179
48	0.000	3.000	0.000	17.647	18	0.000	0.000	38	306.000	108.000	5.556	15.741
41	0.000	1.000	0.000	5.882	54	0.000	0.000	54	306.000	104.000	5.556	16.346
55	0.000	0.000	0.000	0.000	55	0.000	0.000	55	306.000	306.000	5.556	5.556
29	0.000	1.000	0.000	5.882	57	0.000	0.000	57	306.000	108.000	5.556	15.741

Table 4: Centrality measures group 3

	1	2	3	4		1	2		1	2	3	4
	OutDegree	InDegree	NrmOutDeg	NrmInDeg		Betweenness	nBetweenness		inFarness	outFarness	inCloseness	outCloseness
7	7.000	7.000	36.842	36.842	7	39.233	11.472	47	82.000	380.000	23.171	5.000
1	6.000	1.000	31.579	5.263	46	27.783	8.124	46	84.000	234.000	22.619	8.120
14	5.000	4.000	26.316	21.053	14	26.733	7.817	7	88.000	229.000	21.591	8.297
12	5.000	4.000	26.316	21.053	33	25.583	7.481	6	89.000	233.000	21.348	8.155
6	4.000	6.000	21.053	31.579	6	15.783	4.615	33	90.000	233.000	21.111	8.155
13	4.000	2.000	21.053	10.526	2	13.000	3.801	12	93.000	232.000	20.430	8.190
2	4.000	2.000	21.053	10.526	13	8.733	2.554	9	97.000	235.000	19.588	8.085
46	3.000	9.000	15.789	47.368	12	7.983	2.334	8	97.000	234.000	19.588	8.120
8	3.000	3.000	15.789	15.789	1	6.333	1.852	21	102.000	235.000	18.627	8.085
53	3.000	0.000	15.789	0.000	8	0.583	0.171	14	304.000	161.000	6.250	11.801
52	3.000	0.000	15.789	0.000	9	0.250	0.073	13	306.000	161.000	6.209	11.801
33	3.000	4.000	15.789	21.053	19	0.000	0.000	22	307.000	172.000	6.189	11.047
9	2.000	3.000	10.526	15.789	22	0.000	0.000	37	307.000	172.000	6.189	11.047
21	2.000	2.000	10.526	10.526	21	0.000	0.000	20	326.000	380.000	5.828	5.000
22	1.000	1.000	5.263	5.263	37	0.000	0.000	19	326.000	380.000	5.828	5.000
49	1.000	2.000	5.263	10.526	20	0.000	0.000	49	342.000	159.000	5.556	11.950
37	1.000	1.000	5.263	5.263	47	0.000	0.000	2	342.000	147.000	5.556	12.925
20	0.000	1.000	0.000	5.263	49	0.000	0.000	1	343.000	143.000	5.539	13.287
47	0.000	4.000	0.000	21.053	52	0.000	0.000	52	380.000	218.000	5.000	8.716
19	0.000	1.000	0.000	5.263	53	0.000	0.000	53	380.000	147.000	5.000	12.925

CONCLUSIONS

The aim of this study is to determine the structure of the relational network within the Catalan Healthcare System and to identify the most influent actors in terms of innovation capacity.

The use of the factions algorithm is useful in order to find core-periphery structures and/or 'parallel' factions in the structure. If so, analysis must be done taken each faction separately. Further analysis on the internal structure of each faction in terms of cohesion (density or average degree) and centrality of actors is aimed at describing the amount of bridging social capital (Burt, 1992; Freeman, 1979) and bonding social capital (Coleman, 1988; Granovetter, 1985) existing in each part of the network and even each actor. This information can later be used to identify the patterns and the areas representing more innovative capacity.

In the case study we observed the existence of geographical subnetworks, analysed their content and the main structural patterns.(Asheim and Gertler, 2005). Moreover, the most influent actors in each subgroup were identified to be those hospitals from the fourth level or category, technologically intensives, which have a great number of links because of their specific knowledge and their available resources. This advantageous position makes them the main knowledge transmitter within the networks. And the concentration of L4 in Barcelona and their metropolitan area makes this geographical area a healthcare knowledge pole.

Fourthly, although relations are more common intra-groups, we have detected that they also exist inter-groups, and not necessarily between hospitals from the same level. All these descriptions are useful for managers to understand the 'hidden' organizational map in inter-organizational settings like the one analysed, which is relevant for the management of the whole system and of the individual actors as well. Mapping the network can help the system to analyse the current situation and to establish strategies to increase the cooperation among its members.

Finally, in future research we plan to be even more specific in the determination of structural patterns and in correlating them to actual innovative behaviour. As well as, it could be interesting to analyse external contacts of Catalan hospital, in order to know the sources of knowledge coming from a supra-systemic network.

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Knowledge Based Economic Initiatives Towards Innovated Europe

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Abstract

Possibilities for the development of new forms of economic, social and technological headway designed to create and further improve economies based on knowledge & innovation are analyzed here.

The main emphasis is put on national and regional economic specialization and creation of new networks of clusters in the situation of the development of the European Union. We have found that clusterization oriented towards the increase of efficiency of various national and regional economies is a critical precondition for successful creation of modern economy based on knowledge & innovation, both in the whole space of the European Union and particular countries.

Another idea - a concept of creation of regional and cross-regional clusters and their networks also known as „economic oasis“ - is suggested here. It is explained in the paper that in the economies based on knowledge development of clusters and their networks will soon become one of the core forms of economic and technological advancement.

The processes of the creation of knowledge based innovation in the economy of Lithuania are analysed.

Keywords: knowledge - based society and economy, innovation, networks of clusters and economic „oases“, European Union, Lithuania.

1 Introduction

The future of the innovation in the European Union is very close linked to the creation of the knowledge based society and knowledge based economy.

This means that key issues that require strategic decisions are to be considered as issues of creation of the knowledge based society and knowledge based economy.

The essence of these issues could be revealed in the following:

what should the knowledge based society and knowledge based economy be in the future in the European Union?

how should the knowledge based society and economy be created in the European Union?

Striving to find answers to these questions determines the necessity of elaboration and implementation of appropriate strategies for creation of knowledge based society and knowledge based economy. In its turn, in order to ensure elaboration and implementation appropriate concepts and methodologies of preparation and justification of strategic decisions should be used.

This publication analyzes a new approach towards the way how long term strategies designed to create knowledge based economy in the European Union and in the countries of the European Union (for example – in Lithuania) should be prepared.

This approach is a result of scientific research the object of which has been creation of the knowledge based economy in the situation of the enlargement of the European Union.

The objective of the completed research has been the proof of the fact that key priorities for creation of the knowledge based economy is the urge of technological advancement and enhancement of compatibility and productivity using such opportunities as specialization of national and regional economies, creation of clusters and their networks, as well as the development of so called economic “oases” and hyper-clusters in the entire economic space of the European Union.

The main result of the completed research is the concept of strategies oriented towards integration and synthesis, the basis for which is the universal principle of „creation of a new quality“: we should utilize this principle in elaborating and implementing the strategies for creation of knowledge based economy in the European Union.

Key tasks of the completed research have been the following:

demonstrate the fact that knowledge based society and knowledge based economy in the European Union should be created according to the universal principle of „creation of a new quality,

prove the necessity to create and apply the strategies oriented towards innovation, integration and synthesis,

reveal the essence of the rational specialization of national and regional economies,

show the necessity of creation and expansion of regional, cross-regional and international innovation networks of clusters and economic “oases” in the European Union ,

demonstrate the fact that networking of science and technology parks and business centers is the first stage of the knowledge based economy creation process,

show the necessity of the networking of science and technology parks and business centers in the context of knowledge based economy creation processes in Lithuania.

These tasks have been of a priority when attempting to create a modern knowledge based society and knowledge based economy in the European Union.

2 Creation of knowledge based economies in the European Union as a sphere of complex scientific research

2.1 New challenges for the European Union

The development of the European Union is a very complex process of both quantitative and qualitative transformations.

The necessity for the changes within the European Union is determined by a number of *problems* which analysis and systematization is described in various scientific papers (Melnikas, B., 2002; Melnikas, B., Reichelt, B., 2004).

Main *problems* typical to the European Union as a system which require essential and radical decisions are the following:

Within the territory of the European Union there are *very limited sources of energy and raw-materials*. In the environment of the development of the economy

needs for these resources have been steadily growing which means that the European Union becomes more and more dependent on the possibilities for the increase of these resources: we suggest that *prospects of economic development* of the European Union, along with *economic and energetic security* of the European Union has been influenced by various economic and political factors characterizing export of these resources to the European Union;

Within the countries of the European Union *very high standards of living are being implemented here* including the spheres of social security and social warranties, as well as environmental protection. As a consequence, all economic endeavors within the territory of the European Union require substantial expenditure which subsequently means that the *cost price* of the products manufactured in the European Union is *very high*. The increase of the cost price which is disproportionate to the quality of products determines the fact that products manufactured in the European Union become increasingly *incompatible*;

Key indicator for the well-being in the European Union is the ability to manufacture products to the increasing extent and more massively both in their local and global markets, and sell products of high quality and price. This means that in the European Union the need for more markets in order to sell their own products has increasingly growing (besides, it is of crucial importance that there is an adequately high purchase power). Inadequacy of such markets threatens the development of the economies of the European Union.

Necessity to respond to these problems determines main *challenges* to the European Union and its development:

Quantitative increase of the European Union is orientated to the following:

European Union could win possibly more markets to sell their production,

European Union could possibly gain better “direct” access to the countries in Eastern Europe, Central Asia and the Near and Central East where huge supply of energy and raw materials is accumulated and where great potential markets for the products manufactured in the European Union;

Qualitative development of the European Union is orientated to the goal to create *the knowledge based society and knowledge based economy* in the territory of the European Union: This could ensure the following:

ability to create within the European Union the alternative energy sector and other sectors of economy, which could allow strongly decrease the dependence of the economies of the European Union on the import of traditional energy and raw materials,

ability to create and widely distribute brand new products and technologies in the global which could allow the European Union to become a worldly leader in many spheres of economic and social life.

It is worth mentioning that over the last decade greater possibilities to ensure *quantitative increase* can be observed in the European Union, whereas in the sphere of *qualitative development* numerous difficulties and unpredicted obstacles can be seen (Melnikas, B., Reichelt, B., 2004). For this reason qualitative development of the European Union should receive priority consideration: we suggest that prospects of the European Union are basically influenced by creation of the *knowledge based society and knowledge based economy*.

2.1.1 Scientific research dedicated to the creation of knowledge based economy and its main directions and priorities

Knowledge based economy is a new stage of social and economic development indicating that *a society of a new type* is being formed which is characterized by *new quality of life and new possibilities for further modernization*.

Creation of knowledge based economy should be considered as a very important *object of scientific research*. As we might know, there are numerous publications in the contemporary scientific research practice dedicated to the creation of knowledge based economy. (Cohendet, P., Stojak, L., 2005; Currie, W., 2000; David, P.A., Foray, D., 2002; Ein-Dor, P., Myers, M., Raman, K.S., 2004; Farnsworth, K., 2005; Goeransson, B., Soederberg, J., 2005; Grace, A., Butler, T., 2005; Hunt, S.D., 2000; Huseman, R.C., Godman, J.P., 1999; Merrill, R.E., Sedgwick, H.D., 1997; Leydesdorff, L., 2004; Steinmueller, W.E., 2002).

Summarizing the completed research allows us to conclude that in addition to the already developed research directions some *new and greatly prospective* directions might *additionally* be elaborated: one could expect that the research in the directions mentioned above could allow to define *new approaches* towards the *concept* of the knowledge based economies, and the assessment of the conditions necessary for successful implementation of such economy. It is especially important for the *new approaches* to thoroughly prepare and implement the *strategies* designed to create knowledge based economy.

Scientific research dedicated to the creation of knowledge based economy can be completed in two important new directions including:

To create knowledge based economy it is necessary to evaluate the political, social, cultural, economic, information and technological environment. When

completing the research in chosen directions there should be assessed whether *political, social, economic, information and technological environment is adequately or inadequately favorable* for creation of knowledge based economy: if the findings show that such environment is *inadequately favorable*, adequate ways to influence this environment should be sought in the course of the research. Main priorities for the research in this direction are connected to definition of *common* to the entire world phenomena of the economic, social, technological or other progress, along with assessment of *features* of the development typical to either *large regions of the world and various groups of countries* (for instance, analyzing possibilities for creation of knowledge based economy it is necessary to thoroughly examine regularities of the development of the European Union and prospects for the quantitative transformations in the economic, social and cultural space of the European Union)

Creation of visions and patterns of knowledge based economy. Completing the research in this direction it should be defined what kind of knowledge based economy should be in the *future* and *how* it should function. Key priorities of this direction could be:

structure of the future knowledge based economy,

principles and mechanisms of the functioning of this economy

factors of growth, along with orientations of economic, social and political development;

Elaboration, justification and implementation of the necessary strategies for the creation and further modernization of the knowledge based economy. Completing research in this direction there should be a decision made about *how* there will be the transition from current economy to the visionary economy based on knowledge executed; *what* should the *strategies* of the *transition* be; and *what* should the policies of the society and the state be dedicated to the creation to the knowledge based economy. Main *priorities* of the research in this direction are:

completion of political, economic, legal and other prerequisites for creation and further development of the knowledge based economy,

transformation of the current economic system, in order to create future knowledge based economy based on the current one,

international co-operation in the spheres of innovations and technologies,

training of human resources in preparation of solid intellectual foundation for the knowledge based economy.

The new directions of the scientific research mentioned earlier reflect on a wide *panorama* of the issues that should be examined before creating the knowledge based economy. It is obvious that analysis of these issues is directly oriented towards the fact that *adequate methods of management* are used that would allow to prepare and implement strategies appropriate to the changes happening in the society.

2.1.2 Is the European Union an integral space or an integrated system of various spaces?

Processes of the enlargement of the European Union arising currently are very intense.

These processes reflect on two-fold approach towards the European Union and its enlargement:

European Union could be perceived as a *multicultural space*. We suggest that *the common cultural space* of the European Union is comprised by various ethnic, religious, social and other cultural spaces represented by their *regional*, as well as *quantitative and qualitative* indicators. It is of crucial importance that the development of *common cultural space* in the European Union imply both processes of *integration and synthesis*: this means that *integral culture common to the entire society of the European Union* inevitably develops in the European Union;

European Union could be perceived as the *organization of the states belonging to Europe*. This means that it is possible assume that the European Union is generally *an organization of organizations* because a *modern state* broadly speaking can be defined as a *societal organization of the superior degree of the development*. The enlargement of the European Union as an organization of states is going in the way of integration of the new states into this organization, therefore, we suggest that the enlargement of the European Union are followed by the processes of *integration*. At the same time it is important to notice that the European Union as an organization has gradually started executing functions of the *common state* of the countries that belong to the European Union and this means that the European Union is gradually turning into the *super-state*. The development of the European Union as a new super-state simultaneously

expresses processes of *synthesis* typical to the enlargement of the European Union as an organization.

We may *conclude* that both processes of *integration* and *synthesis* develop in the enlargement of the European Union as a *multicultural space and as organization of the states*. Therefore, the character and condition of the enlargement of the European Union in the future will be determined by what processes of the enlargement will *dominate, and whether processes of integration or processes of synthesis will dominate*.

Depending on the fact whether in the future the *processes of integration* or *processes of synthesis dominate*, it is possible to draft *two alternative visions* of the future of the European Union:

The *processes of integration will dominate* in the enlargement of the European Union. In this case, *multicultural space of the European Union* will manifest as a *common space* comprised by *various national cultures* and where *various nations* live. In this case the European Union will continue functioning as the *organization of various national states*;

The *processes of synthesis will dominate* in the enlargement of the European Union. In this case *a new type of common European nation* will *gradually* develop in the space of the European Union, whereas the European Union itself will transform into *the integral European super-state*. In this case modern national states will become *administrative and territorial sub-divisions possessing rather wide autonomy* in the future European Union as a super-state. Besides, we may assume that in the future members of the European Union will rather *identify themselves* with the *integral European nation*, rather than with *current nations of its own*.

It is natural that both of these alternative visions are *hypothetical*. At the same time it is worth noting that the second vision (the vision of the domination of the processes of synthesis) generally is just a continuation of the first vision (the vision of the domination of the processes of integration). This means that both of these visions as a *complex* can be considered as a *common hypothesis* dedicated to the future of the European Union: in this common hypothesis two stages could be emphasized: the first one (the stage of integration processes) and the second one (the stage of the synthesis process).

It is necessary to mention that *regardless* the combination of the processes of integration will characterize the enlargement of the European Union; whatever the case is, the development of the *knowledge based society and knowledge based*

economy will manifest in the European Union. The knowledge based society in the future will represent to the *entire* space of the European Union.

3 Strategies designed to create knowledge based economy in the European Union

Networks of clusters, economic „oases“ and rational specialization of regional economies as a priority prerequisite, ensuring possibilities for creation of knowledge based economy in the European Union. Contemporary economic principles and practices confirm that in efficiently operating economic systems their surplus value is created at greater extent. This statement works in all cases where ways to increase efficiency and compatibility on the scale of both particular economic subjects and large national and regional economic systems (Boldrin, M., Canova, F., 2001; Bond, E., Syropoulos, C., Winters, L.A., 2001; Chortares, G.E., Pelagidis, T., 2001; Dutta, M., 1999; Guy, M., 2001; Redding, S., Venables, A.J., 2004; Sangmon, K., 2002)

The main precondition to ensure high efficiency and compatibility of any economic system is to achieve that any economic system should be properly specialised. Hummels, D., Ishii, J., Kei – Mu Yi, 2001; Huseman, R.C., Godman, J.P., 1999; Melnikas, B., 1997; Olsen, T.E., Osmundsen, P., 2003).

Under the proper specialisation we understand the situation where the range of products produced within the economic system guarantees magnification of the surplus value within this system: the economic system should be exceptionally oriented towards the series of products, services and activities, whose structure allows to achieve potentially greater surplus value or higher velocity of the increase of this value.

For the sake of the rationalisation of the national or regional economic system various means may be implemented. These means should create a solid complex, and have to be long-term and consecutive. The idea of the means should ensure that the entire economic system of particular region or country is developed as a large macro-cluster or hyper-cluster. These large macro-or-hyper-clusters may be multi-profiled and oriented towards creation of different and diverse final products, and it is very important to create final products that are compatible in global markets.

It is obvious that large macro – or- hyper- clusters in particular countries or regions should meet the following requirements:

- large clusters of this kind function as open systems, maintaining both internal and external economic and technological relations in international and global markets,
- inside of the large clusters of this kind various specialised clusters can be created within incorporated diverse institutions of science, research and education, enterprises of production and services, business incubators, parks of science and technology, centers for innovation, and industrial, trade, transportation and communication companies.

Development of large economic systems in a way of clusterisation may be of great variety. A very prospective method to implement this way is creation of regional (territorial) or sectorial "oases".

In general "oasis" can be explained as an economic system, possessing extremely advantageous political, legal, economic and other conditions for activities and development. These conditions are as a rule exclusive and in their presence the "oasis" as economic system receives various privileges or extremely beneficial environment is created for it. "Oases" can be established on behalf of political will of a state or even a group of states: by the way, the idea of regional "oases" is very viable in the improvement and implementation of regional policy of the European Union, with the intentions of creation of "oases" not only in particular countries, but also regions, comprised of regions of different countries.

Regional "oasis" is one where exceptionally advantageous conditions for economic development are created in a territorially outlined area (region). This area may coincide with systems of administrative territorial division of particular countries or may not.

Sectorial "oasis" is one where exceptionally advantageous conditions are created for particular branch of economy, and particular segments of business or public sector.

Creating and developing "oases" it is very important to consider demographic situation, possibilities to attract, concentrate and efficiently utilise human and financial and other resources, as well as possibilities rapidly expand various innovations.

The idea of the "oasis" and opportunities to promote this idea in the situation of the development of the European Union has been described quite comprehensively (Melnikas, B., 2002, 2003, 2004).

Summarizing the statements given above, we may confirm that the concepts of proper rationalization of national and regional economic systems, as well as concepts of creation of macro-or-hyper-clusters and “oasis” are of great importance, ensuring progress in the entire space of the European Union.

The idea of clusters, their networks and “oases”, oriented towards rationalism of specialization of regional economies is very promising, when creating the knowledge based economy in the European Union. The implementation of this concept should be based on the universal principle of „creation of a new quality” when planning to prepare and implement appropriate strategies oriented towards integration and synthesis.

3.1 Priority strategies oriented towards integration and synthesis designed to create knowledge based economies in the European Union.

In order to create knowledge based society and knowledge based economy in the European Union we should purposefully and consecutively implement the strategies oriented towards integration and synthesis embracing *all major spheres of social, economic and cultural life*.

Considering the fact that when creating the knowledge based economy the key priority should be put on *clusterization, networks of clusters, economic “oases” and rational specialization of regional economies* we suggest that: for the benefit of creation of knowledge based economy in the European Union it is necessary to prepare and implement *a complex of strategies for clusterization and rational specialization of regional economies*.

The *strategies for clusterization and rational specialization of regional economies* should include both *the strategies oriented towards integration* and *the strategies oriented towards synthesis*: the strategies oriented towards integration and the strategies oriented towards synthesis are characterized by *different purpose* and *different content*.

The idea of the strategies oriented towards integration is to ensure *high efficiency and compatibility of different regional economies and different sectors* of both in the integral economic space of the European Union and in global markets. These strategies should draw upon the following key decisions:

each national or regional economic system should shape up one or more *priorities* oriented towards *creation of modern state-of-the-art technologies and prod-*

ucts based on them: based on such priorities one could define or develop rational specialization of each national or regional economy,

each national or regional economic system according to the *regional priorities*, should form *regional economic „oases“* and clusters; whereas general „oases“ and clusters can be transformed into *macro - or hyper - clusters* on the scale of large regions or the entire country (the clusters of this kind can be of a *broad scope, multi-scope* and *limited scope*, functioning as *specialized* clusters in particular sectors of economy),

creation of „oases“ and clusterization should ensure that *the major role* in the grow of economy is to be played by *intellectual resources and technological advancement*. The idea of the *strategies oriented towards synthesis* is to achieve *that major sectors of economy on the scale of the whole European Union* operate as *integral undivided systems*.

Each sector of this kind as a system should possess a *very high level of technological development* and should be a *leader* in the corresponding sphere of economy *on the worldly scale*. Orientation towards the challenges of this kind requires that within these strategies the following decisions are made:

on the scale of the entire European Union *the networks of regional and sector clusters as well as „oases“* should be created and mutually developed: each element in the networks of this kind could become *rationally specialized* which would allow to make sure that *the network as a system is of a state-of-the-art level of productivity and technological advancement*,

the networks of regional and sector clusters as well as „oases“ should be *specialized*: subsequently, the networks of this kind on the scale of economic space of the European Union are *mutually complementing* and function based on partnership,

the networks of regional and sector clusters as well as „oases“ that are created in the European Union *can operate outside the European Union*: this will ensure the viability of economic structures of the European Union and their compatibility in the global markets,

the networks of regional and sector clusters as well as „oases in the future should be an organizational basis for the *economies* of the *entire European Union*: the networks of this kind should be understood as the *key structural elements of the economy of the European Union*, as well as a *key organizational structure* of the *knowledge based economy* (it is obvious that in any of these networks high intellectual, information technical and other potential should be

accumulated ensuring rapid and efficient headway of technologies and leadership in the global markets).

Implementation of the strategies explained above is a very important factor to achieve that creation of knowledge based economy and knowledge based society in the European Union become a reality.

To conclude the statements given earlier it is also worth noting that purposeful and consecutive development and implementation of the strategies oriented towards integration and synthesis ensures that *integral and undivided* and *highly efficient knowledge based society* and *knowledge based economy* gradually form within the European Union.

4 Networking of science and technology parks and business centers as the first stage of the knowledge based economy creation process: the case of Lithuania

New nature of business: international experience and model for Lithuania. The 21st century knowledge revolution created new opportunities and possibilities for the access and use of knowledge and information. The transition towards a knowledge economy requires from policy makers to understand the comparative strengths and weaknesses not only their countries but economic systems also and then act upon them to develop appropriate short and long term policies and investments. Edmund Phelps Nobel prize winner in economics maintain that there are two economic systems in the West. Several nations including the US, Canada and the UK-have a private-ownership system marked by great openness to the implementation of new commercial ideas coming from the entrepreneurs.

The other system-in Western Continental Europe-though also based on private-ownership, has been modified by the introduction of institutions aimed at protecting interests of "stakeholders" and "social partners". The both systems include employer confederations, big Unions and Monopolistic Banks. According some authors both of them (Europe, North America) represent corporate downsizing, or the dark side of global economy. All economies and especially new born post communist market countries are looking for the personal way of development. In today's global economy, knowledge has become an even more decisive factor of competitiveness, productivity and growth. The global digital/knowledge economy offers unprecedented opportunities to produce and sell on a mass scale, reduce costs, and customize to the needs of consumers – all at the same time. Whether you live in a large country such as the USA or China, mid-sized country such as

India or Canada or a smaller country such as Lithuania, your potential market is of the same global size. And you can source (net source) inexpensively wherever you wish.

Various management writers have for several years highlighted the role of knowledge or intellectual capital in business. The economic integration and globalization are the two trends of current development of the world economy. In the global digital village every individual or small business can go global and directly compete with any company. Competition in the goods and services market has been brought to new, higher levels, and permanently so.

Developed countries can no longer hide behind politically motivated barriers, physical or other walls to protect themselves from competition from developing countries or emerging markets. Rather than clinging to old models, individuals and corporations in developed and (increasingly) in developing or transition nations need to upgrade their competitive advantages through more education and training.

New information and communication technologies (ICT), especially the Internet (increasingly wireless), bring new opportunities, to concentrate on core competencies, specialize and increase trade and investment flows. For these gains to occur, however, what needs essential transformation is the corporation itself.

Corporations need to change the ways they do business, they must become more flexible, amorphous networks of international entrepreneurs and knowledge managers working on particular projects. How such corporations should be governed is a new challenge before the managers working under the conditions of the global knowledge economy.

In the global economy any country, if it is serious about rising its standards of living must open its economy so as to avoid itself of opportunities of trade, interact with and learn from it. Modern growth strategy was developed at Harvard by M.Porter (Porter, M., 1990), where the different stages of competitive development of the nations are presented. A.Lahti (Lahti, A., 2007) resumed Porter's economic growth stages presenting them in the form of chart and named them like Global Challenge and the new economics (figure1).

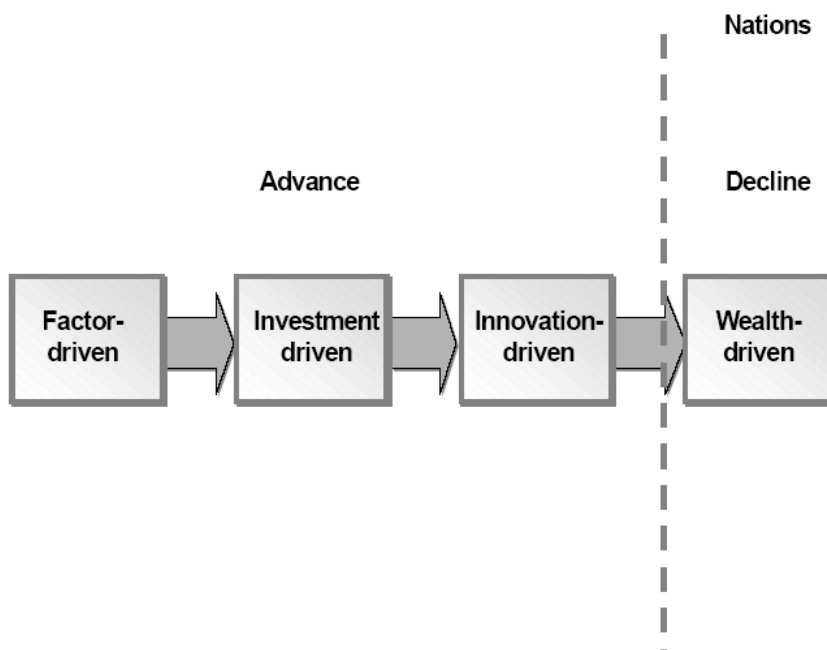


Figure 1. Porter's model of the stages of competitive development of nation

Stage A : Factor-driven. Practically, any of the internalized or globalized industries have drawn their competitiveness from the basic factor conditions, such as low-cost labor and access to national resources. Firms typically produce commodities more than specialities. The rate of technology and R&D investments is low. The local economies are highly sensitive to fluctuations in commodity prices and exchange rates. There are only a few truly international firms. Domestic demand for exported goods is modest. The role of foreign firms is considerable, as they act as a channel for foreign markets and they bring foreign technology, knowledge and management with them to the host country. Technology is assimilated through imports, imitation, or foreign direct investment (Lahti , A., 2007).

Stage B: Investment-driven. In the investment-driven stage, countries develop their competitive advantages by improving their efficiency in producing standard products and services which become increasingly sophisticated.

While the advanced technology still comes mainly from abroad, with licensing and joint ventures, local firms' invest in process technology and modernization of

production facilities etc. Firms often produce under contract to foreign manufacturers that control marketing channels. Home demand is still rather undeveloped, and related and supporting industries are not functioning optimally. It is typical to this stage that wages and input prices are higher than before and employment is increasing. Public policy concentrates on long-term matters. One of the major areas are infrastructure projects. Harmonization of customs, taxation, and corporate law may allow the economy to integrate more fully with global markets (Lahti, A., 2007).

Stage C: Innovation-driven. In the innovation-driven stage, the number of industries operating successfully at international level increases and broadens. Firms create new technologies and methods and compete with low costs due to high productivity rather than low production factor costs. Home demand increases and becomes more sophisticated. Clusters are well developed, fostering innovation and technological change. A country's competitive advantage lies in its ability to produce innovative products and services at the global technology frontier using the most advanced methods. Institutions and incentives supporting innovation are crucial for further development. The economy becomes stronger against outer shocks, like cost shocks, because of its ability to compete with technology and product differentiation. Improvements related to externalities, market imperfections and incentives are important to develop the well-functioning factors, product and financial markets (Lahti, A., 2007).

Stage D: Wealth-driven. Unlike other stages the wealth-driven phase is driven by past accumulation of wealth and becomes unable to generate new wealth. Firms become more vulnerable to uncompetitiveness. They innovate less and the investment rate decreases. Employees begin to lose motivation and so on. The result is that firms lose competitive advantage compared with foreign firms and may even start to move their headquarters from their original home country to other countries. The standard of living and welfare is still rather high. The policy attempts in this stage try to increase the dynamism of the economy, innovations and profitability (Lahti, A., 2007).

First three stages involve successive upgrading of a nations competitive advantages and will be associated with progressively rising economic prosperity. The transition through the four stages is not automatic since countries may get stuck in a stage. Most investment-intensive economies are finding that their relatively high-cost labor make them vulnerable from really lower-wage countries, such as China, India. The transition towards knowledge economy requires to understand the comparative strengths and weaknesses of their countries, make evaluation of its opportunities and threats.

4.1 The SWOT analysis of the Lithuanian high technology oriented industries as starting position for Lithuania's move towards knowledge based growth

Every country possesses its own strengths and weaknesses, opportunities and threats. In spite of the heavy burden of the Soviet occupation legacies, after regaining its independence in 1990 Lithuania embarked on a path of determined, radical, and sustained reforms aimed at re-establishing democracy and functioning market economy. It succeeded remarkably and is now regarded Europe's transformation success story. At the same time Lithuania was in position how to answer the question: what could and should a low –income country with an educated population do to exploit new opportunities associated with the knowledge revolution?

When the WTO&ITC team compared Lithuania's ICT industry with similar industries of countries in the region. The conclusion was made that the industry is developing and expanding its activities across the region. In the EU market, activities related to sub-contracting or onshore software application were taking place. Although conclusion was made, that Lithuanian ICT industry is relatively small compared to the ICT market of Poland for example, it has good growth potential driven by niche areas and niche products.

Table 1. shows the results of the WTO & ITC team's research on Lithuania's ICT industry based on analysis of its strengths, weaknesses, opportunities and threats (SWOT).

The SWOT Analysis of the Lithuanian ICT and Other High Tech Industry: Summary & Outline (Source: Based on the WTO&ITC research and authors' research)

Strengths

Human resources suitable for innovative activities and knowledge-based production;
 Healthy economy, growing most rapidly among the CEE (5-6% for 2001-2005);
 Well-developed high tech & other universities producing over 500 specialists in ICT and other disciplines annually;
 Other well-trained & low-cost human resources available;
 Modern telecom infrastructure with a digitalization ratio of 100% and mobile penetration of some 50%;
 Labor force versatile in English, German, Russian, and Polish;
 Open economy with rule-based system aligned to the EU & WTO – economic stability;
 Developed financial institutions & intermediaries;
 Location between the EU, Nordics, Commonwealth of Independent States (CIS);
 Capacity to promptly adapt to rapidly changing ICT & knowledge based economy;
 Full scale privatization accomplished; industry re-structured based on comparative advantages;
 Institutional support to SME development;
 Well developed IT infrastructure across the region;
 Sound linkages between academia and industry for development of applications;
 EU and NATO integration to provide large market opportunities for ICT-enabled services.

Opportunities

Development of labor-intensive sectors like computer science and knowledge-based sectors to serve a larger market of EU and CIS;
 Availability of structural funds from the EU to provide support to business modernization, employment promotion, improvement in quality of life, etc;
 Industrialization processes based on FDI, advanced technology and international management experience to enhance competitiveness and leverage advantages to achieve export-led growth;
 EU accession to expand sales markets and provide preconditions for foreign trade;
 Globalization of financial resources will provide alternative possibilities for financing;
 Use of digital technologies will open wider markets and provide conditions for more efficient cooperation with advanced economies in ICT, BPO, R&D, and other IT enabled services;
 Possibility to establish positions in the transport service markets of continental Europe, with logistic centres in Kaunas, Klaipeda and Vilnius;
 Free movement of IT and high tech personnel to provide opportunities for application development and onshore software development.

Weaknesses

Manpower adequately skilled but needs re-training on project management and quality management of ICT projects;
 Slow drafting and implementation strategies of ICT & other high tech;
 Vague long-term vision for ICT development including action plans or prioritization of funds;
 Comparatively small market - small investment by MNCs;
 Foreign economic relations still to be formulated on the basis of national and EU interests;
 Capital market in the development stage;
 ICT penetration not sufficient to give a substantial boost to e-commerce and e-business development;
 Logistics management poor - railway transport system physically inadequate;
 Public-private partnerships weak & cooperation among economic entities underdeveloped;
 Insufficient incentives for R&D by business.

Threats

Emigration weakens the intellectual potential of Lithuania;
 Potential closures of domestic ICT companies due to fierce competition unless they develop sustainable niche markets;
 Fear of becoming a center of higher cost production because of alignment with the high-cost EU and trade distortions imposed by third countries;
 Loss of General Preference Systems discounts for exports to North America and Japan;
 International environmental obligations may lead to higher costs of production;
 Advanced ICT countries may wrongly see Lithuanians as consumers and not as developers/partners for modern products and services thereby leaving Lithuania out of BPO networks;
 Lack of coherent vision of the Lithuanian industry;
 Inconsistent policies and inadequate communications may lead to fragmented growth of IT and other high tech industry.

In spite that fact, that knowledge industries in Lithuania are still not very advanced, compared to global leaders. But some pioneering firms that were created around research institutes do have histories going back a decade or so, esp. those in biotechnology, laser research, etc. At this moment scientific-

experimental lasers made in Lithuania you can find in 22 European Universities, 10 USA Universities, 15 Universities of Japan and 2 Australian Universities. According to Gartner Inc. expert's evaluation, the growth of the Lithuanian IT outsourcing market reached some 40 percent over 2003 alone. Lithuania is rated as one of the most attractive providers of this type of service in Eastern Europe.

A national political consensus was reached and the national agreement was signed calling for Lithuania to become a knowledge-based economy. The term "knowledge economy" has been coined to reflect the increased importance of knowledge as a critical factor for economic performance. A knowledge based economy is one where organizations and people acquire, create, disseminate and use knowledge more effectively for greater economic and social development. This requires:

- an economic and institutional regime that provides incentives for the efficient creation, dissemination and use of existing knowledge,
- an educated and skilled population that can create and use knowledge or in other words critical mass that values knowledge capital that sustain a culture that values knowledge,
- a dynamic information infrastructure that can facilitate the effective communication, dissemination, and processing of information,
- a system of research centers, universities, think tanks, consultants, firms and other organizations that can tap into growing stock of global knowledge, assimilate and adapt it to local needs.

The decision was made, that further development of the knowledge economy infrastructure (e.g. better access to high-speed Internet) is needed. That will necessitate a better public sector-private sector collaboration so as to arrive at innovative management models and strategies underpinning the knowledge.

4.2 A knowledge management approach for Lithuania

The widening and deepening of the European integration markedly increased competitive pressures, so companies began looking for new, sustainable and dynamic advantages. Given that the continent is aging pretty rapidly and immigration presents a problem for a number of reasons, a shortage of qualified labor is developing, which can be best addressed by taking advantage of the digital/knowledge revolution and of the potential of new EU members such as Lithuania.

Under these circumstances, a better use of the continent's resources has become critical to winning the competitive game or surviving in the unified Europe and the integrated world.

Large European and multinational corporations (e.g. BT, Buckman Labs, Nokia, Siemens, etc) are the early adopters of new thinking. They first realized that high initial costs of research, human/intellectual capital costs, etc, are efficiently spread only over longer periods and larger geographical areas. The vision they have, specifically their new-frontier mentality and the ability to develop integrative thinking across functional areas of business, not only at the highest management levels but, what is even more important, at lower management levels resulted in knowledge-sensitive enterprise cultures and the resultant organizational learning regarding new business models and strategies. Also, such issues are pretty high on the EU institutions' agenda (e.g. Lisbon Strategy). The unique European competitive advantage (e.g. compared to the USA) is that EU institutions are able to give push and pull to many continent-wide initiatives that fall within the public goods category (e.g. earlier adoption of continent-wide standards for mobiles, knowledge management practices, etc).

The chief criterion of readiness to become a full member of the EU is the capability to withstand the European competitive pressures. While in the first period lower labor costs do provide certain competitive advantages pretty much across the branches of economic activity, this factor is of rather short duration in the case of Lithuania or other transition economies. Lithuania will need to develop higher added-value market niches that will precisely call upon the Lithuanian capabilities to create an entrepreneurial economy that is integrated continentally and globally. Knowledge economy provides such opportunities especially in the context of knowledge and innovation in the European and global business.

The dominant challenge before Lithuania is how to use a considerable theoretical research (e.g. biotech, lasers, semiconductors, game theory) potential of the Lithuanian research institutes, universities, and industry. There is a need to develop a practice-oriented strategy for knowledge-based economy in Lithuania.

The theory-practice gap has been something of a problem inherited from the communist period, as are the inter-institutional collaboration shortcomings. One important aspect of that challenge is the interdisciplinary and cross-disciplinary nature of modern business models that mandates integrative thinking and puts a premium on those managers who are able to integrate functional perspectives. Educational institutions in European countries are still somewhat attached to the subject-based teaching/learning; and this problem is therefore more pronounced

in Europe than in North America. It could well be that knowledge management is that vehicle and that frame of mind that can help overcome such shortcomings.

4.3 Bridging science and business together: Lithuania's achievements

In today's world separate market participants are unable to achieve good results which knowledge economy requires.

The key for solving problems are networks, clusters and other common activities. In the network of such knowledge institutions there are very popular objects of knowledge economy such as knowledge camps, houses, towers, islands, technological parks, valleys, etc.

At the present time in Lithuania five programmes of integrated research, higher education and business centers (valleys) are under preparation. The integrated research, higher education and business center (valley) is a research, higher education and knowledge-intensive business potential concentrated in a single territory, which has a common or related infrastructure and purposefully contributes to the creation of knowledge-based society and knowledge-based economy.

By developing valleys in Lithuania it is sought to create clusters of research, higher education and knowledge-based economy of an international level, to speed up the creation of knowledge-based society and to strengthen Lithuania's competitiveness.

Valleys in Lithuania are created seeking to concentrate, renew and optimize the infrastructure, which would enable state-of-the-art technologies and other most promising sectors of science, technologies and business to be developed, relations between scientific research and higher education to be strengthened, close interaction between scientific research, science, higher education and knowledge-intensive business to be ensured, as well as to engage in training researchers and other specialists.

Also, it is sought to develop scientific co-operation of the highest level on the national and international scale, to attract necessary foreign investments of great intellectual potential, and on the basis of research and higher education, as well as knowledge-intensive business to create clusters of knowledge-based economy.

At the present time the following centers are working on programmes and have already presented the improved visions: Vilnius *Saulėtekio technologijų slėnis*

(Vilnius Sauletekis Technology Valley), *Vilniaus Santaros slėnis* (Vilnius Santara Valley), the Kaunas integrated research, higher education and business centers Nemunas & Santaka, the integrated research, higher education and business center (valley) for the development of the maritime sector of Lithuania(Klaipėda).

In our paper we are going more widely present the knowledge based project – “Sunrise Valley”.

“Sunrise valley” in Vilnius is one of innovative centers, which was deliberately modeled after the Silicon Valley, California, where “Eastman Kodak”, “General electric”, “Intel Fairchild”, “Lockheed”, “Hewlett Packard” and other companies started and developed their activities.

Knowledge economy clusters are successfully created near Universities in different countries. Very successfully towards this direction are developing our neighbors-Nordic countries. In recent years Finland and Sweden twinkled their resources for R&D especially in the last decade that influenced growth of high tech level of production in exports of those countries. Technological parks “Kista” and “Technopolis” are well known knowledge economy clusters in all over the world. The neighboring country Poland also has great achievements in this field of activities. Poland is successfully developing 45 ha square Technological Park “Technoport” near the capital Warsaw. Good conditions for successfully activities started in Vilnius “Sunrise valley” where special social enterprise “Sunrise valley” in May of 2003 was established.

Vilnius University and Vilnius Gediminas Technical University, well known Lithuania’s corporate leaders: ALNA, SONEX, OMNITEL, BITE GSM, EKSPLA, Laser Research Institute, the members of the Knowledge Economy Forum of Lithuania were founders of this public unit. In February of 2004 this project was joined by municipality of Vilnius, which became shareholder of this establishment. In reality “Sunrise valley” accumulated theoretical and practical potential of the best Lithuanian research Institutes, Universities, think tanks, consultants, firms and organizations and is ready to tap into the growing stock of global knowledge and adapt it to local needs.

In the long run (till 2015) “Sunrise valley” the largest unit of Lithuania’s knowledge cluster must be developed into the largest innovation centre in the Baltic states, where high added-value products and services will be created. Such a vision for “Sunrise valley” in the year 2005 was predicted by International Consortium “Centre for Strategy and Evaluation Services”, famous Technological parks from Great Britain, Sweden and experienced local business partners. According to the evaluations by the year 2015 in territory of 2,5 ha about 150 new

high tech enterprises with more than 3000 employees will be created, among them: Innovation Center for the development of laser and IT as well as the formation of business incubator and a scientific–technological park. It will be companies established by Universities and Research Centers, where students, professors and researchers from those institutions will work.

5 Conclusions and recommendations

Creation of the knowledge based society and knowledge based economy in the European Union is a very complex, long-term and ambiguous process.

Key *challenges and priorities* that require main attention when creating the knowledge based society and knowledge based economy are the following:

1. Creation of knowledge based society and knowledge based economy in the European Union should be oriented towards the solution of the following *problems*:
 - i. problems of *insufficiency and increase in the cost* of energy and raw-material, as well as problems of *secure and reliable* import of these resources, along with problems of creation of *alternative energy and economies oriented towards alternative raw materials*,
 - ii. problems of *new prospective markets* necessary for *implementation* of production in the European Union, and problems of its development and introduction,
 - iii. problems of the required potential development for *state-of-the-art* products, as well as problems of *compatibility of the products oriented towards high technologies in the global markets*,
 - iv. problems of *social security, economic well-being*, as well as *social, legal and ecological environment* improvement;
2. The basis for creation of the knowledge based economy in the European Union is the implementation of *the universal principle of „creation of a new quality“* designed to complete the following:
 - i. development of the society and economy of a new type is going under concurrent *processes of integration and synthesis*,
 - ii. when creating the knowledge based society and knowledge based economy in the European Union *integral cultural space* should be created,
 - iii. when creating the knowledge based society and knowledge based economy in the European Union *the strate-*

- gies oriented towards integration and synthesis* should be created and implemented;
2. In the *strategies* designed to create the knowledge based economy in the European Union main emphasis should be put on the following *priorities*:
 - i. *rational specialization* of national and regional economies, ensuring *high compatibility* both in the European Union and in global markets,
 - ii. transformation of national, regional and sector economies into the *macro –or hyper –clusters* and *systems of such clusters*,
 - iii. development of *clusters and networks of economic “oases” in the entire space* of the European Union,
 - iv. further development of *clusters and networks of economic “oases” as key organizational structures* characteristic to the system of the European Union;
 3. In the situation of the further development of the European Union the following provisions should be implemented:
 - i. issues of modernization and compatibility increase for the national, regional and sector systems should be tackled *in the strategies oriented towards integration*,
 - ii. issues related to creation of the *integral and undivided* knowledge based society and knowledge based economy should be tackled *in the systems oriented towards synthesis in the entire space of the European Union*.

The research on knowledge based economy creation in Lithuania as well as in other countries of the European Union concludes that:

- the transition towards a knowledge economy requires that policy makers understand the comparative strengths and weaknesses of their countries and then act upon them to develop appropriate short and long term policies and investments,
- Lithuania will need to develop higher added-value market niches that will precisely call upon the Lithuanian capabilities to create an entrepreneurial economy that is integrated continentally and globally : knowledge economy provides such opportunities especially in the context of knowledge and innovation in the European and global business,
- bridging science and business together provides a compelling platform to research the issues of upgrading competitive advantage in developed countries and contract out non-core competencies to emerging markets,
- bridging science and business together via creating a network of knowledge institutions and projects based on innovative scheme such as Sunrise Valley in Vilnius, deliberately modeled after the Silicon Valley, California and others, create the starting position. Post communist and other emerging market countries such as Armenia, Czech Republic, Ukraine, Hungary, Poland and others are

well advised to jump to these new opportunities as they represent the best chance yet to realize the “latecomer’s advantage” by leapfrogging to technologies and models of doing business which are new for Western countries as well.

Further scientific research and practice dedicated to creation of strategies for the knowledge based society and knowledge based economy in the European Union are greatly promising and important.

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Summary

The future of the European Union lies in the creation of the knowledge based society and knowledge based economy. This means that key issues that require *strategic decisions* are to be considered as issues of creation of the knowledge based society and knowledge based economy.

This publication analyzes a new approach towards the way how *long term strategies* designed to create knowledge based economy in the European Union should be prepared. This approach is a result of *scientific research* the object of which has been *creation of the knowledge based economy in the situation of the enlargement of the European Union*. The objective of the completed research has been the proof of the fact that *key priorities for creation of the knowledge based economy is the urge of technological advancement and enhancement of compatibility and productivity* using such opportunities as *specialization of national and regional economies, creation of clusters and their networks*, as well as *the development of so called economic "oases" and hyper-clusters in the entire economic space of the European Union*.

Key tasks of the completed research have been the following:

demonstrate the fact that knowledge based society and knowledge based economy in the European Union should be created according to the *universal principle of „creation of a new quality,*

prove the necessity to create and apply *the strategies oriented towards integration and synthesis,*

show the necessity of creation and expansion of *regional, cross-regional and international networks of clusters and economic "oases"* in the European Union.

Key *challenges and priorities* that require main attention when creating the knowledge based society and knowledge based economy are the following:

1. Creation of knowledge based society and knowledge based economy in the European Union should be oriented towards the solution of the following *problems:*

- problems of *insufficiency and increase in the cost* of energy and raw-material, as well as problems of *secure and reliable* import of these resources, along with problems of creation of *alternative energy* and *economies oriented towards alternative raw materials,*

- problems of *new prospective markets* necessary for implementation of production in the European Union, and problems of its development and introduction,

- problems of the required potential development for *state-of-the-art* products, as well as problems of *compatibility of the products oriented towards high technologies* in the global markets,

- problems of *social security, economic well-being,* as well as *social, legal and ecological environment* improvement;

2. The basis for creation of the knowledge based economy in the European Union is the implementation of *the universal*

principle of „creation of a new quality“ designed to complete the following:

- development of the society and economy of a new type is going under concurrent *processes of integration and synthesis*,
- when creating the knowledge based society and knowledge based economy in the European Union *integral cultural space* should be created,

3. In the *strategies* designed to create the knowledge based economy in the European Union main emphasis should be put on

the following *priorities*:

- *rational specialization* of national and regional economies, ensuring *high compatibility* both in the European Union and in global markets,
- transformation of national, regional and sector economies into the *macro –or hyper –clusters and systems of such clusters*,
- development of *clusters and networks of economic “oasis” in the entire space* of the European Union,
- further development of *clusters and networks of economic “oasis” as key organizational structures* characteristic to the system of the European Union;

4. In the situation of the further development of the European Union the following provisions should be implemented:

- issues of modernization and compatibility increase for the national, regional and sector systems should be tackled *in the strategies oriented towards integration*,
- issues related to creation of the *integral and undivided* knowledge based society and knowledge based economy should be tackled *in the systems oriented towards synthesis in the entire space of the European Union*.

The research on knowledge based economy creation in Lithuania as well as in other countries of the European Union concludes that:

- the transition towards a knowledge economy requires that policy makers understand the comparative strengths and weaknesses of their countries and then act upon them to develop appropriate short and long term policies and investments,

- Lithuania will need to develop higher added-value market niches that will precisely call upon the Lithuanian capabilities to create an entrepreneurial economy that is integrated continentally and globally : knowledge economy provides such opportunities especially in the context of knowledge and innovation in the European and global business,

- bridging science and business together provides a compelling platform to research the issues of upgrading competitive advantage in developed countries and contract out non-core competencies to emerging markets,

- bridging science and business together via creating a network of knowledge institutions and projects based on innovative scheme such as Sunrise Valley in Vilnius, deliberately modeled after the Silicon Valley, California and others, create the starting position. Post communist and other emerging market countries such as Armenia, Czech Republic, Ukraine, Hungary, Poland and others are well advised to jump to these new opportunities as they represent the best chance yet to realize the “latecomer’s advantage” by leapfrogging to technologies and models of doing business which are new for Western countries as well.

Organizational Innovations in Hospitals: A Case study

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Abstract

Organizational innovations are widely recognized as a competitive advantage factor. In hospitals they play an important role in order to improve patients' value.

The aim of this study is to analyze the organizational innovations implemented in hospitals in the last few years. A classification of different innovations in four areas is proposed.

Case study methodology has been used. The study has been carried out in 16 hospitals in Catalonia (Spain). Catalan hospitals have implemented a wide range of organizational innovations. The most highlighted innovations by hospital managers are in information systems, alliances, telemedicine and process reengineering. Information systems and alliances improvement are seen as key issues for coming years.

The analyzed innovations play a strategic role for both hospitals and Catalan government to improve their efficiency and investments in healthcare system. Results can also be used as a benchmarking tool for hospitals to improve their performance.

Key words- Organizational innovation, hospitals, value creation

Introduction

The importance of health care is growing in all countries worldwide. There is evidence that developed countries have gradually increased the proportion of Gross Domestic Product invested in improving their healthcare system according to OECD data (2009) (3.6% per year since 2003).

The aim of health care is to increase value for patients (Porter and Teisberg 2006). In order to reach this objective changes in the structure and organization are required and innovation can help in it. Innovation, defined in the Oslo Manual (OECD 2005) as the implementation of a new, or significantly improved: (1) product (good or service), (2) process, (3) method of marketing and (4) new organizational method whether it is in business practice, work organization or external relations (Freeman 1982; Drucker 1985; Porter 1985; Andreasen 1997; Peters 1998; Dosi 2000; Porter and Teisberg 2006).

Healthcare organization has been a widely-studied field, above all to increase and improve medical attention given to the patient. To this end, there are several studies which propose organizational models with a view to managing the changes produced in the structure when an innovation is adopted (Kilo 1999; Plsek 1999; Alemi 2000; Feifer et al. 2003; Bigelow and Arndt 2005). Amongst these, collaboration, sharing knowledge among all the organization's members, team work and the involvement of the management team and employees, stand out (Berta et al. 2005; Viens et al. 2005).

However, not all health organizations work and innovate in the same way. For this reason in this study we have focused on the organizational innovations carried out in hospitals. In them, apart from internal organization, which often has to adapt to financial changes, the relationship between patients and professionals who attend them is important. Existing studies in this field are centered on some of the hospital areas (Vaughn et al. 2002; Greenberg et al. 2006), on specialized hospitals (Hickey 1995; Yee et al. 2001) or only on innovations in healthcare organizations which allow health policies on a regional level to be put into practice (Dobbins et al. 2002; Gagnon et al. 2006).

Despite the importance of organizational changes in hospitals, there is little literature which makes reference to the analysis of these innovations in all areas of hospitals. In this context, the main aim of this article is to study the most highlighted organizational innovations carried out in hospitals. In particular, a sample of hospitals from Catalonia (Spain) has been analyzed, along with their strategies for adapting to current characteristics of the healthcare sector: a patient-oriented service, lack of physicians, changes in the financing system, etc.

In the following section, literature is reviewed. The methodology used to carry out the field study is presented in section 3. The discussion of the results obtained and conclusions can be found in the final sections.

Organizational innovations in healthcare

According to Otte et al. (2004), in the future, hospitals should be able to adapt quickly to changes in healthcare policies in order to be competitive. Some hospitals have already begun to make changes in structure and management, but it will be necessary to apply different organizational innovations in order to face the future.

The present study will focus on organizational innovations, given their importance in making an organization, a hospital in our case, more competitive and enabling it to offer a more patient-oriented service (Porter and Teisberg 2006). There are several types of innovations and the type of hospital is also relevant. The difficulty in separating the organizational innovations from the technological ones has to be taken into account.

In order to organize the field study, it was necessary to classify the organizational innovations detected in literature. The classification is not thorough and there may be others, but with regard to the reviewed literature, the innovations

have been classified in 4 main areas. These areas are: telemedicine, information systems, process reengineering and alliances.

a) Telemedicine

It consists of information and healthcare data exchange through organizations and people (Deluca and Enmark 2000; Menachemi et al. 2004). Some studies carried out on the implementation and evaluation of the system show the positive impact on the efficiency of the organization and on the satisfaction of internal and external users (Reijonsaari et al. 2005).

b) Information systems (IS)

System of persons, data records and activities that process the data and information in a given organization, including manual processes or automated processes (Langefors 1973; Ciborra 2002). They are important in all areas of healthcare organization. Their implementation has come up against initial barriers (Wainwright and Waring 2000) which disappear or fade when the first results and benefits of their implementation are analyzed.

c) Alliances

An alliance can be defined as two or more hospitals pool resources to achieve a long-term purpose not possible by one hospital (Zuckerman and D'Annunzio 1990). The creation of networks via alliances among hospitals is important and is considered a competitive advantage factor for the future. The reason for the creation is because one hospital needs a type of service that does not have, and that another does. The advantage is created by cost reduction in the offer of services and in diversification of risk. Moreover, the alliance permits a greater specialization of the network institutions, increasing the diversity of services offered to provide a better medical assistance quality. Specialization also allows a certain type of patients to be attracted, an important factor in a future characterized by per capita financing (Cardwell and Bolon 1996; Wells et al. 2004).

d) Process reengineering

Process reengineering is defined according to Hammer and Champy (1995) as "the fundamental rethinking and radical redesign of business processes to achieve dramatic improvements in critical and contemporary measures of performance, such as cost, quality, service and speed". What is gained is the capacity to work more efficiently, to incorporate team work, and to focus attention

on the patient rather than on the process (Probert et al. 1999; Bigelow and Arndt 2005).

Aim and methodology

The main aim of this project is to study the organizational innovations carried out in hospitals in the last 3 years. The methodology used has been the case study, widely used in the study of organizational innovations in hospitals (see, for example Probert et al. 1999; Stanton et al. 2004; Reijonsaari et al. 2005; Caruthers et al. 2006; Stefanou and Revanoglou 2006). The main reason has been the importance of knowing in-depth each organization under study, obtaining qualitative information from all hospital managers, difficult to obtain in a survey item evaluation report, for example.

The study belongs to a more wide-reaching project in which were analyzed different innovations implemented in Catalan hospitals belonging to the Public Use Hospital Network (XHUP) in the region of Catalonia (Spain). Catalan healthcare system is unique because its financing model is mixed, which means that there are public and private hospitals, but some private hospitals have an agreement with the XHUP. These hospitals provide medical assistance to patients from the public sector and the regional government pays the expenses.

In the questionnaire, managers were asked about technical, organizational and service innovations implemented in the last 3 years and those planned for the future. The survey had two parts: the first were open questions and the second was a check list. Focused on organizational innovations, interviewees were asked about: medical assistance processes, organizational structure and human capital.

Regarding questions on an organizational level, of our interest, they were about the four areas mentioned before: (1) alliances, if the hospital created alliances with other hospitals, by sharing services or professionals, (2) information system, if it had electronic medical records, (3) telemedicine, if the hospital exchange images with other hospitals to improve the diagnose, and (4) process reengineering, if it had been carried out in any unit.

With regard to the sample chosen for the study, it is connected to the hospital level. In the Catalan healthcare system, hospitals are classified into four levels according to the complexity of diagnoses and treatments carried out by the hospital. In the first one, there are small or isolated hospitals in which few specialties are treated. In the second level, there are basic general hospitals, those that

cover the usual requirements of the population. The third level, are reference hospitals in which practically all health problems can be cured and lead to recovery. Finally, there are the high technology hospitals, which treat specific illnesses demanding very specialized technology (Generalitat de Catalunya 1999).

In the case under study, the sample is made up of 16 hospitals, a representative number of the hospital population belonging to the XHUP (31%), as it allows us to gain an insight into the current and future state of organizational innovations in hospitals in Catalonia. Regarding hospitals levels, 3 are from the first level, 9 belongs to the basic general level, and 4 are reference hospitals. No high technology hospitals were selected, as it is difficult to compare them with the rest of the hospitals of the sample.

Results and discussion

The results of the case study have been classified according to the 5 previously mentioned innovation areas.

a) Telemedicine

Two types of telemedicine have been identified between hospitals and: patients and other hospitals (Figure 1). Only one of the hospitals is providing telemedical assistance services to its patients, although this tendency is growing in all hospitals.

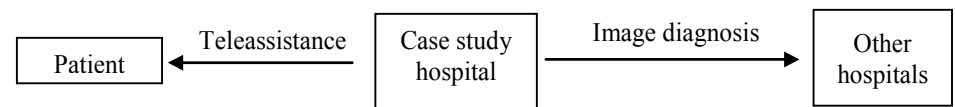


Figure 1. Types and relations of telemedicine

Telemedicine between hospitals is the most frequent. This is based on image diagnosis. For many hospitals it has been the solution for the lack of specialists in certain services, and has also been the solution when deriving patients to other centers. Its evaluation is very positive and 10 hospitals out of 16 of the sample carry out this type of telemedicine. The tendency is also increasing due to good results and participant satisfaction.

b) Information systems

Information systems are one of the most important aspects for Catalan hospitals (Figure 2). All hospitals have ERP management systems, despite being in different stages of development and implementation. In this case, there are hospitals which stress compatibility problems with other systems in the hospital, between hospitals, and between the hospital and the primary care. The ideal would be to create a homogeneous network where all hospitals would be connected, promoting the possibility to share patient information. Six hospitals of the sample have intranet where workers have access to requested information. Also important is the Call Centre (present in 2 hospitals), a system whereby all calls made to the primary care areas are centralized in the hospital.

With regard to medical records, 14 out of the 16 hospitals have started to work on them, but the development rate is different in each one. In this context, the development of systems goes from hospitals that have no electronic medical records system, despite having computerized reports and digitalized images, to hospitals that practically work without paper and have computerized all medical assistance and administrative information.

About pharmacy information systems, each hospital has developed the system which best adapts to its needs, even though these are few. In the sample, only five hospitals have developed this system. In addition, the number of hospitals with electronic prescribing systems is growing.

Concerning medical assistance, patients are attended by doctors and nurses who use tablet or palm computers in two hospitals, in order to transfer information to the medical record easier. In primary medical assistance, the connection to the hospital through IS is something highlighted by 7 hospitals, and is evaluated as positive, although there are still very few.

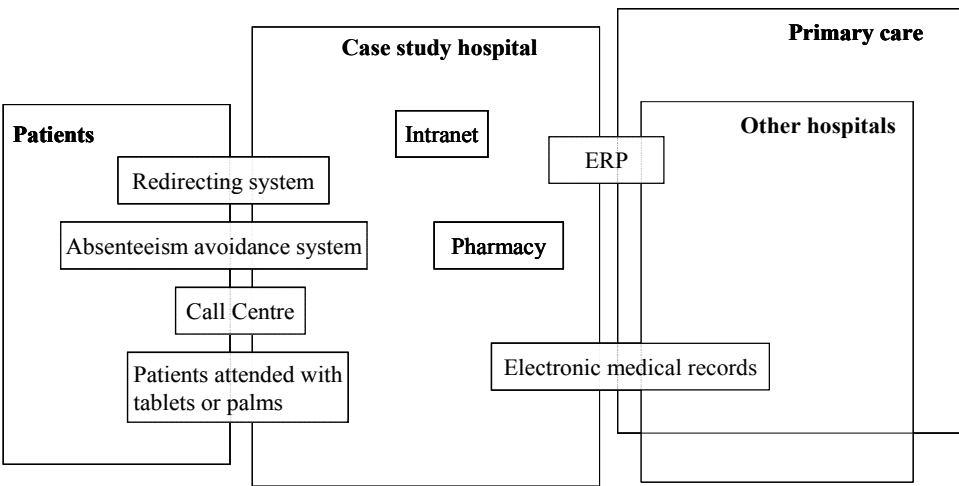


Figure 2. IS types and relation

In one hospital of the sample, two systems which permit connection with the patient have been developed. One of them is the redirecting system for the outpatient department, a device that, on inserting the healthcare card, the patient is informed about which consultation to go to and at what time. In this way, mistakes are avoided. The other system controls absenteeism in doctor's appointments by sending a text message to the patient's cell phone as a reminder of the appointment.

c) Alliances

Alliances among different levels of the healthcare system, different regions in the same country and among other hospitals have been mentioned by 12 hospitals, but mainly by the first-level hospitals (Figure 3). They create them in order to be able to derive patients to other centers, as it is sometimes quicker to derive them to other regions rather than to hospitals within their own region.

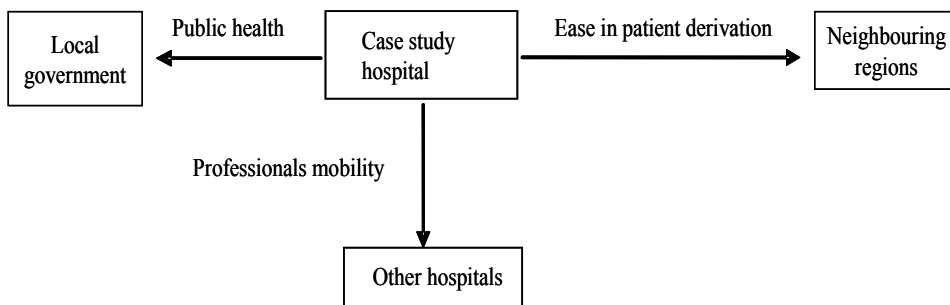


Figure 3. Types of alliances

Regarding alliances with reference hospitals, eight hospitals of the sample highlight them, above all the first-level hospitals. Related to these alliances, five hospitals have stressed the mobility of professionals. This is not very widespread yet, but hospitals practicing it are satisfied and the staff involved even more so, as they acquire more expertise and get to know different ways of working and developing team work skills, etc.

One of the hospitals explained its connection with town halls which asked for advice about different aspects related to public health: tattoos, body piercing,

etc. In this context, the importance of stakeholders for the hospitals should be stressed, since apart from offering their services in the hospital, they can help local authorities.

d) Process reengineering

This is the field where hospitals have worked most, as there are several initiatives to be highlighted (Figure 4). The most important innovations have been carried out in medical assistance continuity, and in the connection between the hospital and the primary healthcare center.

Regarding medical care continuity, 11 hospitals have regarded it as very important due to the evolution of the population. Under this concept, home medical rehabilitation, social day care hospital, readmission management in old people's homes, home hospitalization, the treatment of Alzheimer, etc., are to be found. However, integral attention of the illness is the most stressed with regard to process reengineering, because it is mentioned by 11 hospitals.

Attached to this type of healthcare is the connection of the hospital with the primary healthcare center, a point highlighted by 12 hospitals. It is very important to be able to train and help doctors and primary care personnel, because this allows the hospital to decentralize certain types of treatments and diagnoses in order to be able to specialize in other illnesses. Help and training in primary healthcare can be given in two ways: either specialists are incorporated in primary healthcare (a point highlighted by 2 hospitals), or consultancy services are given (mentioned by four hospitals). In the first case, the specialist works and attends patients in the primary care center, while in the second; the specialist helps the primary healthcare physician with difficult diagnoses.

Within the hospital, reengineering activities have been carried out in 15 of the 16 hospitals. Process organization has been important in 8 hospitals and two of these have highlighted matrix organization as the most suitable for their centers. Unification of services to increase efficiency and investment decisions also stand out here. The creation of different functional units, some of them very new, such as quick diagnosis, and other more widespread ones, such as the sleep unit, have also been mentioned by nine hospitals.

However, within the hospital, the most mentioned phenomenon (10 hospitals), has been the restructuring of the emergency unit, above all the triage system. Some use the computer-assisted triage system, but in others is carried out by

qualified personnel. And some hospitals highlight the importance of the role of primary healthcare as a first filter.

Finally, behind all this reengineering, the majority of hospitals mention the creation of multidisciplinary teams, which have been well received by medical personnel. At first, there has been some reluctance, especially among the different medical assistance levels, but the result has been very positive and satisfactory.

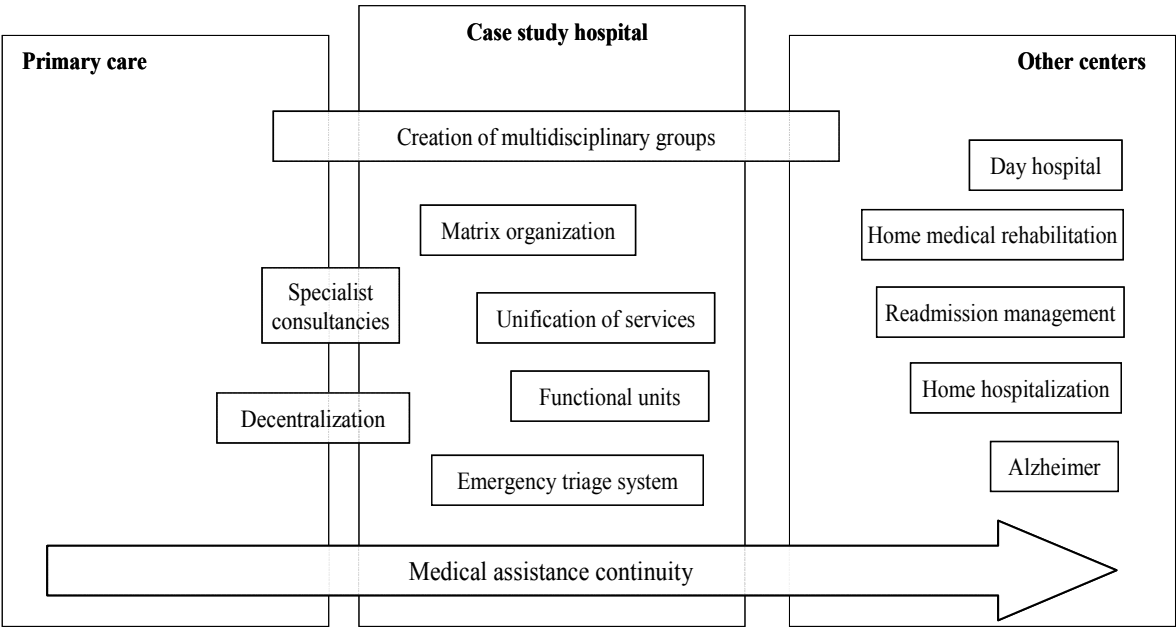


Figure 4. Types and relations of process reengineering

Conclusions

The main aim of the current study has consisted in summing up the most highlighted organizational innovations in Catalan hospitals. It has become clear that

Catalan hospitals are innovating and the innovations have been classified according to the 4 organizational areas detected in the literature: telemedicine, information systems, alliances, process reengineering.

Process reengineering has been the innovation with the highest effort last years. The improvements have been implemented in medical assistance continuity and in improving connections between hospital and primary care.

Information systems have been highlighted as the most important innovation for hospitals in the sample, independently of their level, although it is well worth mentioning that the rate and degree of development among hospitals is very different. In the future, IS will continue to be important as a tool of efficiency and communication improvement.

Telemedicine has been developed a lot among hospitals, related to alliances. All hospitals that have put it into practice give it a positive evaluation. At present, it exists mainly between hospitals, although it is also intended to be used with patients. According to Carter and Bélanger (2005), the latter will increase as the population gets used to using information and communication technologies as a habit.

Alliances are important for 75% of the hospitals, but they have been most highlighted by first-level hospitals, owing to their need to improve services offered to their patients and patient satisfaction. The most important features of alliances are medical personnel mobility and the increase in services offered to the population, which will increase patient satisfaction. Alliances will be important in the future because of the lack of medical personnel in the region.

Finally, it is important to emphasize that there are results from this study that do not stem from the hospital's initiative, but have been promoted by the region's government and affects the treatment hospitals give to them. Some of these are the adoption of a specific ERP system or per capita financing. This last initiative will motivate hospitals to improve in efficiency and cost reduction, although a cultural shift and global strategy are necessary to stand up to it confidently (Robbins 2003).

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Service Content and Context Affecting the Dimensions of Seamless Mobile Service Interface: Case Errors

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Abstract

The results presented in this paper outline, in which context the mobile Internet services are used and how services fall into different purposes of use. This paper focuses on identifying the errors, which people experience while using the mobile Internet in different contexts and for different purposes (content). The importance of use context should be seen in the case of mobile services, which are used via mobile devices. The real use environment is not taken too profoundly into consideration as usability tests are conducted. However, we did not find results supporting the claim that mobile Internet services are used in movement. We found three different types of errors: technology, service and user related. Based on Fixed-line users' beliefs on low error rates in the case of mobile Internet, we conclude that usability doubts are not hindering their usage of mobile Internet.

Keywords: Electronic services, errors, use context

Introduction

Concept of usability is often related in the human-computer interaction context (Podd 1995; Park et al. 1999; Catarci 2000; Battleson et al. 2001). Usability is a general term for ergonomic product quality and has been used interchangeably

with terms such as seamless user experience and user-friendliness (Dzida 1995). In the human-computer interaction literature, usability has been defined as ease of learning, efficiency of use, memorability, error rates and preferences (Hix and Hartson 1993, Nielsen 1993). Bevan (1999) has added dimensions of understandability and operability and Han et al. (2000) define perception/cognition and control/action as dimensions of product usability. So far the product's objective performance has been receiving more attention than subjective aspect of usability (Nielsen et al. 1994; Logan 1994; Nagamachi 1995; Hofmeester 1996; Jordan 1997).

Mobile Internet can be used in various contexts whereas the usage of fixed-line Internet is always environmentally pre-determined. Dias (1998) found that enjoyment has a positive effect on ease of use, which has a positive effect on perceived usefulness of a technology-based service. The results presented in this paper outline, in which context the mobile Internet services are used and how services fall into different purposes of use. This paper focuses on identifying the errors, which people experience while using the mobile Internet in different contexts and for different purposes (content).

Context affecting the seamless use experience of mobile services

Conventional usability testing does not pay much attention to real use environment (Lindroth et al. 2001). The importance of use context should be seen in the case of mobile services, which are used via mobile devices. The use environment can be very different from an office of any kind and yet it is normally an office environment in which the usability tests are performed. The creation and introduction of user-friendly products that meet the needs of intended users require designers and manufacturers to understand that a user's experience with the product in use is an outcome of interacting elements from the natural, socio-cultural and techno-physical environments (Babbar et al. 2002). Products must be easy to use and fit with the practices, activities and context of the consumer (Bevan 1999).

Context is a key issue in interaction between human and computer, describing the surrounding facts that add meaning (Schmidt et al. 1998). Location of use is central to the understanding of context but context also includes the collection of nearby people and objects as well as changes to those objects over time (Schilit et al. 1994). Kim et al. (2002) defined mobile context as any personal and environmental information that may influence the person when s/he is using mobile

Internet. This definition is in line with previous studies, which have defined contextual information as focusing on what is important to user tasks, user actions and user-specific situations (Esteba et al. 1999; Guanling et al. 2000). Kim et al. (2002) further divided the use context under personal and environmental context. The personal context refers to information (emotional or physical state) about the people who are currently using mobile Internet (Ebling et al. 1998; Pascoe 1998) and the environmental context refers to the circumstances surrounding the mobile Internet user (Day 2001; Schmidt 1998).

Content definitions and errors related in mobile service usage

Content indicates the relevance of a particular piece of information under a certain context. The dimensions of content include how effectively the information is given, how reliable the information is, and how often the information is updated (Tomonari et al. 1996). Kim et al. (2002) found that usability problems related to the content of mobile Internet occur most frequently and more often when users are stopping rather than moving.

Schoenbachler et al. (2002) found that customers' desire to shop for entertainment will affect motivation to buy from a channel. Content can be also classified as having hedonic or utilitarian values. If a customer has a specific goal for the use, her purpose of use is utilitarian. If a customer is using mobile service for fun, the purpose of use is hedonic. The division between hedonic and utilitarian purposes of use is not always clear. Suoranta (2002) found when conducting focus group interviews that what customers perceive as hedonic, was originally sold to them for utilitarian purposes and *vice versa*.

Errors as a usability attribute in our context is two-fold like efficiency of use. We refer to two kinds of errors, namely minor and catastrophic errors according to Nielsen (1993, 31). Minor errors hinder the use of the electronic services, but do not affect the outcome. Minor errors include typos, using wrong links, pressing wrong keys and so on. Minor errors are interrelated with efficiency of use (Nielsen 1993, 32). Catastrophic errors lead into a situation, in which the customer is unable to finish the use of electronic service in a desired way. Customers should be able to recover easily from minor errors but catastrophic errors tend to leave long-lasting effects.

Methodology

The usability attributes by Nielsen (Nielsen 1993, 26-37) were chosen as the starting point for our seamless use experience investigation as they constitute a generic model and fit in the service context too. The relation between usability and seamless use experience has been described in detail in Mattila 2004, Mattila 2005 and Mattila et al. 2006. Before the actual data collection, focus group interviews among expert users were conducted. The meaning of these interviews was to map the possible options for survey questions. The questionnaire was pre-tested on a group of 60 students and modified accordingly. A postal survey was conducted in May 2003. The sample was drawn from TeliaSonera¹ Finland's customer database. The sample was stratified in three active user segments of mobile users, fixed-line users and combined users equal in size depending on the main electronic service delivery channel in their use. The questionnaires were tailored *respectively*.

We call the customers, who did not own according to the database a private fixed-line connection at home, *the Mobile users*. The customers collected under this sample had the highest volume of mobile data transfers (GPRS, high-speed data) during the last six months in comparison to other customers in the database. They represented in every way the most active mobile Internet users the database had. *The Combined users* had a private fixed-line Internet connection in use at home. Further, their customer record showed active usage of mobile Internet (GPRS, high-speed data) connection and WAP-services during the last six months. The Fixed-line users owned a mobile phone and they were using regular mobile phone services such as SMS. There was no sign of Internet related activities during the last six months in their customer record. They had a private fixed-line Internet connection (mainly ADSL) in use at home.

¹ Based on the number of customers, TeliaSonera is the largest mobile operator in Sweden and Finland, the second largest operator in Norway, and the fourth largest operator in Denmark. TeliaSonera is also the largest fixed voice and data provider in the region with leading positions in Sweden and Finland and a significant position in Denmark. TeliaSonera International Carrier is the leading IP wholesaler in Europe with a 10% market share. TeliaSonera is listed on the Stockholm Exchange, the Helsinki Exchange and Nasdaq Stock Market in the USA.

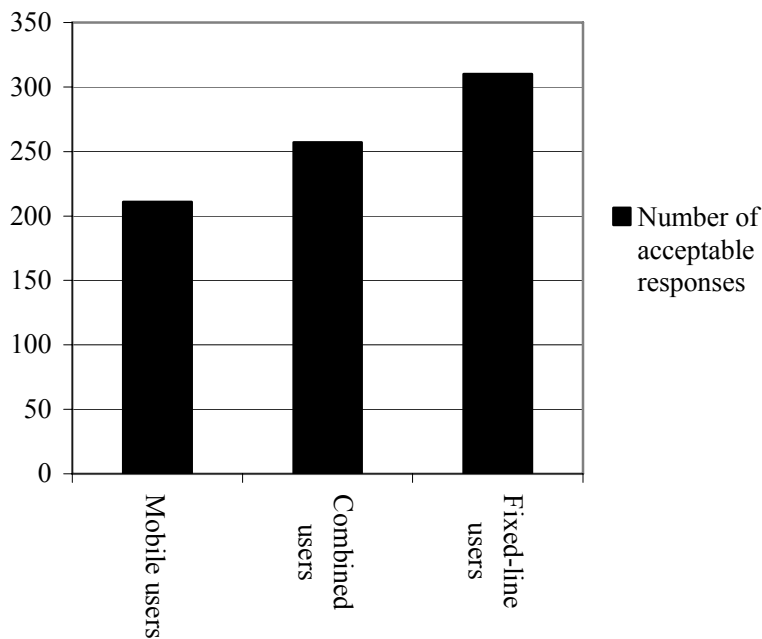


Figure 1. The division of response rate among the different user segments of customers

After a second follow-up, 778 responses were accepted under further analyses. The final response rate was 25.9%, which is acceptable according to economic science standards. The distribution of the responses in different user segments is presented in figure 1. A small minority of respondents reported using mobile phone (GRPS or high-speed data connection) as a modem in connection with a laptop as their primary electronic delivery channel. Among the Mobile users there were 16 such a customers and among both the Fixed-line users and the Combined users two in each segment. *For the analyses in this paper, the Combined users who were using mobile Internet as their primary service delivery channel, have been joined in the Mobile users and the ones using fixed-line Internet as primary service delivery channel, have been joined in the segment of Fixed-line users.*

The respondents were asked to fill out a structured questionnaire on a 7-point Likert scale concerning their preferences, experiences and beliefs towards usage of mobile and Internet services. Literature (Cooper et al. 1995; Järvenpää et al. 1997; Crisp et al. 1997) as well as prior conducted surveys guided us in de-

fining the scales to measure the customers' perceived seamless use experience. There were up to 27 questions in each tailored questionnaire. The Mobile users were answering mobile Internet specific questions whereas the Fixed-line users were answering fixed-line Internet specific questions. As the Combined users segment had knowledge on both types of electronic services and delivery channels, half of them received a questionnaire regarding the mobile Internet seamless use experience and the other half was answering to questions concerning the fixed-line services.

The survey questionnaire included questions concerning the respondent's basic demographic variables, psychological determinants such as level of innovativeness and mobile Internet usage, which was further categorized under four main themes: usage context, service content, seamless interface dimensions and use experience. To get a more accurate and objective results, the mean value of the respondents' subjective responses were calculated and used as the basis of our evaluation. Statistical methods such as ANOVA, crosstabulation, correlation coefficients, rotated factor analyses, Chi squares and finally structural modeling (AMOS) were applied to our data. Cronbach's alpha was used to measure the reliability of the results. Only results relevant to this paper are presented in here.

Results

The demographic profile of the respondents is presented in table 1. One third (33.9%) of the respondents were women and two thirds (64.8%) were men. The majority (59.8%) of the respondents were 25-49 years old and their annual household income (28.1%) before taxes fell within the range of 20 000 – 30 000 euros, which matches with the average annual income of two adults family in Finland (Statistics Finland 2003). Only every fifth (18.2%) of the respondents had two or more children living at home. The majority of all the respondents were workers (40.6%). This result is compatible with the result of the educational background of the respondents, which was in most cases (29.0%) vocational school. Obviously, Internet and its services are becoming available for all the consumer segments regardless of their annual household income or educational background.

Table 1. Profile of respondent

Demographic characteristics	Mobile users		Combined users		Fixed-line users		Total	
	No	%	No	%	No	%	No	%
Total	211	100.0	257	100.0	310	100.0	778	100.0
Gender								
Male	157	74.4	192	74.7	155	50.0	504	64.8
Female	54	25.6	55	21.4	155	50.0	263	33.9
Missing	0	0	10	3.9	0	0	10	1.3
<i>s.d.</i>	0.437		0.417		0.501			
Age								
Under 24 years of age	64	30.3	33	12.9	43	13.9	140	18.0
25-34 years	81	38.4	96	37.4	62	20.0	239	30.7
35-49 years	43	20.4	83	32.3	100	32.3	226	29.1
Over 50 years of age	20	9.5	41	15.9	104	24.5	129	16.6
Missing	3	1.4	4	1.6	1	0.3	8	1.0
<i>s.d.</i>	0.998		0.974		1.196			
Annual household income								
Less than 10 000 euros	33	15.6	21	8.2	43	13.9	97	12.3
10 001 – 20 000 euros	54	25.6	48	18.7	82	26.5	184	23.7
20 001 – 30 000 euros	59	28.0	87	33.9	73	23.5	219	28.1
30 001 – 40 000 euros	25	11.8	37	14.4	40	12.9	102	13.1
More than 40 001 euros	29	13.8	53	20.5	60	19.3	142	18.3
Missing	11	5.2	11	4.3	12	3.9	34	4.5
<i>s.d.</i>	1.650		1.875		1.741			
Marital status								
Married	27	12.8	101	39.3	128	41.3	256	33.0
Cohabitation	60	28.4	69	26.8	58	18.7	187	24.0
Single (incl. widow, divorced)	115	54.5	80	31.1	116	37.5	311	39.9
Missing	9	4.3	7	2.7	8	2.6	24	3.1
<i>s.d.</i>	0.940		1.154		1.397			
Number of children living at home								
0	165	78.2	152	59.1	176	57.0	493	63.4
1	21	10.0	45	17.5	71	23.0	137	17.6
2	14	6.6	29	11.3	42	13.6	85	11.0
3 or more	8	3.8	28	10.9	20	6.5	56	7.2
Missing	3	1.4	3	1.2	1	0.3	7	0.8
<i>s.d.</i>	0.791		1.074		1.019			
Education								
Elementary school	24	11.4	31	12.1	48	15.5	103	13.2
Secondary education	34	16.1	63	24.5	64	20.7	161	20.7
Vocational school	69	32.7	85	33.1	72	23.2	226	29.0
University degree	48	22.8	39	15.2	82	26.4	169	21.7
Other	33	15.6	36	14.1	41	13.2	110	14.2
Missing	3	1.4	3	1.2	3	1.0	9	1.2
<i>s.d.</i>	1.952		1.916		2.063			
Profession								
Leading position	10	4.7	20	7.8	20	6.5	50	6.4
Worker	96	45.5	116	45.1	104	33.5	316	40.6
Public servant	28	13.3	31	12.1	40	12.9	99	12.7
Other	71	33.6	85	33.0	144	46.3	300	38.5
Missing	6	2.8	5	1.9	2	0.6	13	1.8
<i>s.d.</i>	2.367		2.526		2.547			

Over third (37.3%) of the Mobile users use mobile services weekly and four out of five (83.8%) Fixed-line users use fixed-line electronic services weekly. The Mobile users think that they are mostly going to add using search engines (50.2%) via mobile Internet. The Mobile users also believe that they are going to use reservations (31.5%) and e-mail (25.0%) more in the near future via mobile Internet. The Fixed-line users were also asked how they feel about starting to use mobile Internet services in the near future. Every fifth (21.1%) of the Fixed-line users believed that it is likely that they will start using mobile services related in home and living, children and family, or traveling in the near future. The second most popular future mobile services among current fixed-line heavy users were search engines and real-time chat. The Fixed-line users also believed that they are likely to start using services for pleasure (comics, horoscope, puzzles) via mobile Internet.

Customers were asked to classify services according to their purpose of use. Even though it was not specified in which context the service was expected to be used, we have a reason to believe that because of the content of the questionnaire, the respondents may have been thinking using services in an electronic environment when they classified them according to the purpose of use. Some of the services such as real-time chat and remote diagnostics can be used only via electronic (or more specifically via mobile) channels. It was of an utmost importance to ask the customers their perception of the content, because previous studies have found that, what customers use for fun in mobile Internet has been classified as utility by the service providers (see for example Suoranta 2002).

There were no differences in opinion between user segments how they classified the services. Shopping was seen as purely hedonic by 12 percent of the respondents. If the customers were thinking about shopping through the Internet, this finding makes sense. Sports news was also classified as hedonic whereas news in general was used for more utilitarian purposes. The mobile Internet services with the most hedonic purpose of use in the minds of the customers were: real-time chat, relationship, downloaded services, gambling and games (see figure 2). The mobile Internet services with the most utilitarian purpose of use in the minds of the customers were: search engines, remote diagnostics, traveling, finance, e-mail, health, career and education, news and reservations. The content of the mobile Internet services was seen more utilitarian than hedonic. This finding is challenging the general opinion, which relates the use of mobile Internet services more often in hedonic purposes than utilitarian ones.

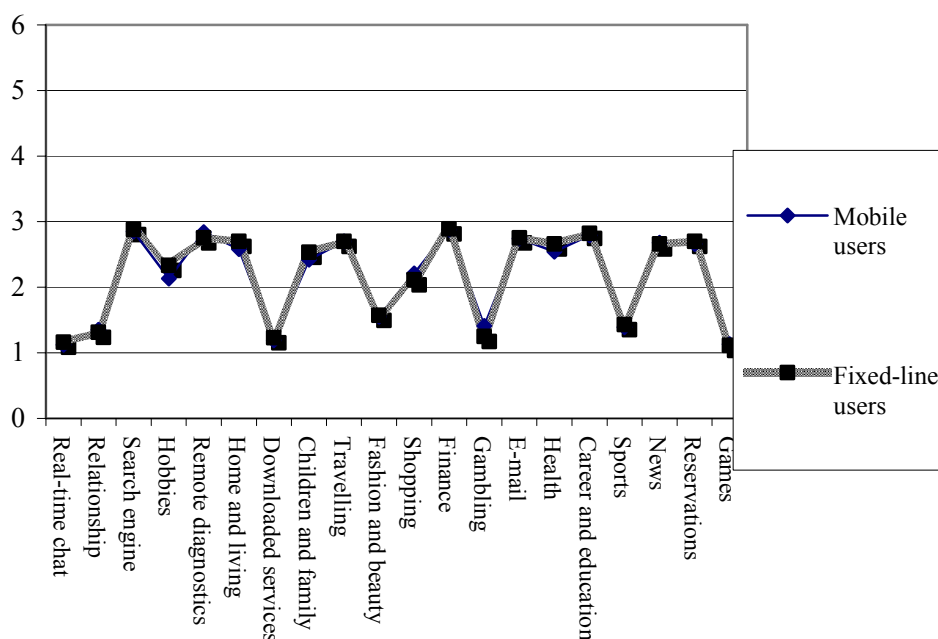


Figure 2. Service contents according to purpose of use(0 = purely hedonic ... 6 = purely utilitarian)

The customers were asked what is their *primary* channel in use to access a list of services. They were given several channel options (mobile Internet, fixed-line Internet, mobile phone as a modem, PDA, self-service, personal service) to choose from. The most popular service delivery channels were electronic, which is no surprise knowing the sample structure. Even the heavy users of mobile Internet services use more fixed-line connection than mobile Internet connection. In fact, the Mobile users use fixed-line Internet more for the needs of home and family and shopping than the Fixed-line users themselves (see table 2).

Table 2. Delivery channel in use depending on the service content

SERVICE CLASSIFICATION: Purpose of use (content)	DELIVERY CHANNEL IN USE	Mobile users	Fixed-line users
Relationship (e.g. dating services)	Mobile Internet	29.4 %	10.1 %
	Fixed-line Internet	51.7%	68.7 %
Search engines	Mobile Internet	12.1 %	0.7 %
	Fixed-line Internet	76.3 %	94.4 %
Hobbies and leisure time	Mobile Internet	17.6 %	8.7 %
	Fixed-line Internet	62.2 %	69.1 %
Communication	Mobile Internet	18.3 %	4.2 %
	Fixed-line Internet	67.0 %	91.3 %
Home and family	Mobile Internet	13.5 %	12.1 %
	Fixed-line Internet	54.7 %	51.0 %
Shopping	Mobile Internet	4.3 %	2.8 %
	Fixed-line Internet	38.0 %	32.4 %
Games	Mobile Internet	26.5 %	4.4 %
	Fixed-line Internet	48.8 %	71.1 %
Financial services	Mobile Internet	9.4 %	0.7 %
	Fixed-line Internet	61.3 %	83.5 %
Career or studying	Mobile Internet	6.8 %	2.4 %
	Fixed-line Internet	69.9 %	73.7 %
News	Mobile Internet	21.7 %	2.0 %
	Fixed-line Internet	52.2 %	72.9 %
Entertainment	Mobile Internet	10.7 %	1.7 %
	Fixed-line Internet	58.0 %	61.1%
Reservation	Mobile Internet	12.5 %	9.1 %
	Fixed-line Internet	52.3 %	53.8 %

The rates of shopping were low for both user segments and via both channel options. Mobile Internet seems to be used more for hedonic purposes such as relationship and games and less for utilitarian purposes such as career or studying. News makes an exception as they were classified as having a utilitarian purpose of use and yet they are used actively (21.7%) also via mobile Internet. This can be explained by the ease of use related in mobile news services. Most operators offer WAP-enabled news services, which are build in the mobile phone menu.

Despite the common belief that mobile Internet services are used in movement, we did not find results supporting that claim. It appears that even though the newest versions of mobile phones have calorie meters, thermometers and other features for use when exercising, customers have not adopted using mobile services when actually moving or exercising. Over half of the respondents (50.5%) never used mobile services in movement. However, some respondents (17.0%) reported of using mobile Internet services among other people. It is common in Finland that whenever people get together, somebody starts showing new features and mobile Internet services with his or her phone. Further, the mobile Internet games are often played with several players as teams, which may require usage among people. Over half of the respondents (53.6%) informed that they never use mobile Internet services with children. We found this surprising simply because of our impression from real life situation we have observed in playgrounds, and further investigation revealed that this finding was because of most of the respondents had no children living at home. However, majority of the respondents (58.1%) who had children did also use mobile Internet services with children.

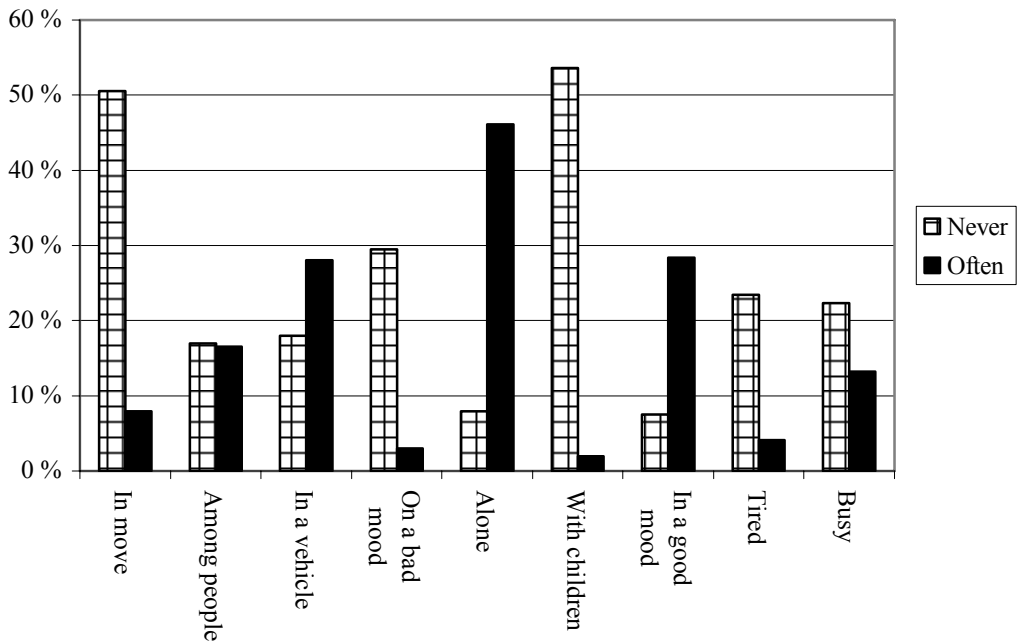


Figure 3. The use context of mobile Internet services

We found three different types of errors: technology (device or connection) related, service related and user related. No connection and dead battery were common technology related errors. If service was not operating or there were no suitable payment methods available, it was a question of service related errors. User related errors had to do with user's bad memory and computer/mobile device illiteracy. We found that technology related errors tend to be catastrophic and hinder the use completely. The user related errors tend to be milder and minor by nature. The service related errors can be very irritating and hampering the achievement of goals set on the service usage but rarely completely catastrophic. The findings are presented in table 3. The less the customers used a specific service delivery channel, the more they experienced channel specific errors (minus correlation coefficients on table 3). The Mobile users are identified with bolded figures and the Fixed-line users with italic.

Table 3. Errors related in electronic service delivery channels: MOBILE USERS and
FIXED-LINE USERS

CORRELATION MATRIX Service delivery channel in use ⇒ Errors in seamless use experience ↓	Mobile Inter- net	Fixed- line Inter- net	Mobile phone as a modem	PDA
Runs out of electricity in the middle of service usage	- .200**, -.230**		-.136*	
Unsuitable device in terms of service usage		-.199**		-.134*
The connection keeps breaking			.167*	
Service downloads slowly	-.152*, -.118*		.248**	
Compatibility problems between device and service	-.115**	-.145*		- .200**
No recollection about the needed information to operate the service			.202**	- .171**
Cannot find the appropriate keys	-.125*			- .306**
Service is not working	- .224**, -.163**	-.147*		- .249**
No suitable payment method available				- .251**
Data gets lost, no confirmation about a (un)successful transfer				- .198**

** Correlation is significant at the 0.01 level.

* Correlation is significant at the 0.05 level.

In the case of all the errors, over half (from cannot find the right keys 52.9% to service is not working 82.1%) of the Mobile users related them primarily in mobile Internet. The Mobile users related the second most errors in mobile phone usage as a modem and only few errors were related in fixed-line Internet in this user segment: 37.5 percent related an error of not remembering how the service is operated in the fixed-line Internet. It appears the Mobile users related catastrophic errors such as technology errors in their primary delivery channel, mobile Internet, and minor errors such as user specific errors in the secondary service delivery channel, fixed-line Internet.

Vice versa, the Fixed-line users related most of the errors in fixed-line Internet with three exceptions. They felt that mobile phone as a modem runs most often out of electricity in the middle of service usage (67.9%). They also experienced problems with unsuitable devices (49.4%) most often in the case of accessing Internet services via mobile phone as a modem. Also the Fixed-line users had a strong belief that it's difficult to find proper keys to operate mobile Internet services (61.5%) and that they don't remember how to use a fixed-line Internet service (64.6%). It is worth remembering that the Fixed-line users may have tried using mobile Internet services but are not currently actively using them. Based on their beliefs on low error rates in the case of mobile Internet, we conclude that usability doubts are not hindering their usage of mobile Internet. In fact, previous study has found that the Fixed-line users are satisfied with their current situation and simply have no reason to start using mobile services. As they have fixed-line Internet connection daily in use usually both at home and work, and if needed via mobile phone as a modem in connection with laptop, they already feel independent from time and place (Mattila et al. 2005).

Table 4 presents the significant variables of errors related in specific service contents. It appears that customers experienced most errors in services they used the most (financial services) and the least (shopping). The errors the Fixed-line users² relate in mobile Internet services are mostly based on their beliefs and perceptions instead of extensive use experience. There were only few significant correlations between service content and errors in the Fixed-line users segment. They related user specific errors (such as not remembering how to use the service) and therefore minor errors in hedonic purpose of use (traveling). In fact, traveling services were the mobile Internet services that the Fixed-line users believed to start using in the near future.

² 13.8% of the Fixed-line users were occasionally or seldom using mobile Internet services

Table 4. Dependencies between error types and service content: MOBILE USERS and FIXED-LINE USERS

CORRELATION MA-Service content ⇒ Errors ↓	Real-time chat	diagnos-tics	Shopping	Financial services	Gambling	E-mail	News	Traveling
Runs out of electricity in the middle of service usage		.305**	-.333**	.221*				
Unsuitable device in terms of service usage						-.220*		
The connection keeps breaking	.180*	.209*			.209*			
Service downloads slowly		.179*					.175*	.167*
No recollection about the needed information to operate the service								.170*
Cannot find the appropriate keys								.258**

** Correlation is significant at the 0.01 level.

* Correlation is significant at the 0.05 level.

There was no clear interdependency between service content and experienced errors in the segment of Mobile users. They seemed to relate both catastrophic (technology specific) and service specific errors in both utilitarian and hedonic purposes of use. However, the user specific errors did not have a significant correlation with the service content at all. For example, there was a significant correlation between breaking connection and remote diagnostics ($r=.209$, $p<.05$) in use as well as with real-time chat ($r=.180$, $p<.05$). News services were experi-

enced to download slowly, which may be due to the large pictures they usually entail. Suoranta (2002) found that customers would like to be able to choose, which pictures in news they want to download on their mobile device, if any. Mobile e-mail services were found having problems with unsuitable devices especially when used via Personal Digital Assistants (PDA). It goes without saying that accessing one's e-mail via PDA or any other mobile device cannot be as usable as via personal computer due to message contents (long, pictures, charts), smaller keys and screen, and one key sharing several alphabets.

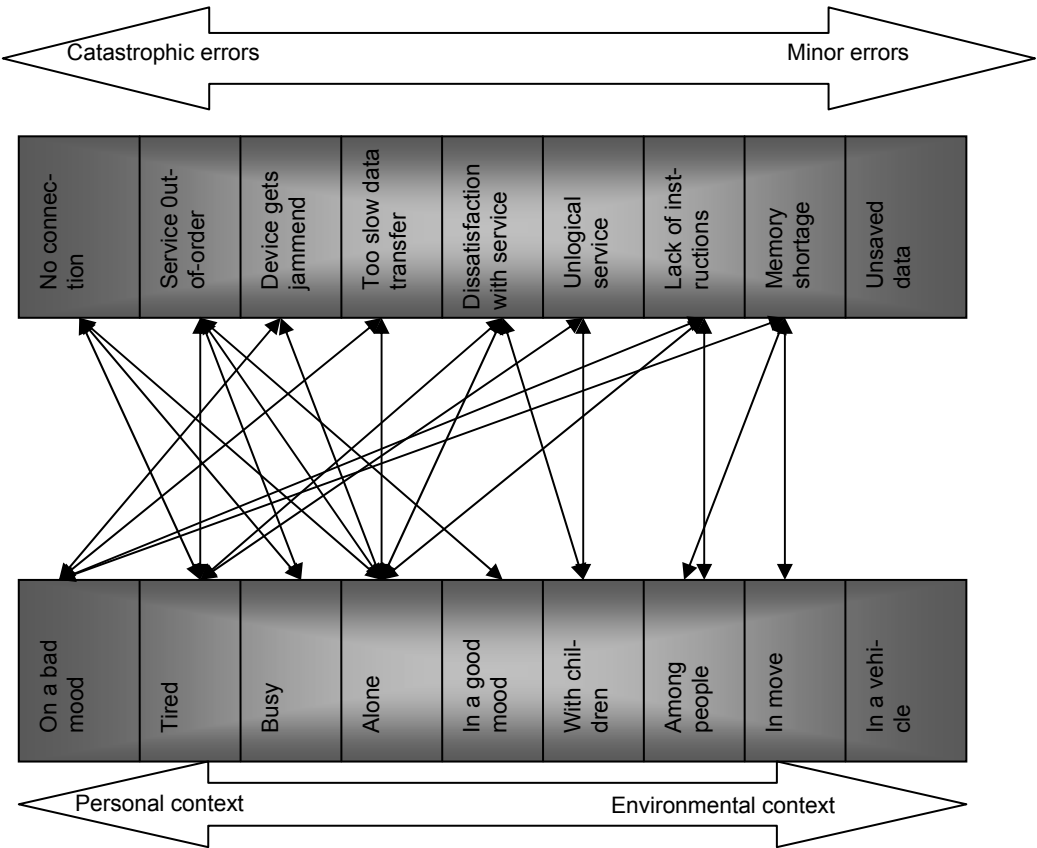


Figure 4. Dependencies between error types and use context

Catastrophic errors seem to relate closely in personal context whereas minor errors relate in environmental context (see figure 4). The figure entails all the re-

spondents who informed having used mobile Internet services. The correlation matrix in full is presented in Appendix. For example, there was a significant correlation ($r=.198$, $p<.01$) between being alone (personal context) and having no connection established at all (catastrophic technology specific error). Furthermore, there was a significant correlation ($r=.166$, $p<.05$) between lack of instructions (minor error) and using mobile services in a group of people (environmental context). There are more errors having dependencies with personal context of mobile Internet service use than with environmental context.

Even though mobile Internet services are often used in a vehicle, the respondents did not related any errors in such a use context. Perhaps they were feeling relaxed and using mobile services for hedonic purposes. They had not experienced any problems with unsaved data in relation to use context either. It goes without saying when you are on a bad mood, you are bound the experience more errors of all sort. When users were alone, they felt more errors than average. Using mobile Internet services in a group of people correlated with memory shortage ($r=.196$, $p<.01$) and lack of instructions ($r=.166$, $p<.05$). It is easy to understand the possible pressure from the reference group when one is showing them how to use mobile Internet services and realizes that there is too little memory on device to get the most spectacular features out. Tiredness seems to correlate with many experienced errors as well.

Conclusions

The results presented in this paper outline, in which context the mobile Internet services are used and how services fall into different purposes of use. We focus on identifying the errors, which people experience while using the mobile Internet in different contexts and for different purposes (content).

We found three different types of errors: technology (device or connection) related, service related and user related. We found that technology related errors tend to be catastrophic and hinder the use completely. The user related errors tend to be milder and minor by nature. The service related errors can be very irritating and hampering the achievement of goals set on the service usage but rarely completely catastrophic.

The less the customers used a specific service delivery channel, the more they experienced channel specific errors. In the case of all the errors, over half of the Mobile users related them primarily in mobile Internet. The Mobile users related the second most errors in mobile phone usage as a modem and only few errors were related in fixed-line Internet in this user segment.

It appears the Mobile users related catastrophic errors such as technology errors in their primary delivery channel, mobile Internet, and minor errors such as user specific errors in the secondary service delivery channel, fixed-line Internet. On the other hand, the Fixed-line users related most of the errors in fixed-line Internet.

Based on the Fixed-line users' beliefs on low error rates in the case of mobile Internet, we conclude that usability doubts are not hindering their usage of mobile Internet. There was no clear interdependency between service content and experienced errors in the segment of Mobile users. They seemed to relate both catastrophic (technology specific) and service specific errors in both utilitarian and hedonic purposes of use. However, the user specific errors did not have a significant correlation with the service content at all.

Mobile e-mail services were found having problems with unsuitable devices especially when used via Personal Digital Assistants (PDA). Catastrophic errors seem to relate closely in personal context whereas minor errors relate in environmental context. There are more errors having dependencies with personal context of mobile Internet service use than with environmental context. When users were alone, they felt more errors than average. Tiredness seems to correlate with many experienced errors as well.

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APPENDIX Correlation matrix related in figure 4.

CORRELATION MATRIX Service use context ⇒ Errors in seamless use experience ↓	In move	Among people	In a vehicle	On a bad mood	Alone	With children	In a good mood	Tired	Busy
Device gets jammed				.192**	.172*				
Too little memory on the device	.173*	.196**		.154*					
Speed of data transfer is lower than promised				.195**	.140*				
Connection cannot be established at all					.198**			.241**	.145*
Downloaded program is not working					.199**		.163*	.254**	.161*
Service is not what expected					.152*	.146*		.226**	
There is no logic in service performance						.155*		.163*	
Insufficient instructions on use of service		.166*		.152*	.157*				
Data which was entered didn't get saved									

** Correlation is significant at the 0.01 level.
* Correlation is significant at the 0.05 level.

Acceptance of Innovations - Developing the UR-TAM model

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Abstract

Information technology (IT) acceptance research has produced many models, each with a different set of acceptance determinants. In this paper, we first attempt to review user acceptance theory and then discuss the four common models. Second, this study also intends to assess the relationship of Users' Informational-Based Readiness (UIBR), the tendency to adopt Internet banking services as an innovation and whether or not it contributes to the prediction of an individual's intention (decision) to accept innovation as a new variable, thereby extending the former variables known as psychological determinants.

In order to achieve this, the study proposes a new model for studying the acceptance of technology. For this study the researcher matched and merged the relevant literature from behavioural studies, user's readiness and the diffusion of innovation studies to formulate a unified model that integrates the new introduced variables and produces a new model of user's Informational-Based Readiness. The variables used in this study are restricted to the scope of the research framework, which is a revised Acceptance Technology Model (attitude → Intention → Action), by including concepts of Diffusion of Innovation (innovation attribute and communication channel). This study has its own particular strengths and weaknesses and the researcher's goal is not to prove previous TRA and TAM false but as a trial to find an alternative theoretical formulation that better accounts for observed data. Therefore, this is a quantitative study ap-

proach of the individual level and examines a new model in the acceptance of Internet Banking services (IB). In order to assess the study's model we used data collected from 369 bank customers and the application of Internet Banking (IB) services was used to assess its acceptance. The study found that users' information readiness combined with innovation attributes are the joint determinants of the users' attitude towards the use of IB. The intention can explain the variance of usage and the intention as a function of attitude and users' information readiness to use IB. The work in this study is guided by the studies of Davis' (1989) and Ajzen and Fishbein (1980). Some limitations will be highlighted.

Keywords: Internet Banking, Adopter's Readiness, IS Theories

1 Introduction

Exploring user adoption of new technology, according to Hu et al. (1999), has received considerable attention in information system (IS) disciplines from both researchers and practitioners. Venkatesh et al. (2003) reported that, it is often described as one of the most mature research areas in modern IS literature and research. Many IT models explained the adoption of innovation, each with differing sets of acceptance determinants. Although several models of technology acceptance are found in the IS literature review, Taylor and Todd (1995) further differentiate the research on the determinants of IT usage into two approaches of research. The first approach employed intention-based models. The Theory of Reasoned Action (TRA), Theory of Planned Behaviour (TPB), Technology Acceptance Model (TAM) and the Triandis model, are examples of intention-based models. These approaches use behavioural intention to predict usage and focus on the identification of the determinants of intention, such as attitude, subjective norms, perceived behaviour control, influencing factors, and facilitation conditions. The technology adoption models proposed by the four theories are examples of studies based on behavioural based-intention. The second approach examined the adoption and usage of IT from a diffusion of innovation perspectives (Rogers, 1995).

Since the aims of this study are to look at determinants that accurately account for innovation's acceptance and studying them through behaviour model that assist in forecasting the individuals' decisions towards using that innovation (Internet banking). The pillars that underpin this study approach are based on the researcher's review of previous behavioural paradigms that exist in several IS Theories. The researcher noted that previous research in the discipline of IS adoption strived to identify a number of determinants from the Behavioural Sci-

ence perspective. Several studies focused attention on the study of the determinant in the mirror of psychological variables and several IS authors in studying innovation acceptance utilized among other theories – TRA, TPB, TAM, TRA, and DOI. Some researchers recently began to emphasize the importance of adding other non-psychological variables such as the adopter's experience (e.g. Brown, et al. 2004; Karjaluoto et al. 2002; Black et al. 2001; Tan & Teo, 2000), exposure (e.g., Chang, 2004, and Barbara, 2001), knowledge (e.g., Fredriksson, 2003) and awareness (Devlin and Yeung, 2003). This implies that previous research in IS discipline has established the need to examine other factors that influence an individual to accept innovation. By reviewing the existing intention-based theories such as TRA, TPB, TAM, and TRA this study noted a critical gap in modelling the behaviour to accept new introduced technology (innovation). The study explains the gap in light of the need to examine further factors beyond the psychological determinant. Also there is a need to differentiate intention behaviour from habit behaviour. Accordingly this study argues that psychological determinants can explain an individual's intention as well as another determinant called User Informational Based Readiness (UIBR). Also the link between intention and actual behaviour needs further clarification.

UIBR is drawn from the notion that the extensive information disseminated by capable and comprehensive IT Media in the digital era (e.g. Internet, TV, Books, and phones) means that certain individuals might have a greater chance of receiving such information compared to others. Therefore customers will have different levels of knowledge, experience, exposure, and awareness of Internet banking. Continuing this premise the study suggests that an individual's level of knowledge, experience, exposure, and awareness of innovation could work together in identifying the determinant of Technology acceptance, based on the effect of their intention to use or not use a particular innovation. The influence of UIBR on intention may contribute to the prediction of IB and extend the ability of theory performance. The critical gap is in the theory itself as none of the theories mentioned consider that an individual's behaviour may be different because the individuals are different in readiness to the innovation under investigation. The researchers in this study do believe that the behaviour of individuals in the digital era is different from those that lived in the previous five decades. The effect of social influence on human behaviour, as expressed in the Ajzen theory by the term Subjective Norm, could be assimilated into the new construct of individual readiness for two reasons. The first issue is that the Subjective Norm considers the moment effects (contemporaneous) at the time when the behaviour is investigated. While informational-based readiness is a norm stored in an individual's mind (instructions a person receives through exposure, awareness, knowledge

and learning, and experience through daily life). These instructions or norms are prompted or recalled when a related behaviour is examined. The second issue is that the Subjective Norm effect is usually sourced from the influence of humans (e.g., Peers, friends, family, and supervisors) while it is now debated that mass media has an enormous effect on an individual's behaviour compared to recommendations through the word-of-mouth channel.

2 Study Background

There is no single theory that stands out as providing the best comprehensive explanation of the factors influencing behavioural intention towards the acceptance of a particular technology. Therefore, more studies are necessary to identify the influence of different factors through the best of the more established theories. The conceptual justification that the study framework stands on is derived from two established theories – TAM and DOI. In this connection, those models represent a grounded basis to explain our study framework. This is in line with Rogers' (1995, p.301) argument that "one of the most means of conceptualising adoption and diffusion behaviour is first to view this behaviour in its most basic and elementary form, and then to develop some of the complex variable affecting it". The following section explains the justification for the framework used in this study based on the models in the theories of TAM and DOI.

The Theory of Diffusion of Innovation has received extensive research attention for over half a century. Conceptually, Prescott & Conger (1995) reported that the DOI theory appears to be the most applicable for information systems (IS). In addition it appears to require less organizational support and the extent of implementation appears to be related to non-traditional innovation characteristics such as functionality and efficiency. On the other hand, Prescott & Conger (1995) reported that the DOI is more affected by contextual and environmental variables and their differences might be better explained by economic influence. In the past few years, according to Moore & Benbasat (1991), researchers of IS have started to utilize theories of innovation diffusion, with major attention given to how potential users perceive information technology innovation adoption. In addition, Rogers (1995) mentioned that there is a continuum of the types of adoption decision ranging from individual choice to group decision but that the adoption decision is largely an individual one. In my opinion the reasons justify the consideration of the applicability of the theory to investigate the adoption of IB among social system members of Yemeni bank users. Evidence supporting

this point of view is the argument of Chan & Ming-te (2004) on the necessity to investigate "customers' needs and desires before introducing any banking strategies on the Internet". Also the customers' expectations and acceptance of the new technology and their beliefs in their ability to use it directly influence their need and desire to adopt it. Another facet of the DOI theory's usefulness can be observed in its flexibility and capability to be used in (IS) research, especially the pre-adoption case – to measure the willingness of the social system members towards acceptance of a particular innovation. Evidence to strengthen this point of view is derived from the theory itself. The theory offers two main constructed variables; relative advantages and complexity. Both variables represent the function of the potential users' attitude in Davis's Technology Acceptance Model (1989). Moreover, they are very useful in predicting the challenges, inhibitors, as well as the drivers behind innovation acceptance among the social system members. Empirically, recent research on IB conducted by Al-Sabbagh & Molla (2004) utilized the two variables to explain inhibitors and drivers of IB diffusion in Oman. The Theory of Diffusion of Innovation has, according to Chakravarty & Dubinsky (2005), chiefly considered major innovations as being disruptive to the behaviour of potential adopters. They demonstrated that the five key attributes of innovations, affect adopters' reactions to the innovation through three determinants: perceptions, attitude towards, and likelihood of the innovation investigated. With respect to the TAM, this study agrees with Chau & Lai's (2003) argument that the original TAM is insufficient because the technology setting of, and the transaction environment in IB, are drastically different when compared with conventional IT and the typical business environment. Concerning the overall development process in the case of developing countries, this study suggests utilizing concepts of the DOI theory, especially as the DOI views the individual's decision as a cumulative grade for society's decision on the adoption of any particular technology. Similarly, psychological concepts are still needed to understand the human behaviour towards the adoption. Therefore, the TPB theory will be more convenient to investigate the adoption of IB because it mirrors two main players in the adoption process – the adopters' psychological characteristics and the characteristics of using the innovation.

3 Literature Review

When studying the acceptance of innovation in the field of IS, earlier research used to head towards the use of either the design paradigm or the behavioural paradigm. The research in this paper will debate the behavioural paradigm in an attempt to expand the understanding of some of the information systems theo-

ries and find possible misleading gaps. In order to look more closely at the current misleading gaps found in theories of behavioural paradigm, this researcher will discuss some common theories used to serve in the acceptance studies in the IS field including TAM, TRA, and TPB. Before analysing these theories or models and evaluating the significance of these issues in determining the success of each model, it is useful to define some important terminology used in this study. Accordingly, “misleading gaps” refers to the inconsistent effect of the chosen construct; “acceptance” refers to the stage in which a technology is chosen for use by individuals or an organization. Similarly, “Innovation” is used with the nuance of a new or “innovative” technology being adopted. “Diffusion” refers to the stage in which the technology spreads to general use and application. This section deals with the adoption theories related to the diffusion of innovation and several technology adoption models.

3.1 Individual Behaviour

An individual’s behaviour is the key factor in many consumer studies that attempt to forecast how humans behave towards adopting innovations. In the past, the Abraham Maslow hierarchy of need theory claimed that individual behaviour is based on various desires and needs. On the other hand, IS researchers tried to understand human behaviour as a function of multiple interactions of variables related to an individual’s needs, perception, attitude, norms (internal factors), with variables that individuals have no control over (external factors). Recent IS research utilises several adoption theories and their extensions, where the researchers’ goals were to understand human behaviour towards acceptance of technology and innovation. Researchers in this study attempt to highlight four adoption theories that will assist in formulating a new model as follows:

Social Psychology Adoption Theories

Models from social psychology, such as the TRA, TPB, TAM, and Triandis (4 Theories) are generally used to investigate adoption studies. The theory of Reasoned Action (TRA) (Ajzen and Fishbein, 1980) and the Theory of Planned Behaviour (TPB) (Ajzen, 1985) in addition to the Technology Acceptance Model (TAM) were reviewed as a fundamental background for this study. The fourth theory found is that of Triandis (1980), but this theory is seldom used in IS and has not yet been used in IB adoption studies. A brief description of three of these theoretical models is presented in the following sections.

Theory of Reasoned Action (TRA), during the period 1967 to 1980, Ajzen and Fishbein worked on a model of the psychological processes of human behaviour that mediate observed relations between social influences, attitudes and behaviour called the Theory of Reasoned Action (TRA). According to Ajzen and Fishbein (1980), the structure of the TRA is divided into three main areas as depicted in Figure (1). The first area is intention, which is defined as the likelihood of doing something. The main premise of this theory is that a person's intention is the main predictor and influencer of attitude. The second area is attitude, which is defined as an individual's positive or negative feeling associated with performing a specific behaviour. The third area is the subjective norm, which is determined by an individual's normative beliefs, based on whether others think he/she should or should not perform that particular behaviour.

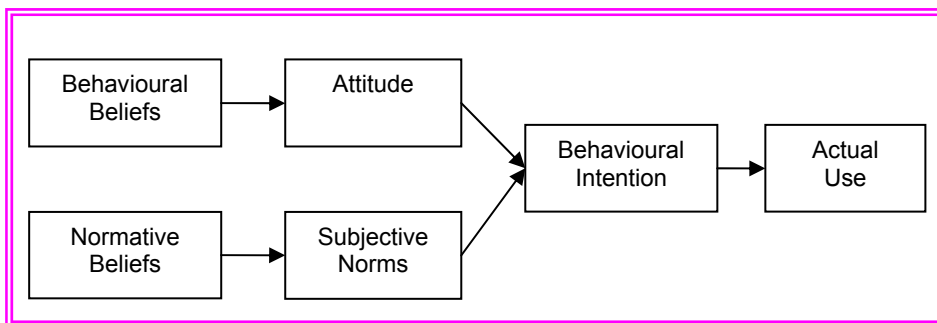


Figure 1. Theory of Reasoned Action (Source: Ajzen and Fishbein, 1980)

Figure (1) depicts how the TRA is designed to explain human behaviour (Ajzen and Fishbein, 1980) and consists of two factors that affect behavioural intentions – attitude towards behaviour and the subjective norm. Attitude is defined as an individual's positive or negative feeling towards performing behaviour. The subjective norm is the individual's perception of social pressure to perform the behaviour. The TRA has been widely applied in its original or extended form to predict online grocery buying intentions (Hansen et al., 2004), nursing (Ellison, 2003), the adoption of IT applications (Anandarajan et al., 2000) and more recently, to investigate the factors which influence the consumer's intentions to purchase services over the Internet (Njite and Parsa 2005). Karjaluoto et al. (2002) tried using the TRA to explore how different factors influence attitudes towards Internet banking (IB) and the use of IB in Finland. Furthermore, the TRA

was used as a basis to develop the theory of planned behaviour as well as for modifying the TAM model with SN as suggested by Venkatesh and Davis (2000) and Morris and Venkatesh (2000). It is important to note that the TRA capability in explaining behaviour were questioned because of the inconsistency effect of subjective norm (SN) in modelling technology acceptance in the IS context. Brown et al. (2004), in a comparative study of IB adoption in Singapore and South Africa, demonstrated that SN showed no influence on the adoption of IB in either Singapore or South Africa as hypothesised in their model. Liao et al. (1999) and Shih and Fang's (2004) findings showed that SN was not a significant determiner in either study.

Theory of Planned Behaviour (TPB), is an extension to the TRA theory and was developed to justify conditions where individuals do not have complete control over their behaviour (Ajzen, 1991, Ajzen and Fishbein, 1980). The theory of planned behaviour posits that behaviour is determined by the intention to perform the behaviour. The components of behavioural attitude and SN are the same in the TPB as in the TRA. However, in addition, the model includes behavioural control as a perceived construct. Therefore, in the TPB there are three constructs that determine the user's intention – attitude, SN and PBC. This theory has been used to study the adoption of different information systems such as spreadsheets (Mathieson, 1991), computer resource centres (Taylor and Todd, 1995), electronic brokerages by Battacherjee (2000), and negotiation support systems by Lim et al., (2002). Figure (2) presents the TPB as follows;

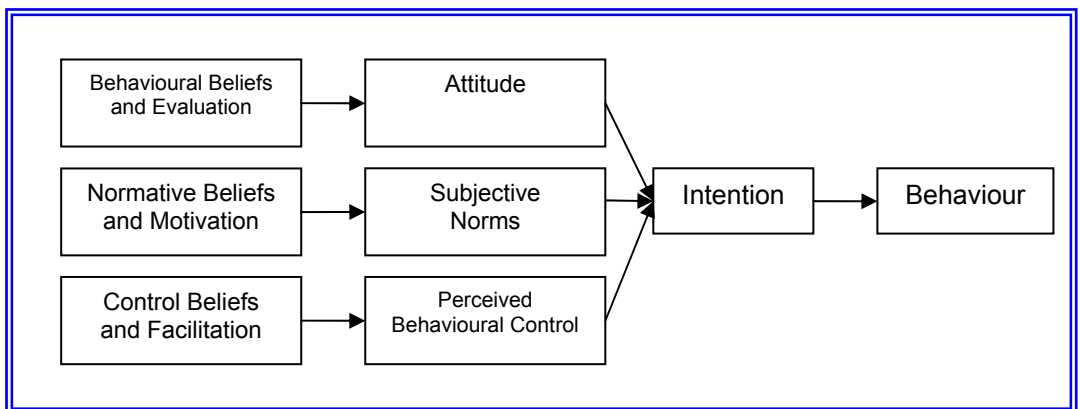


Figure 2. Theory of Planned Behaviour (Source: Ajzen, 1991)

Of the studies that employed the theory of planned behaviour (TPB), two of them used TPB to study intention towards adopting Internet banking. Liao et al. (1999) provided an example from the context of Hong Kong and Shih and Fang (2004) in the Taiwanese context. Based on these two studies, the findings demonstrated that the TPB was only partially applicable in predicting the adoption intention of virtual banking (Liao et al., 1999 and Shih & Fang, 2004).

Decomposed TPB Model, Taylor and Todd (1995b) suggested a new format of the TPB theory that is considered as helpful for a better understanding of the relationships between the belief structures and the antecedents of intention. Several researchers have examined approaches to decomposing beliefs into multi-dimensional constructs. The decomposed TPB model is inspired by Taylor and Todd (1995a; 1995b). This model provides three sets of belief structures in a multi-dimensional belief construct. These beliefs, according to Taylor and Todd (1995b), can be referred to as attitudinal beliefs, normative beliefs, and control beliefs and are related to Attitude, SN and PBC respectively. The decomposed TPB model has many valuable advantages such as it represents the TRA's core constructs. Also, it provides more attitudinal belief dimensions that are derived from Rogers' (1995) five attributes of innovation, rather than the two factors of ease of use and usefulness proposed in the TAM model.

Technology Acceptance Model (TAM), Davis et al. (1989) introduced the TAM to the field of IS research and it was first used to explain computer usage behaviour before becoming one of the most widely used and referenced theories in the context of technology acceptance (Davis, 1989; Legris et al., 2003; Gefen et al., 2003). Briefly, the TAM, as shown in Figure (3) posits two specific variables, namely perceived ease of use (PEOU) and perceived usefulness (PU). These determine one's behavioural intention to use a technology, attitudes towards adopting IT, and the actual usage. Intention is a measure of the strength of one's intention to perform a specified behaviour. The TAM model has received extensive empirical support through validations, applications, and replications (e.g. Mathieson, 1991; Plouffe et al., 2001; Legris et al., 2003).

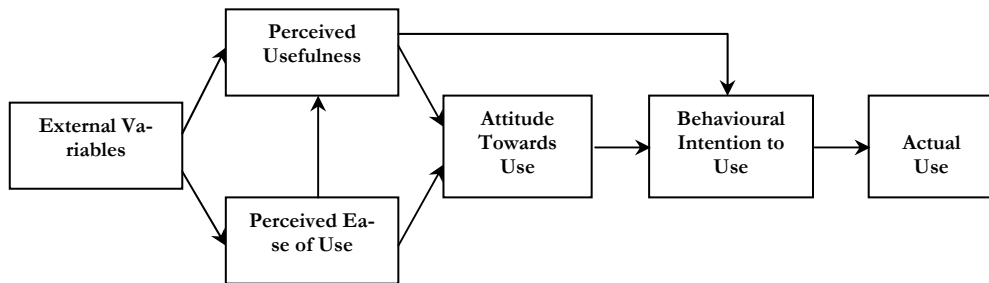


Figure 3. Technology Acceptance Model (Source: Davis, 1989)

In Figure (3), the sequence of the adoption process path, according to the TAM, can be noted as an actual system use (actual behaviour) that is determined by perceived usefulness (PU) and perceived ease of use (PEOU). The PU and PEOU relate to the attitude towards using behaviour that leads to intention behaviour and, finally, to performing the behaviour. Perceived usefulness is defined as the “prospective user’s subjective probability that using a specific application system will increase his or her job performance within an organizational context” (Davis, 1989). Further, the TAM assumes that perceived usefulness is influenced by the perceived ease of use, because other things being equal, the easier a technology is to use the more useful it can be. The perceived ease of use refers to “the degree to which the perspective user expects the target system to be free of effort” (Davis et al., 1989). The TAM suggests that the effect of external variables on intention is mediated by the key beliefs (i.e. perceived ease of use and perceived usefulness). These external variables might include system design characteristics, training, documentation and other types of support, as well as decision maker characteristics that might influence usage (Davis et al., 1989). On the other hand, external variables might manifest themselves in many different variables such as gender, past experience, transitional support, and SN (Legris et al., 2003). In their comprehensive study of the TAM, Legris et al. (2003) found that among 38 studies, 16 showed a significant positive correlation between perceived usefulness and behavioural intention, while 10 revealed that perceived ease-of-use was a significant predictor of behavioural intention. They also concluded that, overall, the TAM is proven to be a useful theoretical

model in helping to understand and explain use behaviour in IS implementation. However, they also suggested that, because of its parsimonious nature, the TAM should be integrated into a broader model that includes variables related to both human and social change processes and to the adoption of the innovation model. An example of a model that meets this call to some extent is the Perceived Characteristics of Innovating (PCI) model (Moore and Benbasat, 1991). The TAM model has been extended and modified to the TAM2, which includes two concepts of social influence processes and cognitive instrumental processes as determinants of perceived usefulness (Venkatesh and Davis, 2000). The second TAM extension incorporated perceived resources that refer to the extent that an individual believes he or she has the personal and organizational resources needed to use an IS, such as skills, hardware, software, money, documentation, data, human assistance and time (Mathieson et al., 2001). The third extension proposed by Pikkarainen et al. (2004) included four constructs, namely; perceived enjoyment, amount of information on online banking, security and privacy and quality of Internet connection. These could be evidence of the flexibility of such extensions that the original TAM extended to, and, also give evidence that studies based on the TAM theory have found that PU and PEOU are not the only predictors of technology acceptance. The TAM has been proposed to investigate different IS adoption. Examples of the studies that used the TAM model exist in literature in great abundance. For instance, research on the intention to adopt negotiation support systems by Lim et al., (2002), E-Commerce adoption by Gefen and Straub (2000), e-services adoption by Featherman and Pavlou (2003), predicting consumer intentions to use on-line shopping (e.g. Vijayasarathy 2004; Shih 2004), consumer acceptance of online banking (e.g. Pikkarainen et al., 2004) and recently, behavioural intention to use mobile banking (e.g. Luarn and Lin, 2005). The TAM is the most widely used in the studies of IB. Sathye (1999) pioneered the studies of IB adoption followed by Wang et al. 2003; Chau, and Lai, 2003; Pikkarainen et al., 2004; Chan, and Ming-te, 2004; Lai and Li, 2004. In comparing the existing research it leads one to conclude that all the studies aimed to investigate the influence of different external factors on the TAM's two main variables PU and PEOU. Existing research using the TAM model took three forms in investigating the user's adoption of a particular technology. In one of these, the researchers designed their model to target the user's attitudinal behaviour towards IB adoption such as Chau and Lai (2003) and Lai and Li (2004). In the second form, researchers went further to investigate factors influencing users' intentions to use IB such as Wang et al. (2003), Chan. and Ming-te (2004) and Lai and Li (2004). In the third one, re-

searchers were concerned with investigating factors influencing the actual use of IB such as Sathye (1999) and Pikkarainen et al. (2004).

3.2 Innovation's Attributes (attributions)

Innovation's attributes is a new concept that is proposed by this study to refer to how much innovation's attributes agrees or disagrees to a person's wanted expectation. Davis's (1985) inaugural TAM, in investigating the acceptance of technology, focused on assessing an individual's attitudinal belief through two attributes of the innovation – how much individuals perceive it is useful and how easy it is for them to use. Davis's (1985) TAM paved the way for this study to argue that investigating the acceptance of innovation should not be limited to usefulness and ease of use; researchers have to look into the issue with a holistic view. Accordingly, this paper introduces innovation's attributes to represent the attitudinal beliefs and test the effect on attitude in a new behavioural model. In line with this, the theory of DOI introduced five variables developed to explore the diffusion of a particular innovation technology in a society. Rogers (1995)'s innovation variables are the most cited in information systems research pertaining to predicting adoption and examine its influence in the adopting rate. Innovation characteristics according to Agarwal & Prasad (1997), do explain acceptance behaviour. Lockett & Littler (1997) hypothesized on the perceived innovation characteristics based on the anticipation of the adopter of direct banking services. Moreover, Rogers (1983) indicates that, the perceived innovation characteristics explained 49 to 87 percent of the variance in the rate of adoption of various innovations. The five innovations attributes of Rogers (1983, 1995), which affect the rate of adoption of an innovation are: (1) Relative Advantage, (2) Compatibility, (3) Complexity, (4) Trialability, and (5) Observability. They are important determinants of consumers' adoption decisions (Black et al., 2001). Moreover, Bradley & Stewart (2003) reported that the characteristics of innovation not only influence its diffusion, but its aspiration, which includes achievement of competitive advantage, reducing cost and protecting the strategic position of adopter. Moreover, the perceptions consumers have about the characteristics of innovations, as reported by Gerrard & Cunningham (2003), are helpful in differentiating the adopters' and non-adopters' views as to who are more innovative, the adopters or the non-adopters. With respect to the five innovation attributes, Kautz & Larsen (2000) say that the better individuals' perceptions of these attributes, the higher are the chances of a successful adoption of an innovation. Furthermore, innovation attributes show the ways in which these understandings improve our capacity to take efficacious action to employ attributes of innovation

in our study as an indirect measure of attitudinal belief in IB use. However, although the dominant orthodox theories of the adoption of innovations stem from microeconomics, the theory of DOI has been widely applied to many health issues. It has been applied to AIDS research (e.g. Maguire, 2002), anti-smoking campaigns (e.g. McDonald, 2004; Pampel, 2001), paediatric primary care (e.g. Barth and Sherlock, 2003), applied nursing research (e.g. Lee, T-T, 2004), and anti-drug campaigns (e.g. Thomas, 2004), etc. Rural sociologists studied the diffusion of agricultural technologies in social systems. They used the model of diffusion and innovation such as the diffusion of palm oil by Chaudhuri (1994), the diffusion of innovation in the flour milling industry by Hayward (1972), etc. In addition, it has been successfully applied to specific information technology products such as Java software used in Internet and Intranet environments or hypertext environments (e.g. Burns, 1997; Zhang and Saboe, 2004). This study focuses on an individual's perception about the characteristics of innovation to technologies, mainly self-service based (Internet banking), as exploratory and predictive variables for user attitude and acceptance behaviour. In addition, this work will rely on perceived characteristics of innovation as a platform for developing a constructed measurement tool of innovation.

3.3 User's Informational-Based Readiness

In the previous section we discussed innovation characteristics while this section will discuss the characteristics of the individual. Both Innovation Characteristics and Individual Characteristics were considered by Prescott & Conger (1995)'s Diffusion and implementation Model. User's informational-based readiness is a newly proposed concept that has not yet been studied academically. Its focus is to identify the informational characteristic of the individual. In this circumstance, Informational-Based Readiness, refers to the potential adopters' assessment of their **awareness, information knowledge, experience and exposure** to the related technologies available or recommended by referents, which reflect their informational abilities to adopt or reject the innovation. In other words, user's or customer readiness refers to people's propensity to embrace and use new technologies of banking over the Internet for accomplishing their needs from the banking dealing. In this study, the User's Informational-Based Readiness construct is given the acronym UIBR. This construct aims to probe the potential adopter in terms of their informational capability and readiness for IB. In order to understand the potential adopters' readiness, this study suggests specific elements, namely awareness, knowledge, experience and exposure. In this study, the operational definition of UIBR is limited to those specified attributes.

This study argues that there is a relationship between the users' Informational-based readiness (UIBR) for the innovation and the behavioural intention as well as the attitude to adopt this technology. The innovation examined in this study is acceptance of Internet Banking services. Therefore, this argument is translated into a research proposition in order to be tested. "The variable that could contribute in predicting customer's behavioural intention to use IB is UIBR which included user's (Awareness, Knowledge, Experience, and Exposure) variables". In other words, this study argues that the more the customer is aware, knowledgeable, experienced, and has past exposure to using IB, the more likely that IB will be adopted. User's Informational Readiness as a new determinant of acceptance of the innovations should be considered by IS researchers for several reasons. First, adopters nowadays are different from adopters in the last two decades in terms of the vast amount and easily understandable information disseminated to people today. The people are also different in terms of their exposure and experience related to products that might have an effect on the speed of acceptance. Second, imitation learning, as related to the product of technologies innovation, gets people to easily move towards the acceptance of an innovation. With the advanced multiple channels of mass media technology, there is a substantial amount of information disseminated to the adopters, which plays a vital role in speeding up decision making and the behaviour formation of people. Similarly, the informational-based normative influence, according to Rogers (1995, p.199) occurs when potential adopters are aware of an innovation and are motivated to try it. In terms of the attitudes of bank customers towards objects, Machauer and Morgner (2001) described the formation of attitude as a customer-bank relationship, as it is a product of two attributes, namely goals and the knowledge or experience of customers.

3.4 Communication Channel (Subjective Norm)

Rogers' (1995) DOI posited that any individual's decision to adopt or reject an innovation is independent, but that it may still be influenced by the norms of the system and by communication occurring among members of the interpersonal network. SN reflects an individual's perception of social support for, or opposition to, his or her performance of the behaviour (Ajzen & Fishbein, 1980). Bearden et al. (1986) and Karahanna et al. (1999) categorized social influence (normative belief) into two types – informational-based influence and normative influence. According to Bearden et al. (1986) and Kelman (1961), both forms of social influence are thought to operate through the processes of internalisation, identification, and compliance. Bearden (1986) posited that the normative com-

ponent does not discriminate adequately between informational-based social influence and influence that is truly normative in nature. Rogers (1995) pointed out that individuals could actively seek information about an innovation after they are aware that the innovation exists and when they know which source or channel can provide further information about the innovation. Rogers (1995, p.192) said that the importance of different channels or information sources about the innovation is determined by their availability to the audience of the potential adopter. Informational influence, according to Bearden et al. (1986), occurs when individuals accept information as evidence of reality. In the diffusion of innovation literature, some researchers have focused on the process by which adoption occurs (Rogers, 1995). This approach, according to Rogers (1995) and Liao et al. (1997), asserts that the adoption of an innovation is primarily the outcome of a learning or communications process. The outcome of a communication process in this study refers to an individual's awareness-knowledge of innovation existence and its attributes (Aggarwal et al., 1998). In the two early stages of the adoption process, communication channels, according to Rogers' (1995), play different roles in creating knowledge versus persuading individuals to change their attitude towards an innovation. Here, it becomes clear that many potential adopters form their opinions of an innovation based on the information conveyed via the mass media and impersonal channels. Furthermore, Rogers (1995) and Aggarwal et al., (1998) posited that one method to speed up the process by which innovations are adopted is to communicate the information about the innovations more rapidly.

4 Methodology

A questionnaire was developed as the main instrument for the current study. The questionnaire, in addition to demographic and information about bank customer, elicits data on individuals' perceptions about Internet banking services, the possible referents that could be taken as influencers, and respondents' attitudes towards using IB services. The first issue of operationalising the constructs dealt with measuring the respondents' attitude towards using IB services and their intention to use. This was gauged based on responses to five statements meant for measuring intention and another four statements designed to measure attitude. Respondents were asked to rate their agreement or disagreement to each behaviour based on a seven point Likert scale. The second issue of operationalising the constructs dealt with measuring perceptions about Internet banking services using elements included in Rogers' literature review. These were developed from the five dimensions identified in Rogers' (1995, p.

218) theoretical framework called the five attributes of innovation (Appendix I-A). The third issue of operationalising the constructs dealt with measuring communication channels, which were determined by a scale adapted from Pedersen (2005); Battacherjee (2000) and Taylor and Todd (1995b). Data was collected via a self-administered questionnaire survey using convenience sampling. One thousand questionnaires were distributed to bank customers who were bank account holders in any of the 17 banks operating in Yemen. There were 471 responses received and thirty-five questionnaires were discarded due to incomplete responses.

4.1 Development of the UR-TAM Model and Questionnaire

The model consists of two independent variables – Users Informational-Based Readiness (UIBR) and Innovation Attributes (IA). These two variables jointly function as an intervening variable showing the attitude towards use, which in turn is a function of intention to use (I), which determines Actual Behaviour (AB), the dependent variable in the TAM model. Items on a seven point Likert scale are used as the research instrument, which was developed in consideration of TAM, TRA, and TPB. It consists of five sections displayed in Appendix I-A. They are: i) *Intention to Use*: (5 Items) consists of five items that together express the attitude of the respondent towards the use of the subject – Internet banking services; ii) *Attitude towards Use*: (4 Items); iii) *Informational-Based Readiness*: (4 components involving 18 Items); iv) *Innovation Attribute*: (4 components involving 20 Items) that together express the perception of the respondent on Internet banking attributes using Rogers' (1995) five attributes; v) *Actual Behaviour*: (4 items). The following diagram displays the underpinning conceptual framework

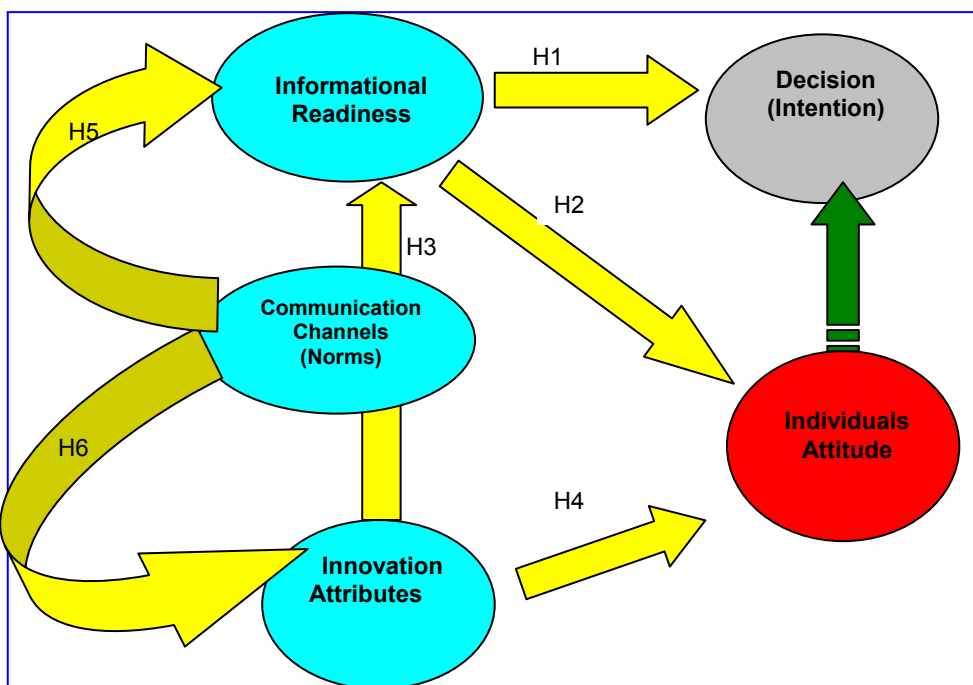


Figure 4. Conceptual Framework

Davis (1989) highlighted that system usage is often operationalized using self-reported measures. Therefore E-banking usage in this study is measured using four questions, with three of them posed to get the respondents' frequencies of use, 1) Internet banking, 2) SMS banking and 3) e-rail. Respondents were asked to "tick the box" for – Never, less than once a month, once a month, few times a month, a few times a week, several times per day. The fourth question was on a 7-point Likert scale with the adjective extremely agree and extremely disagree at the endpoints (See Appendix I-A).

4.2 Hypothesis:

The conceptual framework of the study displayed in figure 4 proposes some multiple relationships among research model's variables as follows:

H1: There will be a positive relationship between Users' Behavioural Intention (BI) towards the use of IB and Users' overall Informational-based Readiness (UIBR).

H2: There will be a positive relationship between users' attitude (ATT) towards the use of IB and Users' overall Informational-based Readiness (UIBR).

H3: There will be a positive relationship between Users' overall Informational-based Readiness (UIBR) and perceived attribute of Internet banking services.

H4: There will be a positive relationship between users' attitude (ATT) towards the use of IB and Users' Perception on Internet banking services

H5: The norms of all communication channels have an effect on individuals' informational-based readiness towards acceptance innovations.

H6: There is an association between communication channels and the attribute that individuals perceived about the innovation (Internet).

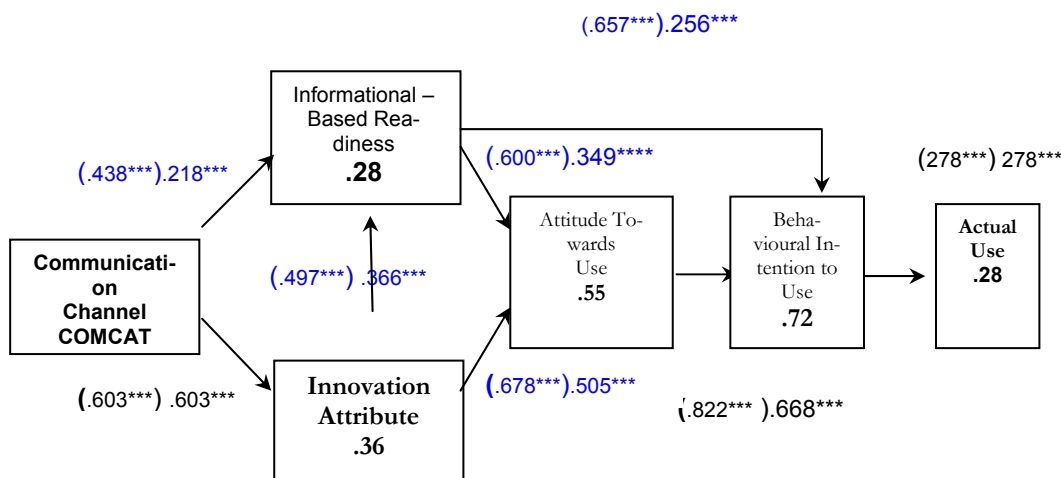
5 Data Analysis

In order to perform further analysis of the current study data, the researcher checked the constructs reliability. Therefore, reliability tests were performed to check for the internal consistency and the results are displayed in the following Table (1).

Table 1. Reliability Test

Variables	No. Items	Full Model Sample (n=369)	Sample 1 Split = 1(n=192) Time 1= January	Sample 2 Split = 0 (n=177) Time 2 = March
Usage	4	.720	.754	.673
BI	5	.914	.914	.916
ATT	4	.908	.899	.917
UIBR	18	.718	.735	.731
ATRB	20	.910	.910	.909
COMCAT	10	.900	.911	.888

The Usage scale with four-items scored a Cronbach alpha of 0.72 at the full set model (includes all cases for data collected in both Time 1 “January” and Time 2 “March”) while it is respectively 0.75 and 0.67 at time 1 and 2. The five-item BI scale achieved reliability scores of 0.91 (full), 0.91 (January) and 0.92 (March). The four-item ATT scale achieved an internal consistency of 0.91 (full) and 0.90 and 0.92 respectively for the two points of time – January and March. The eighteenth-item UIBR scale scored reliability coefficients of 0.72, 0.74, 0.73 Cronbach alpha. Respectively, the twenty-item ATRB scale achieved reliability coefficients of 0.91 at all points in time and the full sample set. Lastly, the ten-item COMCAT scale obtained a reliability coefficient of 0.90 at the full set model, 0.91 for time 1 and 0.89 for time 2. According to Davis (1989), these scale reliabilities are all at levels considered adequate for behavioural research. In order to examine such relationships among the variables in this study, as shown below figure (2) simplifies the explanation of the expected relationships.



Note: 1- *** p < 0.001, ** p < 0.01, * p < 0.05

2- Numbers in Parenthesis indicate zero-order correlation; other numbers are path coefficients,

3- Numbers in Bold R²

Figure 5. Informational-Based Readiness Model (UR-TAM)

Lee & Baskerville (2003) pointed out that the generalizability of an IS theory to different settings is important for basic research as well as for purposes of managing and solving problems that corporations and other organizations experience in society. In order for a Multiple Linear Regression equation to have utility for prediction it must be generalized beyond the sample that was used to derive it. Generalizability in Information Systems, according to Lee & Baskerville (2003), refers to the validity of a theory in a setting different from the one where it was empirically tested and confirmed. A theory that lacks such generalizability also lacks usefulness. Statistical sampling-based generalizability is a valid concept within its bounds, but its uncritical application as the norm for all generalizability can lead to an improper assessment of the generalizability of many research studies (Lee & Baskerville, 2003). A variety of methods are available for assessing such generalizability. In order to generalize our findings to populations beyond our sample, this study needs to aggregate evidence that the study's regression results are not limited to the sample used in estimation. Since the study does not usually have the resources available to replicate and validate our results, the study employs statistical procedures to assure that the solution that fits our data sample can be generalized. Accordingly, Hair et al. (2006, p. 259) suggested two approaches by which the researcher can assess the validity of the results, the first method included an assessment of adjusted R^2 and the second approach divided the sample into two subsamples (split-sample).

Adjusted R^2 , This study's first indicator of generalizability is the adjusted R^2 value, which is adjusted for the number of variables included in the regression equation. The adjusted R^2 is used to estimate the expected shrinkage that would not generalize to the population, because our solution is over-fitted to the data set by including too many independent variables. Hair et al. (2006, p.234) reported that adjusted R^2 is useful in comparing models between different data sets as it compensates for the different sample. If the adjusted R^2 value is much lower than the R^2 value, it is an indication that the regression equations may be over-fitted to the sample, and of limited generalizability. $R^2=.751$ and the Adjusted R Square $=.746$ are very close values, anticipating minimal shrinkage based on this indicator (Tabachnick & Fidell, 2007).

Cross-Validation, according to Malhotra (2004, p.522), is one of the approaches for evaluating the model, whereby the researcher examines whether the regression model continues to hold on comparable data not used in the estimation (Hair et al., 2006). The typical procedures to validate the study results

(model) obtained by using the entire data set, were guided by Malhotra (2004, p.523) as follows;

The researcher divides the sample randomly into two groups, which are the estimation sample and validation sample.

The regression is computed for the estimation sample and then used to predict the values of the dependent variable in the validation sample. SPSS provides us with Multiple R statistics for both the estimation and the validation sample.

The study then compares the regression equations derived for both samples. If the two regression equations contain a very different set of variables, this indicates that the variables might have achieved significance because of the sample size and not because of the strength of the relationship. Our findings' concerning the individual variables is that the predictive utility of these variables does not meet generalizability. R^2 , also called the coefficient of multiple determination, is the percentage of the variance in the dependent explained uniquely or jointly by the independents. If the Multiple R value for the validation sample is close to the value for the screening sample, the model is validated. In the double cross-validation strategy, the study reverses the designation of the screening and validation sample and re-runs the analysis. Table (2) displays results obtained from three samples used for purposes of the validation test and to analyse the UR-TAM capability in explaining the variances in the model's dependent variables as follows:

Table 2. Regression Results: determinants and Models

Equation	Full Model Sample (n=369)				Sample 1 Time 1= 1(n=192)				Sample 2 Time 2 = 0 (n=177)			
UR-TAM	b	R ²	Adj. R ²	Beta	b	R ²	Adj. R ²	Beta	b	R ²	Adj.R ²	Beta
Explaining Usage BI		.109	.107	.331***		.127	.122	.356***		.091	.086	.302***
BI= ATT + UIBR ATT UIBR		.718	.716	.668*** .256***		.702	.699	.655*** .254***		.735	.731	.684*** .256***
BI=ATT + UIBR + COMCAT ATT UIBR COMCAT		.730	.728	.613*** .230*** .134***		.724	.720	.608*** .201*** .174***		.740	.735	.636*** .248*** .089
ATT= UIBR + ATRB UIBR ATRB		.552	.550	.349*** .505***		.558	.554	.385*** .474***		.549	.544	.315*** .536***
UIBR=ATRB + COMCAT ATRB COMCAT		.277	.273	.366*** .218***		.299	.292	.347*** .260**		.254	.245	.381*** .175*
TRA		R ²	Adj. R ²	Beta		R ²	Adj. R ²	Beta		R ²	Adj.R ²	Beta
BI= ATT + SN ATT SN		.689	.688	.749*** .138***		.685	.682	.729*** .171***		.697	.694	.775*** .099*
A= $\sum b_i e_i$ $\sum b_i e_i$		.465	.464	.682***		.459	.456	.678***		.472	.469	.687***
TAM		R ²	Adj. R ²	Beta		R ²	Adj. R ²	Beta		R ²	Adj.R ²	Beta
BI = ATT + U ATT U		.705	.703	.647*** .244***		.704	.701	.612*** .286***		.708	.704	.692*** .191**
ATT = U + EOU U EOU		.582	.559	.483*** .321***		.574	.570	.392*** .417***		.559	.554	.561*** .240***
U = EOU EOU		.528	.526	.726***		.570	.567	.755***		.484	.481	.695***

Note: A= intercept, *** p <0.001, ** p<0.01, * p<0.05

The results shown in Table (2) show that; first, the study hypotheses are all supported by the data of this study for data collected in either time 1 or time 2. Sec-

ond, the correlations investigated and shown in figure (5) reveal adequate significant relationships among the study constructs. The intention-usage correlation obtained in this study of 0.36 at time 1 and 0.30 at time 2 is comparable to Davis's (1989) findings. The study data reveals that both users' informational readiness and Internet banking attributes are strongly correlated with users' attitudes towards using IB with coefficients ($r=0.60$) and ($r=0.68$) respectively. It reveals that the intentions are subject to change with time and those variables regarded as determinants of Behavioural Intention (BI) can explain the variance of BI increasingly in the feature.

Results

Explaining Usage (U), the relationship between BI and usage, measured at the full model of $n=369$, and the result shows that Intention (BI) has a significant relationship with usage ($r=0.28^{***}$). The intention was found to correlate with usage for the data set collected at the earlier point time 1, in January, ($r=0.22^{***}$) and the data collected at the later stage, the point time 2, in March ($r=.36^{***}$). The findings obtained by regressing usage on the URTAM variables (ATT, UIBR, IBATR and COMCAT), using both samples 1 and 2, indicate that intention mediated the relationships of these variables to usage. Inspecting the standardized coefficients, (Beta) shows that BI accounted significantly for explaining 33 % of the variation in the usage of Internet banking services.

Explaining Behavioural Intention (BI), as hypothesized in this study, both attitude and users' informational-based readiness to accept technology explained a significantly high portion of the variation (72 %) in BI regarding the application of the full set of data. Moreover, it accounted for 70 % of the variance at time 1 and 74 % of the variance at time 2. According to Davis (1989) TRAs (A and SN) accounted for 32 % of the variance at time 1 and 26 % of the variance at time 2 while TAM explained 47% and 51 % of BIs variance at time 1 and 2 respectively. Investigating the determinants of BI, ATT had a strong significant effect on BI ($\beta=.67$ full; $\beta=.66$ time 1; $\beta=.68$ time 2) and UIBR had a significant effect on BI ($\beta=.26$ full; $\beta=.25$ time 1; $\beta=.26$ time 2). Comparing this finding to TRA determinants, as highlighted by Davis (1989), BI's determinants suggested by this study have two advantages over TRA. First because they both succeed in explaining high portions and are consistent with the variation in BI. Second, the BI determinants of this study, both attitude and User' informational-based readiness, are shown to affect BI significantly, while SN in the TRA, according to Davis (1989), had insignificant effect in either time period investigated. With respect to the

TAM, the findings highlighted by Davis (1989) indicated that attitude had a smaller effect on BI in time 1 and an insignificant effect in time 2, while the current study shows that attitude had very strong significant effects for almost all time periods ($\beta=.67$ full; $\beta=.66$ time 1 and $\beta=.68$ time 2, respectively). The study's findings also reveal that, UIBR had a significant direct effect on BI ($\beta=.26$) and an indirect effect through attitude.

With respect to variable explaining attitude, The regression results reveal that both UIBR and ATRB, as determinants of attitude in the **UR-TAM** model, explain roughly 55% of attitude's variance for all time periods. The TRA in this study explains 47% of attitude's variance at the full time period, 46% at time 1 and 47% at time 2. Looking into the determinants of ATT, ATRB had a strong significant effect on attitude ($\beta=.51$ full; $\beta=.47$ time 1; $\beta=.54$ time 2) and UIBR had a significant effect on BI ($\beta=.35$ full; $\beta=.39$ time 1; $\beta=.32$ time 2). Both UIBR($r=.600^{***}$) and ATRB ($r=.68$) are strongly correlated with attitude. The UR-TAM significantly explained the portion of the variation, 28% in Users' Informational-based readiness, to use Internet banking services when applying the full set of data. Looking at the determinants of UIBR, ATRB had a strong significant effect on UIBR ($\beta=.37$ full; $\beta=.35$ time 1; $\beta=.38$ time 2) and COMCAT had a significant effect on UIBR ($\beta=.22$ full; $\beta=.26$ time 1; $\beta=.18$ time 2).

Conclusion

Mathieson et al. (2001) indicated that the TRA is a general theory of human behaviour while the TAM is specific to IS usage. The findings of this study are supported and guided by three specific theoretical models, – TAM, TRA, and DOI. In this study the researcher examines the impact of two kinds of variables on the usage of Internet banking. The user's internal beliefs represented by attitude and intention variables and the second type are the impact of external informational variables representing the user's readiness and the communication channel. TAM and DOI can fully cooperate to explain why people accept or reject an innovation. In view of this shortcoming, innovation attributes from the diffusion theory (Rogers, 1995), psychological variables from TAM and the UIBR newly proposed variable, would also need to be examined for further validation in different disciplines and contexts. The study's results yield major insights concerning the determinants of Internet banking by the proposed UR-TAM. It confirmed that a user's usage of Internet banking can be predicted from their intentions. On the other hand, a user's attitudes are, significantly, the primary determinant of people's intention to use Internet banking. The user's informational readiness to

use Internet banking is a significant determinant of the user's intention to use IB. On the other hand, the user's attitude towards using Internet banking services is jointly determined by the index of Internet banking attributes and the user's informational readiness. The study's findings has an implication for managerial practice by giving the signal to decision makers and practitioners to seek further information on how is user readiness to accept the technology that organization intends to invest in and introduce to customers. The present research implications are also relevant to the marketing area as they help determine whether the mix marketing strategies adopted are effective or not. The marketing mix, also known as the 4 P's of marketing, which is the combination of product, price, place (distribution), and promotion.

It has implications for increasing user acceptance to innovation because decision makers believe that the impediments of accepting new ideas by individuals are attributable to the lack of information on both the innovation availability and its attributes.

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End-Users' Satisfaction Attributes: An Approach to Assess Information System Performance in Firms

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Abstract

This study is an attempt to investigate the perceived performance of firms by utilizing an extension of DeLone and McLean's (1992) IS success framework, which incorporates performance as a function of end-user satisfaction and systems usage. To achieve the study's aim, the researchers use Martilla and James' (1977) 38 items to extract the Information Systems (IS) attributes that are applicable to the investigated companies. Also, the study's focus is to understand the system's usage based on the nature of use derived from DeLone and McLean's (2004) study. Therefore, an end-user satisfaction survey was carried out and targeted the end users of IS in the Multimedia Super Corridor (MSC) firms in Malaysia. A usable sample of 404 was achieved. Factorial validity was assessed, and then correlation and regression analyses were employed to test

the hypotheses. The findings revealed three IS attributes and four types of IS use. The findings also revealed that company's perceived performance is associated with end user satisfaction of IS.

Keywords: Importance-Performance Analysis (IPA), Use of Information Systems, User Satisfaction

1 Introduction

Understanding end-users' perception about their adopted Information Systems (IS) might assist operators and decision makers to understand the weaknesses and promises of IS. Therefore, examining firms' IS in the light of several identified attributes may provide more and clearer tools to understand and assess its performance. Researchers and firms should pay attention and utilize this approach because IS attributes (Dimensions), as highlighted by Martilla and James (1977), among others, obtained a link to the use of information systems as well as to user satisfaction. There are quite a number of researchers who attempted to measure IS success from various perspectives using various theoretical models. Davis et al (1989) introduced the Technology Acceptance Model (TAM), which is in a behavioural paradigm that attempted to explain the relationship between end-user beliefs about IS and system usage. In 1992, DeLone and McLean (1992) developed the IS success framework consisting of information quality, system quality, use, user satisfaction, individual impact and organizational impact. These two models (TAM and D&M) gained popularity in IS research and literature. Based on a review of the literature, Wu and Wang (2006) highlighted that the original IS success model still needed further validation; therefore, this study proposes a simplified model of DeLone and McLean to understand IS performance.

2 Literature Review:

2.1 System Use

End-users can be defined as the people who directly use the system by performing various work practices that prepare data and information for the system (Ozkan, 2006). Some IS researchers defined System Use as the measure of the frequency of using systems (Fan and Fang, 2006; D&M, 1992) or The extent of the system being used (Hellstén and Markova,2008). In other words, System Use is defined as recipient consumption of the output of an IS as well as means

to employ the information system (Roldán & Leal, 2003). Typically, system use was measured as frequency of use, time of use, number of accesses, usage pattern, and dependency (D&M, 2003). An e-commerce study conducted by D&M (2004) employed variable system use by focusing on the nature of use. It is quite obvious that a critical mass of members regularly using the Information Systems is necessary to convince potential users. In this study, the users of IS viewed not so much on how many users of the IS has as a whole, but rather on how much it is utilized from the personal network are using the IS.

2.2 End-Users' Satisfaction Attributes Measure

IS researchers turned to the efforts of psychologists to define user satisfaction in its larger sense, among them Bailey and Pearson (1983), who agreed to the definition that satisfaction in a given situation is the sum of one's feelings or attitudes towards a variety of factors affecting that situation. While Zviran, et al. (2005), viewed user satisfaction in terms of system use and acceptance as the practical measure of IS success. Apart from that, Gatchalian (1999) argues that end-user satisfaction is a measure of success in a highly competitive market and understanding the product's features and characteristics by the end-users is a serious requirement. Fan and Fang (2006), in their ERP acceptance model, define user satisfaction as user's subjective evaluation of various consequences after using ERP systems. In marketing research, Martilla and James' (1977) framework introduced a measurement of 38 statements to assist in understanding customer satisfaction. These statements will be employed in this study to identify grouped components. This will make it easier to examine the end-users satisfaction of the performance of Information Systems in an organization. Table (1) displays the coding and simple descriptive analysis to all the statements involved in this study. The end-users' satisfaction survey can capture some grouped attributes experienced through the use of Information Systems in the firm.

Seddon and Kiew (1996) Fan and Fang (2006) test the D&M model and results provide substantial support for the connections among system quality, information quality, and user satisfaction. Much of the previous research examines the success of IS in the light of users' satisfaction, which is a function with three qualities. These qualities to be addressed are the information, the system itself and the services produced by the particular Information Systems. In Information Systems, quality as a definition can be interpreted various ways, for this, Ozkan, (2006) indicated that quality is an empty statement without some indication of its

performance and applicability in the user environment. Ozkan (2006) highlighted, that quality is contingent and resides in the user's perception of the product. This suggests that success in understanding the end-user's satisfaction of IS is closely related to understanding the definition of quality.

2.3 Information Quality (IQ) Vs User Satisfaction

Information quality is defined by Hu (2003) as the quality of the information produced by a system concerning its concentration on information utilization or consumption. Furthermore, it is defined by features regarding the actual information that is presented by the information system (DeLone, 1992; DeLone, 2003, Aasheim, 2007). In the ERP acceptance model, information quality is defined as the user perception of ERP system's output in its reliability, accuracy, completeness, and consistency (Fan and Fang, 2006). According to Hu (2003), information quality also encompasses variables that are mainly concerned with the user's information consumption such as flexibility, and the degree to which the available information is presented. While, the e-Procurement Success Model projected by Vaidya (2007), comprised Transparency, Management Information and User-friendliness of catalogues. Findings from previous research indicated that IQ is positively related to user satisfaction when regarding PDA solutions and general information systems (Ellingsen, 2002; DeLone, 1992; DeLone, 2003; Almutairi, 2005; livari, 2005; Rai, 2002).

2.4 System Quality Vs User Satisfaction

DeLone, (2003) and Aasheim (2007), among others, highlighted that System Quality is recognized by technical features regarding the network and the IT equipment itself. Therefore, some of the fundamental facets of system quality found in previous research addresses features like reliability, response time, and accuracy, ease of integration, flexibility, and functionality (Hu, 2003). Accordingly, system quality has to be assessed from multiple considerations where reliability is essential, making system integration an important aspect of system quality (Hu, 2003). According to Roldán & Leal (2003) system quality refers to the desired characteristics of the IS itself, which produces the information and it is related to the quality of the IS output. In an ERP acceptance model, Fan and Fang (2006) define system quality as the user perception of measuring an ERP system in its flexibility, reliability, and accessibility. In the e-Procurement Success Model projected by Vaidya (2007), the system quality variable comprised

Ease of Use, System Availability, and Interoperability (integration capability). In other words, System quality concentrates on important characteristics or factors intrinsic to system design or implementation (Hu, 2003). Moreover, Roldán & Leal (2003) reported that, system quality of the executive IS exerted a significant positive influence on EIS end-user satisfaction.

2.5 Service Quality (SQ) Vs User Satisfaction

In an attempt to describe service quality, researchers find difficulty in reaching a single definition as the term, from the perspective of IS researchers, has many different interpretations making it unclear and subjective. Quite simply, quality is similar to beauty, which is in the eyes of the beholder. In studies conducted by DeLone, (1992); DeLone, (2003), and Aasheim, (2007) the variable SQ is recognized by features regarding internal user support services.

In the field of IS, service quality might stand for certain aspects that service quality brings through Information Systems, which appear to fulfil the end-users demand. In this line, Collier (1994) summarizes popular definitions of quality as: matching specifications, a stage where user specifications are met, a fair exchange of a value at a price, and potential for utilization. The assessment of service quality can leverage from existing quality measurements available in the relevant IS literature, according to Hu (2003), service quality can be examined in terms of service consistency, reliability, timeliness, empathy, assurance, and accuracy or adequacy. In the e-Procurement Success Model projected by Vaidya (2007), the service quality variable comprised Responsiveness, Accountability, Compliance, Process Reliability and Issue Resolution (help desk). The relationship of Service Quality and end user satisfaction has attracted considerable interest from researchers in the field of IS (DeLone, 2003; Luarn, 2005; Hsu, 2002; Hussein, 2005; Kim, 2005) and has long been recognized as playing a crucial role for both the successful use of the firm's IS and Company Performance, which strengthens company survival in today's competitive market. The findings of previous research indicated that there is a positive correlation between SQ and User Satisfaction concerning information systems (DeLone, 2003; Luarn, 2005; Hsu, 2002; Hussein, 2005; Kim, 2005). Service Quality, which investigates user support quality, was incorporated.

3 Research Method

This research suggests a research framework which is an extension of DeLone and McLean's (1992) IS success framework and researcher attempt to incorporate performance as a function of end-user satisfaction and systems usage. In the meantime, researchers consider end-user satisfaction and systems usage as a function of the Quality of Information System. Figure (1) display the proposed research model and variables incorporated.

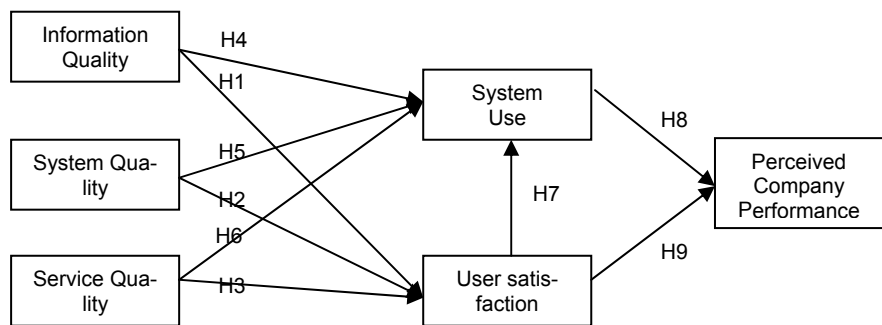


Figure 1. Proposed Research Model

The instrument actually measures three variables that are causes of user satisfaction: information quality, system quality and service quality of IS. The model proposes that “information quality, system quality and service quality singularly and jointly affect both system use and user satisfaction. Moreover, the amount of use can affect the degree of user satisfaction as well as the converse being true. Use and user satisfaction are direct antecedents of the performance. Therefore, we hypothesize:

H1. The extent of information quality in Information Systems of MSC is positively associated with users’ satisfaction.

H2. The extent of system quality in Information Systems of MSC is positively associated with users’ satisfaction.

H3. The extent of service quality in Information Systems of MSC is positively associated with users’ satisfaction.

H4. The extent of user satisfaction is positively associated with company performance.

The instrument actually measures two variables that are causes of company performance: system use and users' satisfaction of IS. The systems use has been broken into four variables to indicate types of IS use in the organization. Therefore, the researchers hypothesize:

H5. The extent of system use in terms of "Customer Service" is positively associated with user satisfaction.

H6. The extent of system use in terms of "Execute Internal Work" is positively associated with user satisfaction.

H7. The extent of system use in terms of "Purchase Orders" is positively associated with user satisfaction.

H8. The extent of system use in terms of "Information Search" is positively associated with user satisfaction.

H9. The extent of Information System use in "Customer Service" is positively associated with Company Perceived Performance.

H10. The extent of Information System use in "Execute Internal Work" is positively associated with Company Perceived Performance.

H11. The extent of Information System use in "Purchase Orders" is positively associated with Company Perceived Performance.

H12. The extent of Information System use in "Information Search" is positively associated with Company Perceived Performance.

The data for this study is obtained through a survey questionnaire conducted in 2008 covering MSC3 companies located in both Cyberjaya and the Bukit Jalil area, Malaysia. In this study, the data collection method was a self administered questionnaire to IS end-users through a contact person in each company. Participation was on a voluntary basis with convenience sampling of IS end-users obtained. A total of 1,000 questionnaires were distributed, but only 404 (40 percent) usable responses were used in the analysis. Table 1 displays a brief summary of the research sample size:

Research Sample Size

³ MSC Malaysia, formerly known as the Multimedia Super Corridor, is a Government initiative designed to leapfrog Malaysia into the information and knowledge age

Initial Sample size	1000
Non-Returned	330
Number of forms received (Achievable sample size)	670
Response rate	%
Incomplete forms	266
Number of useable forms	404
Gross Response Rate	%

With respect to the measures, questionnaire items were adapted from previous studies, which are described as follows: end-user Satisfaction on IS importance (James et al., 1983), perceived company performance (five items adopted from Roldán, & Leal, 2003), end-user overall satisfaction and IS use adapted from (Meister & Compeau (2002) and Caremobil (2005). The respondents were required to rate their level of agreement with statements using a 7-point Likert scales ranging from “strongly disagree” (1) to “strongly agree” (7). Prior to the study, the questionnaire was pre-tested using four UM lecturers majoring in MIS and marketing. The final measures are displayed in Appendix (Table AI).

4 Data Analysis

Table 1. Respondent Industry Profile

Company Activity	Frequency	%
IT solutions	50	12.4
Finance	96	23.8
HR management	26	6.4
Communication	192	47.5
Aerospace	7	1.7
R&D	33	8.2
Total	404	100.0

The preceding Table (2) indicates that the highest numbers of respondents came from the communication industry 47.5%, followed by finance 23.8%, and then IT solution companies with a percentage of 12.4%. While the smallest portion of respondents came from the Aerospace industry with 1.7%. Wu and Wang (2006) highlighted that there have been many debates on the relationship of the right-hand side of the IS success model while there have also been many em-

empirical studies that support the relationship of the left-hand part of the DeLone and McLean model. Therefore, in this study, all the aforementioned end-users satisfaction statements (38 items) were subject to factor analysis. Principal Component Analysis (PCA) was used with Varimax rotation to determine whether these items could be grouped into components that comply with Martilla and James' (1977) framework. The criteria was employed to avoid a situation of cross-loading, to determine and interpret whether the factors extracted were similar to those used by Igbaria et al. (1998) and Jusoh et al., (2008) in which the cut-off loading was 0.50 or greater on one factor and 0.35 or lower in the other factors. After performing several rounds of factor analysis a total of seven items were deleted from the analysis. The items removed due to cross-loading were SAT9, SAT16, SAT17, SAT23, SAT24, SAT25 and SAT27. Three components were extracted with Eigenvalues exceeding 1, which explains the total variance of **68.85**. Factorability was assessed using Bartlett's Test of Sphericity (0.969) and the Kaiser-Meyer-Olkin Measure of Sampling Adequacy (Chi-Square =11889.841, $P < 0.001$). As shown in Table (2) seven items converged in component one, which was given the name Systems Quality, explaining 58.842. While twelve items, from Information Quality, converged in component two, which explains 6.276 % of the variance and another twelve items, which were given the name Service Quality converged in component three, explaining 3.377 % of the variance.

Table 2. Information Systems Attributes

Code	Research Statements Items	Components		
		Systems Quality 1	Information Quality 2	Service Quality 3
SAT1	Top Management Involvement			.696
SAT2	Organizational Competition With The EDP Unit			.733
SAT3	Priorities Determination			.740
SAT4	Relationship with The EDP Staff			.606
SAT5	Communication with The IS Staff			.704
SAT6	Technical Competence of The IS Staff			.681
SAT7	Attitude of the IS Staff			.544
SAT8	Schedule of Products and Services		.555	
SAT10	Processing of Change Requests		.650	
SAT11	Vendor Support		.695	
SAT12	Response/Turnaround Time		.679	
SAT13	Means of Input/ Output		.676	
SAT14	Convenience of Access		.655	
SAT15	Accuracy		.573	
SAT18	Reliability		.681	
SAT19	Currency		.774	
SAT20	Completeness		.714	
SAT21	Format of Output		.704	
SAT22	Language		.627	
SAT26	Security of Data	.647		
SAT28	Expectations	.705		
SAT29	Understanding of Systems	.735		
SAT30	Perceived Utility	.695		
SAT31	Confidence in the Systems	.734		
SAT32	Feeling of Participation	.646		
SAT33	Feeling of Control	.728		
SAT34	Degree of Training	.702		
SAT35	Job Effects	.792		
SAT36	Organizational Position of the Systems Function	.774		
SAT37	Flexibility of Systems	.760		
SAT38	Integration of Systems	.763		
	Eigenvalues	18.241	1.946	1.157
	Percent of Variance Explained (68.85)	58.842	6.276	3.377
Note: Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.				

Quite a number of previous studies supported the relationships that “system quality and information quality” cause “system use and user satisfaction” (Wu and Wang, 2006; Igbaria and Tan 1997; Seddon and Kiew 1994). In line with DeLone (2003), the variable Service Quality is recognized by features regarding internal user support services. Two rounds of Factor Analysis were performed on the variables in the right-hand part of the DeLone and McLean model and Table (3) displays the results as follows:

Table 3. Nature of System Use, end-users’ Satisfaction and Perceived Performance (Following pages)

[illegible]

	Rotated Component Matrix ^a	Component					
		Satisfaction	Performance	Customer Service Requests	Execute Internal Work	Purchase	Information
usat1	IS to complete my work	.800					
usat2	IS is very useful	.837					
usat3	IS enable to make better decisions	.868					
usat4	use IS for other tasks	.849					
usat5	IS solution is easy to learn	.825					
usat6	IS solution is well adapted to my work	.822					
usat7	IS a standard work tool in MSC	.809					
usat8	very satisfied with the IS solution	.717					
PCP1	<i>IS increased company's productivity</i>		.859				
PCP2	<i>IS improved the competitive position</i>		.893				
PCP3	<i>IS increased company's profitability</i>		.901				
PCP4	<i>IS increased the revenues</i>		.900				
PCP5	<i>IS improved overall performance</i>		.891				
UIS7	Receive Customer Request and Inquiry			.666			
UIS11	Update customer list			.674			
UIS12	Attendance Log in/log off			.605			
UIS14	Tracking customers orders			.823			
UIS15	Study colleagues work progress			.588			
UIS16	Telephone company's customer			.761			
UIS1	Receive work list				.711		
UIS2	Read customers information				.698		
UIS3	Read work procedures				.836		
UIS4	Update work procedures				.744		
UIS6	Read company catalogue					.579	
UIS8	Read general IS online literature					.636	
UIS10	Order company material					.761	
UIS9	Surf the Internet and find business opportunity						.679
UIS17	Send business E-mails						.745
Eigenvalues		8.611	5.098	2.977	1.327	1.179	1.044
% of Variance Explained (72.272)		30.753	18.209	10.634	4.739	4.209	3.728
Cronbach's Alpha Reliability Test		.941	.950				
Numbers of Items		8	5	6	4	3	2
Note: Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.							

As is shown in the preceding Table (3) six components with Eigenvalues of greater than one were extracted and explained 72.27 % of the variance. It is noted that all items related to users' satisfaction were converged in component 1, which explains 30.753% of the variance and items related to the perceived performance were all loaded on the second component, which explains 18.209 % of the variance. With respect to the items related to IS use, they were split into four grouped components: 1) Customer Service Requests (**10.634 %** of variance), which involved six items, 2) Execute Internal Work (4.739 % of variance), which involved four items, 3) Purchase Orders (4.209 % of variance), which involved three items and 4) Information Search (3.728 % of variance), which involved two items. These four usage components will be treated against the model's variables as well as merged and treated as a combined variable of IS usage in this study as the researcher's main concern is the overall IS usage. Table (3) exposed that the construct of user satisfaction is well distinguished from the construct of Perceived Company Performance and discriminates against the four dimensions for system use as well.

4.1 Testing Hypotheses and Associations among IS Attributes

The study's hypotheses are tested using correlation between the major proposed variables System Use and End-user Satisfaction. The following table (4) displays the Pearson correlation test as follows:

Table 4. Pearson Correlation

Variables	Satisfaction	Performance	Service quality	Information quality	System Quality	Information search	Purchase orders	Execute Internal Work	Customer Service Requests
Mean	41.2796	24.3156	32.5084	58.0100	57.2711	7.4397	8.5384	15.7446	21.8143
S.D	8.32314	4.49256	5.90356	9.75847	10.36475	2.64617	4.01396	5.45143	8.69287
Satisfaction	1.000								
Performance	.392**	1.000							
Service quality	.370**	.415**	1.000						
Information quality	.346**	.422**	.816**	1.000					
System Quality	.331**	.415**	.754**	.781**	1.000				
Information search	.318**	.075	.060	.090	.064	1.000			
Purchase orders	.155**	.027	.064	.124*	.165**	.394**	1.000		
Execute Internal Work	.292**	.212**	.225**	.278**	.308**	.429**	.543**	1.000	
Customer Service Requests	.175**	.099*	.171**	.201**	.214**	.390**	.592**	.608**	1.000

**. Correlation is significant at the 0.01 level.
 *. Correlation is significant at the 0.05 level.

The test of the relationship between systems use in terms of (Information Search) and the three variables – System Quality, Service quality and Information quality – reveals no significant relationships. The findings thereby offer no support for hypothesis (H5 and H8). A possible explanation for the lack of correlation between these variables may be that exploring the business opportunity or use of E-mails to send business mail has nothing to do with service quality, system quality or information quality. It may be that the MSCs are not utilizing IS effectively for information search. This suggests a need for another study to give further explanation on this issue.

It is noted from the preceding Table (4) that all the variables involved in this study have significant relationships at the $p > 0.01$ with users' satisfaction on the Information Systems. There are no significant relationships between the use of system and information search to find Business Opportunity and the use of it for the purpose of purchase orders and company perceived performance. While use of the systems to communicate with customer are significantly correlated at $p > 0.01$ with the perceived performance. Also, use of the systems for enquiry purposes at $p > 0.05$ with perceived performance.

4.2 Regression Analysis

Table 5. Results of Multiple Linear Regression: Direct Predictors Vs. PCP

Predictor Variable	Unstandardised Coefficients		Standardised Coefficients	t
	B	Std. Error	Beta	
IV1 – Satisfaction	.202	.026	.375	7.683*
IV2 – Information Search	-.163	.090	-.096	-1.804
IV3 – Purchase Orders	-.137	.067	-.122	-2.035**
IV4 – Execute Internal Work	.157	.051	.190	3.064**
IV5 – Customer Service Requests	.017	.033	.032	.509
R:	.425			
R ² :	.180			
Adjusted R ² :	.170			
Analysis of Variance				
	Sum of Squares			Significance of F
	DF	res	Mean Square	
Regression	5	1457.756	291.551	17.429
Residual	396	6624.077	16.727	.000

*P < .001, **P < .05,

The findings presented in the preceding Table (5) reveal that the regression equation was found to be significant ($F=17.429$, $P < .001$) and the accuracy of the regression model is supported by the examination of the residuals as well as the Durbin Watson=1.965. The standardized coefficients Beta (β) for Satisfaction are positive and significant, indicating that "there is *positive linear relationship between Satisfaction and Company Perceived Performance* at $p < 0.001$ ". This is support for the study's hypothesis (H4.) being statistically true. The Beta (β) for

both Purchase Orders and Execute Internal Work are significant at $p < 0.05$ and the beta value is positive for Execute Internal Work while it is negative for Purchase Orders, therefore, this result supports hypothesis (H10), which says “*there is a significant and positive linear relationship between Company Perceived Performance and the use of IS to Execute Internal Work*”. While *there is a significant but negative linear relationship between Company Perceived Performance and the use of IS to Purchase Orders* (H11). Differently, the coefficients Beta (β) for both Information Search and *Customer Service Requests* are not significant, indicating, “*There is no significant positive relationship between the Company Perceived Performance and both Information Search* (H12) *and Customer Service Requests* (H9)”. Hence, neither hypothesis (H9) nor (H12) are supported.

Surprisingly neither Information Quality nor Service Quality are predictors of System use in Malaysian MSC status companies, even though Information Quality and Service Quality were mentioned as a highly important associated factor ($r = .754^{**}$) by MSC respondents. Findings indicate that there is a positive association between service quality and user Satisfaction both when regarding system use solutions and general information systems (DeLone, 2003; Luarn, 2005; Hussein, 2005; Kim, 2005). Therefore, this study assumes that the same phenomenon will occur in Malaysian MSC status companies, and claims that the variable belongs in the IPA evaluation model. The test of the relationship between System Quality and User Satisfaction reveals a significant correlation. The Beta value is, .04 at a significance level of .686. The findings, therefore, offer no support for the relevant hypothesis. Where the system is functioning relatively well, one should also try to assess if the importance of System Quality and Service quality diminishes over time.

Table 6. Regression Results: Predicting Overall IS Performance by System Use and Users' Satisfaction (Enter Method)

Independent Variable	B	t	R ²	F	p
DV1 – System Use (sysuse)					
Constant	27.409	5.344	.072	10.279	0.000
IV1 – Service Quality (SERVQUALTY)	-.286	-1.121			.000
IV2 – Information Quality (INFOQUALTY)	.254	1.570			.263
IV3 – System Quality (SYSQUALTY)	.358	2.670			.117
					.008
Independent Variable	B	t	R ²	F	p
DV2 - Satisfaction (SAT)					
Constant	22.255	9.281	.145	22.670	.000
IV1 – Service Quality (SERVQUALTY)	.326	2.741			.000
IV2 – Information Quality (INFOQUALTY)	.076	1.005			.006
IV3 – System Quality (SYSQUALTY)	.070	1.110			.315
					.268
Independent Variable	B	T	R ²	F	P
DV3 – Performance (Perfrm)					
Constant	15.380	13.791	.152	35.693	0.000
IV1 - Satisfaction (SAT)	.204	7.917			.000
IV2 – System Use (sysuse)	.009	.713			.477

P<0.05

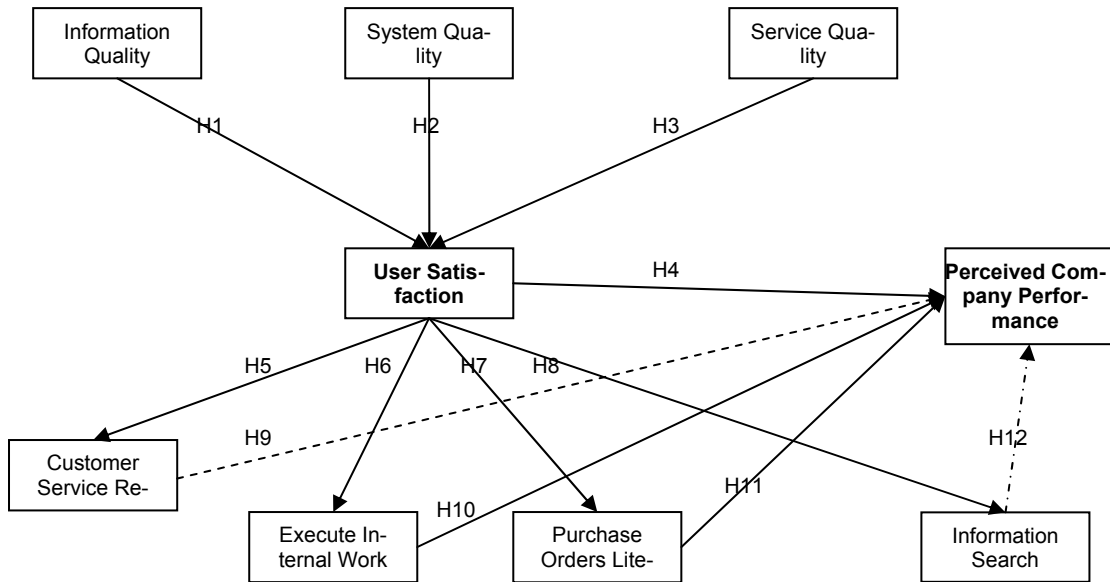


Figure 2. Research Model

5 Discussion

The study's findings by factor analysis indicates that the variable information quality is recognized by features regarding the schedule of products and services, processing of change requests, vendor support, response/turnaround time, means of input/output, convenience of access, accuracy, reliability, currency, completeness, and format of output and language. While the variable system quality is recognized by features regarding the security of data, expectations, understanding of systems, perceived utility, confidence in the systems, feeling of participation, feeling of control, degree of training, job effects, organizational position of the systems function, flexibility of systems and integration of systems. Whereas the variable Service Quality is recognized by features regarding the top management involvement, organizational competition with the EDP unit, priorities determination, relationship with the EDP staff, communication with the IS staff, technical competence of the IS staff and the attitude of IS staff.

On the other hand, findings by factor analysis indicate that the variable related to the nature of system use is recognized by four variables grouped as Customer Service Requests, Execute Internal Work, Browsing Work, and Business Oppor-

tunity. These variables in its larger sense were closely to the classification excited in the thought of M&D (2004) that investigating the e-commerce adoption using M&D Model. Fan and Fang (2006) argued that the inconsistent relationships between system quality and information quality were due to the similarity of system quality and information quality. The high quality of the system will produce high quality information in nature. In this connection, user perception may, in part, explain most variance by system quality. Fan and Fang's (2006) results also show that system quality has a significant direct relationship with system use, while information quality has a significant direct relationship with user satisfaction.

5.1 Limitations

The relatively lower discriminant validity of some constructs, such as system use, compared with those reported by prior studies, suggests the importance of re-evaluation of measurements suggested by Fan and Fang (2006) and, therefore, strengthens the importance and applicability of this instrument across different contexts.

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Appendix

First Round - Rotated Component Matrix

	Component				
	1	2	3	4	5
SAT1			.672		
SAT2			.699		
SAT3			.679		
SAT4			.541		
SAT5			.636		
SAT6			.608		
SAT7			.524		
SAT8		.523			
SAT9		.578			
SAT10		.710			
SAT11		.709			
SAT12		.708			
SAT13		.717			
SAT14		.712			
SAT15		.546			
SAT16		.528			.560
SAT17					.684
SAT18		.558			
SAT19		.648			
SAT20		.546			
SAT21		.545			
SAT22					
SAT23				.671	
SAT24				.681	
SAT25				.664	
SAT26	.599				
SAT27	.550			.551	
SAT28	.607				
SAT29	.692				
SAT30	.639				
SAT31	.677				
SAT32	.550				
SAT33	.689				
SAT34	.734				
SAT35	.764				
SAT36	.705				
SAT37	.736				
SAT38	.739				

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

Appendix End-Users Satisfaction Statements, coding and descriptive analysis

Code	Statement	Mean	Median	Std. Deviation
SAT1	Top Management Involvement	5.4332	6.0000	1.21119
SAT2	Organizational Competition with the EDP Unit	5.2368	5.0000	1.10995
SAT3	Priorities Determination	5.1389	5.0000	1.15135
SAT4	Relationship With the EDP Staff	5.3349	5.0000	1.12691
SAT5	Communication with the IS Staff	5.2797	5.0000	1.13088
SAT6	Technical Competence of the IS Staff	5.3101	5.0000	1.06632
SAT7	Attitude of the IS Staff	5.4228	6.0000	1.08693
SAT8	Schedule of Products and Services	5.3415	5.0000	1.08245
SAT10	Processing of Change Requests	5.2010	5.0000	1.13671
SAT11	Vendor Support	5.2164	5.0000	1.17477
SAT12	Response/Turnaround Time	5.0671	5.0000	1.14157
SAT13	Means of Input/ Output	5.1509	5.0000	1.06248
SAT14	Convenience of Access	5.1563	5.0000	1.11069
SAT15	Accuracy	5.2942	5.0000	1.07910
SAT18	Reliability	5.2324	5.0000	1.02497
SAT19	Currency	5.3109	5.0000	1.03791
SAT20	Completeness	5.2704	5.0000	.99567
SAT21	Format of Output	5.3308	5.0000	1.01722
SAT22	Language	5.2580	5.0000	1.17158
SAT26	Security of Data	5.0546	5.0000	1.12803
SAT28	Expectations	5.2174	5.0000	1.14688
SAT29	Understanding of Systems	5.2443	5.0000	1.15117
SAT30	Perceived Utility	5.2655	5.0000	1.02402
SAT31	Confidence in the Systems	5.2263	5.0000	1.13418
SAT32	Feeling of Participation	5.2368	5.0000	1.08508
SAT33	Feeling of Control	5.2064	5.0000	1.07747
SAT34	Degree of Training	5.0248	5.0000	1.16584
SAT35	Job Effects	5.1144	5.0000	1.18796
SAT36	Organizational Position of the Systems Function	5.1662	5.0000	1.15527
SAT37	Flexibility of Systems	5.0843	5.0000	1.08809
SAT38	Integration of Systems	5.1613	5.0000	1.07823

Innovating to Win: Partnering Post-secondary International Business Students with Small/Medium Enterprises to Spur Market-driven Innovation and Global Competitiveness

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Abstract

Small and medium manufacturing firms may well hold the key to Canada's economic renewal. Recent data show that Canadian SMEs lead the world in terms of in-house process and product innovation, yet are under-supported by current innovation policy, even though they employ more workers and proportionately export to more markets than do large companies. In Canada, innovation policy is not currently financed and structured to capitalize on the significant untapped export potential of SMEs, and Canadian SMEs are reluctant (due to size) to hire the business talent they need to 'go global.'

This paper proposes a practical, achievable model for partnering SMEs with international business management students enrolled in post-secondary international business programs with SMEs to create the business innovations that can revitalize and restore Canada's global competitiveness. To support this model, governments should broaden existing innovation policy to embrace the business

dimension of new value creation, and open innovation funding to involve students in non-technical disciplines at Canada's colleges and universities.

Keywords: Innovation, education, SMEs

If Ontario and Canada are to achieve their full economic potential, we need inspired public policies to lower the cost of investment, reduce barriers to competition, define and support innovation more broadly, and improve our understanding of the needs of existing and aspiring global leaders. That way our firms and people can compete to win in the international arena – and realize sustainable prosperity.

(Institute for Competitiveness and Prosperity, 2008b)

Introduction

Tough times call for inspired measures, and the need to dig deep to discover and optimize the resources we as a nation currently possess. We know Canada possesses the great economic advantage of a linguistically and culturally diverse workforce and a highly educated entrepreneurial class. Less well understood is the asset we have in our small and medium enterprise (SME) sector, one that can be leveraged to counteract the economic uncertainty and turmoil wrought domestically by globalization and the current global economic crisis. Building the capacity of SMEs to vigorously engage in international trade will allow us to diversify our export markets and complement the strong trading relationships with the USA and other current trading partners. Economic trends reveal emerging opportunities in the global marketplace that export-ready SMEs currently cannot respond to because their size limits or prohibits investment in international business expertise. At the same time, the funding mechanisms that could help SMEs hire business students and graduates with international business management skills and 'fluency' in a range of national and regional industrial cultures are falling short. This is because they target education/industry partnerships focused heavily on conducting pure science and technology 'discovery' research at universities and medical research labs, with hopes that industry will step in to commercialize new product and process inventions.

We are not proposing to do away with this aspect of innovation policy. We are arguing, however, that policy makers can make four changes in how they define and support innovation. Requiring little or no new investment dollars, the following changes will go far in helping SMEs overcome their export challenges:

- expand the scope of ‘innovation’ to include any changes to management process within SMEs that can make Canada more responsive to existing opportunities and the demand in global markets;
- commit new monies for business innovation to overall innovation funding – coupled with matching dollars from industry –
- this would enable the provision of business development services for SMEs with export-ready or near market-ready goods and services while simultaneously bringing Canada’s rate of innovation investment on par with other developed nations,
- the subsequent market-driven innovation research would in turn make the R&D more precise and focused on product innovations and improvements that have an even greater likelihood of success;
- include *all* publicly-funded education institutions and programs in regional economic development and innovation schemes, creating knowledge linkages among and between firms and education/training institutions according to the needs of local businesses;
- and, create funding mechanisms flexible enough to connect SMEs with the disciplines and practitioners *most relevant* to an individual SME’s internationalization strategy (i.e. to proactively include students learning and training in social sciences, arts, and humanities disciplines, as well as scientific and applied science disciplines more traditionally associated with innovation)

Partnering government, colleges and businesses offers a rapid, cost- effective approach to revitalizing economic regions hit hard by globalization by creating self-sustaining regional innovation systems connected to world markets. To prosper in this global economic context, Canadian SMEs do not need handouts, but rather access to the market and competitive intelligence that can make them more competitive locally and globally. At the same time, Ontario’s post-secondary and post-graduate business and humanities students are eager and ready to deploy their new-found knowledge and research techniques, creating a win-win scenario where training and business support are focused on real world business cases with the potential to sustain regional communities and create new jobs. In this paper, we focus largely on the contribution of international business management programs, keeping in mind the wisdom of making all forms of knowledge available to the firms that need them.

The education/SME partnerships we are advocating have been tested in pilot projects in Ontario and Nova Scotia. Both projects clearly indicated that education/industry partnerships offer an immediate and cost-effective way to provide

practical support for SMEs that are ready or near ready for expansion to foreign markets. Early findings are showing education/industry collaborations focused on conducting market and competitive intelligence in foreign countries can rapidly create global competitive advantage for local firms. These collaborations also provide priceless on-the-job training for a new generation of highly skilled international business professionals. Over the long term, this market-driven approach creates a 'virtuous circle' of innovation and knowledge sharing that can turn regional industry clusters into self-sustaining *regional innovation systems* (RIS). Here, following University of Toronto researchers Meric Gertler and David Wolfe, an RIS is "conceived as the set of economic, political and institutional relationships within a given geographical area that generates a collective learning process, leading to the rapid diffusion of knowledge and best practice (Gertler & Wolfe, 2009). For Canadian and other communities seeking ways to revitalize their economy, education/SME partnerships can be powerful and cost-effective catalysts for creating the networks of knowledge required to build and sustain healthy economic regions.

Canada in the Global Game – Down but Not Out

Three converging trends have come together to create the pressing need for policy makers to rethink Canada's overall innovation strategy. First, Canada already boasts a strong track record as an entrepreneurial country whose SMEs lead the world in terms of internal innovation. Second, globalization and other factors have led to the loss of jobs in manufacturing to other industries in other jurisdictions. Third, provincial and federal governments already have identified innovation (albeit almost solely in the form of new technology discovery and invention) as a crucial funding and policy target. We would like to comment briefly on those trends before addressing the opportunities that have also opened up as a result of these and other factors.

First, the restructuring and downsizing of many of Canada's largest employers since the 1990s has resulted in tremendous and consistent growth of SMEs. In fact, Canada has been one of the world leaders in the creation of new businesses (Vale, 2006, p.8). This is a positive fact that has seldom been acknowledged or celebrated. Acknowledging this strength confirms Canadian resilience, creativity and drive. It also confirms the pervasive entrepreneurial spirit and commitment to innovation that characterizes the growing SME sector. These assets need to be embraced and harnessed if Canada is to emerge from the cur-

rent global economic crisis as a healthy economy that can demonstrate leadership for other nations grappling with the realities of the economic downturn.

This leads directly into the second issue of job loss and regional economic distress. In Canada, as in other developed nations, business and labour alike have expressed consternation over the loss of jobs, takeovers and transfer of manufacturing to other countries with lower labour costs, although business analysts and economists disagree as to the extent of the impact. The new reality is that the hyper-competitiveness of globalization is likely to continue and increase, such that we need new strategies to compete, both regionally and nationally. In practice, this means finding cost-effective, market-driven ways to support industry so that it remains strong in the face of unprecedented global competition by responding to the needs and desires of global customers.

Specifically, we believe innovation strategy that seeks to help Canada compete globally needs to focus much of its efforts on the SME sector, which includes all companies with fewer than 500 employees. This is due to the fact that, in aggregate terms, SMEs employ more employees than all large firms combined (Industry Canada, 2007). Therefore, we need to ensure our SMEs, Chambers of Commerce, and all other stakeholders are focused on collaboratively orchestrating a strategy for supporting SMEs in “going global.” Otherwise, if those SMEs fail to capitalize on their potential, the capacity for regional economies and communities to thrive will also be compromised. By contrast, if we can help them maintain or gain competitive advantage, everyone prospers.

Third, there is a growing consensus that regions require their own unique innovation strategy. Recently, the World Economic Forum identified the linkage between innovation and Canada’s global competitiveness as a critical area in which to focus. The recent global financial crisis confirms that we are indeed in a global economy, one that requires that each player in the global marketplace shape different policies and approaches to the market. Federal and provincial governments already have made significant investments in technology-driven innovation in the science, high-tech and medical industries. However, these success stories count as just a fraction of what we now know is Canada’s total potential for innovation.

We propose that economic policy be redesigned to capture all forms of innovation, where innovation is understood as the proactive production and leveraging of novelty in products, services, methods of production, distribution and management systems. This definition captures a sense of how innovation is both a process and an outcome and that what is routine for one firm, industry or market

may constitute an innovation in a different firm, industry or market. The success of any innovation is determined by how well it contributes to the transformation of an idea into new forms of economic and social value (European Commission, 1995, p.1-2). As such, it reminds us that simply doing something new may not constitute a true innovation. By this definition, any changes considered to be innovative have to in some way add value to the company, and this includes changes to the business plan.

In accordance with this more expanded notion of innovation, the Institute for Competitiveness and Prosperity (ICP) is calling for the diversification of provincial innovation policy in such a way as to make businesses more responsive to international markets and competitors:

To improve our innovation performance, government policy needs to focus as much *on the demand* for innovation as on funding of R&D and the hard sciences....Public policy also needs to drive towards creating greater pressure on businesses. No matter how much government support is given for innovation, businesses only innovate to the extent their customers and competitors pressure them to (Institute for Competitiveness and Prosperity, 2004).

By producing the goods and services world markets are demanding, we can be much more strategic in maintaining our competitive advantage nationally, provincially and regionally. While a purely R&D innovation strategy pours millions of dollars for investment into experimentations that may or may not result in successful commercialization of products and/or processes, market-driven innovation requires minimal investment and produces more reliable outcomes. Attending to the potential convergence of what existing and new foreign markets are calling for and what Canadian firms can and do offer will much better position Canadian firms to act on emerging global opportunities

Playing to Our Strengths

Even in the midst of unprecedented economic change and threats to its industrial structure, Canada continues to boast competitive strategic advantages relative to other nations:

- resilience of Canadian entrepreneurs and sustained SME growth (Vale, 2006)
- significant government investment in research and development (R&D)(Institute for Competitiveness and Prosperity, 2008a)

- strong educational institutions that offer a unique applied-learning approach (Institute for Competitiveness and Prosperity, 2007)
- a culturally and linguistically diverse workforce (World Economic Forum, 2007) entrepreneurial owners demonstrating capability and a driving passion to make and market products that will allow their companies to succeed globally
- world-class design capabilities at every level, encompassing the design of goods, infrastructure, work organization, and business strategy (Diamond, 2008, p.7)
- an inherently creative workforce, to the extent that one-third of workers in the manufacturing sector can be said to belong to the “creative class” (Florida & Milway, 2008)
- demonstrated global leadership in in-house innovation, particularly in the SME sector

Acknowledging and leveraging these considerable assets will allow us as a province and a nation to stimulate *sustainable* regional economic development, Canada’s global competitiveness, and innovation capacity generally.

Not only is Canada the global innovation leader among OECD countries, it also leads in terms of its innovation record within SMEs. The OECD reports that Canada ranks fifth in the world with respect to innovation within companies related to products (Organization for Economic Co-operation and Development Science, Technology and Industry Scoreboard, 2007, p.95). Even more impressively, Canada actually leads all other nations with respect to product innovation within SMEs and it also leads all other nations with respect to in-house process innovation in large and small firms alike (Organization for Economic Co-operation and Development Science, Technology and Industry Scoreboard, 2007, p.95). These are powerful yet seemingly little known findings that, if made visible to policy makers, can be used right now to adjust innovation policy to capture the significant innovation capacity that already exists in the SME sector. One way to do this with very little additional capital investment is to open eligibility for innovation dollars to the Canadian community college sector, one that can add the applied research component that differentiates colleges from universities. Connecting industry with pure and applied post-secondary research teams can create new synergies leading to economic growth based in policy that leverages the already strong record of SME innovation to support those firms in making, adjusting and adding value to products and services that foreign markets need and want. We believe this is a model that would be attractive to smaller firms such that they would be more than willing to become co-investors with governments to drive market-driven innovation in their sector.

A Winning Strategy for a New Game – Broaden Innovation Policy to Capture Latent SME Export Potential

To mount a sustained innovation effort focused on growing SME export capacity, Canada's innovation policy needs to be expanded and redefined. To that end, in 2007, the federal Minister of Finance formed the Competition Policy Review Panel to review Canada's competition and foreign investment policies, and make recommendations to the federal government for making Canada more globally competitive. The Panel conducted consultations, heard from Canadians and international experts, and commissioned research to inform its recommendations. The report "*Compete to Win*" calls on all Canadian firms to *aggressively* retool themselves for an integrated world economy by increasing their ability to compete globally, and not simply within North America (Government of Canada, 2008, p. 103). If we really do hope to maintain, or ideally, improve our current level of global competitiveness, there are benefits to understanding the economic development policy and institutional structures developed by innovation leaders including the United States, Australia and Norway, countries that are actively investing in SME innovation.

The fact that the U.S. is leading Canada in innovation may reflect proactive public policy that involves cross-sector relationships and emphasis on boosting the global competitiveness of industry on a regional basis. Since 1988, the U.S. government has created a network of 31 CIBERs (Centres for International Business Education and Research) as a response to international competition that posed a severe threat to its core industries. CIBERs are administered by the Department of Education and are mandated to serve students, faculty, cross-campus centres and the business community with the goal of increasing global competitiveness across industries. Since their inception, CIBERs have provided the market research and competitive intelligence that allows businesses to identify profitable export opportunities as well as market-based needs to improve or adapt products and processes based on a more complete assessment of customer requirements. This in turn becomes a catalyst for firms to invest in R&D, be it in-house or with education/public research agency partners. More recently, the U.S. Economic Development Administration has invested in research aimed at designing policy to build sustainable *regional innovation systems* supported by the CIBER network that is already in place (U.S. Department of Commerce, 2008).

Elsewhere, the same market-driven systems approach is fast becoming the benchmark for effective innovation policy. Australia's 2008 Report of the National Innovation System calls for increased investment in market-facing research and human capital development and for the creation of an innovation council to replace the current Science, Engineering and Innovation Council (Council for the Humanities and Social Sciences, 2008). All recommendations are designed to drive innovation from "the bottom up," based on the reality that it is the private sector that has the freedom and agility to lead innovation in a way that hierarchical government structures cannot. Many of the recommendations focus on expanding Australia's already successful Enterprise Connect system to include proactive business innovation services to drive SME internationalization, and to fund a new Knowledge Connections program that links and leverages knowledge to create successful regional innovation systems.

Australia's breakthrough came as a result of its adoption of Finland and Sweden's innovation policy. A distinguishing feature of the Finnish/Swedish approach lay in how their governments saw the need to invest in *all* elements of the system and in the processes that connect all of the elements: "A key learning from Finland is the need to develop a coordinated National Innovation System...[that] begins with the recognition that in the knowledge-based economy, knowledge can be fostered to produce economic benefits. Industry is therefore actively involved in training and knowledge transfer to the universities, and a large number of internships are provided to link the theoretical studies to practice." (Roos, G., Fernström L., & Gupta O., 2005, p.4-11). Similarly, in 2004, the Norwegian government created the state-owned company Innovation Norway, whose mandate is to promote innovation that will internationalize the Norwegian economy to simultaneously drive wealth production that will fund social innovation projects. Innovation Norway takes its lead from business, and in particular the SME segment of industry, in the formation of its innovation policy and proudly notes that its core group of clients are Norwegian SMEs (Innovation Norway, 2004).

The U.S., Australia and the Nordic countries offer powerful guidance for future innovation policy formation in Canada, particularly two principles to guide our own policy reform. The first lies in the wisdom of taking a systems approach to economic development that draws on the capacities and knowledge of all parts of their regional economies, coordinated by a publicly-funded regional business knowledge centre often housed at a government-owned university and/or college. The other principle lies in structuring knowledge sharing so that it is business, not the research institution, that is leading innovation based on respon-

siveness to unsolved customer needs and competitive intelligence. Of equal interest is the fact that small and medium-size firms are at the centre of the most productive innovation systems. Indeed, it is Nordic SMEs, like those in Canada, that are already innovating, showing the agile smaller firm is well positioned to become a crucial component in a system-wide engine of economic renewal.

The fact that the SME segment that is playing a major role in driving Norway's industrial internationalization should be of great interest to Ontario and other Canadian regions with a diverse SME-rich industrial base. Exporting is acknowledged as a key factor in economic growth and one that is closely correlated to real GDP growth (Industry Canada, 2007). The question remains as to how can governments can best facilitate the success of SMEs, those potential "gold-mines" of innovation knowledge and export capacity that remain invisible and untapped by our current approach to innovation. A Public Works and Government Services Canada report stated that "SMEs account for 45% of GDP, much of the economy's growth, 60% of all jobs in the economy, and 75% of net employment growth", concluding that "SMEs are critical to the Canadian economy and society as they are increasingly the engines of job creation, economic growth and innovation" (Public Works and Government Services Canada, 2008). Interestingly, SMEs are also key exporters, according to a 2007 report:

"Nearly 85 per cent of Canadian exporters were small businesses. More importantly, small businesses were responsible for 20 per cent of the total value of exports in 2002, with an average value of \$2.3 million. Medium-sized businesses accounted for 15 per cent of the total value of exports in 2002, with an average value of \$11.8 million, while large businesses accounted for 64 per cent, with an average value of \$194.5 million in exports. It is clear from the new data that small firms do make a significant contribution to Canada's exports." (Industry Canada, 2007)

At the same time, while small businesses send their exports to a broader range of countries than do medium-sized and large firms, they proportionally export less. Only 1.4 per cent of small businesses export, while 27.0 per cent of medium-sized and 37.7 per cent of large businesses participate in exporting (Industry Canada, 2007). The distribution of exports by firm size shows important differences between small and large firms. This is at least in part due to the fact that, even though many SMEs have a product, idea or patent with export potential in world markets, they face formidable challenges related to financing, management, marketing and/or technology.

There are policy implications arising from this data. Providing business intelligence to SMEs would build on the fact that many small and medium enterprises already are trading with a wider variety of international countries than previously had been thought, reaching a wider range of markets than the bigger companies that typically receive government innovation support. This suggests that the SMEs can serve as an excellent vehicle to broaden the number of international trading partners, reduce over-reliance on just one or two markets, and capitalize on emerging markets. The challenge lies in marshalling the appropriate knowledge to guide SMEs to the next level without needing to incur additional investment on the part of SMEs or taxpayers.

It is ironic that SMEs are routinely overlooked in innovation policy, given the fact that they may be seen as the “low-hanging fruit” for regional economic renewal insofar as they already excel at in-house innovation in the terms conceived by current innovation policy. What they lack is the intensive international market research and business planning that can take their already commercialized products and services to markets worldwide – and they need all of this at an affordable price. Without due attention to this gap in the innovation chain, we risk losing the competitive advantage, jobs and productivity that SMEs can provide to the overall economy, falling even further behind our competitors.

Business analysts and leaders in the manufacturing sector already are saying what Canadian policymakers now need to grasp – that is, innovation is not just about the goods and processes creative people develop in research laboratories, but rather should be seen as a process of valuing, creating and commercializing new knowledge at every stage of the value chain. While it is true that Canada’s total investment in R&D is actually higher proportionately than the U.S. and many other countries, innovation funding for applied business knowledge is lagging. Minimal investment in providing business knowledge innovation to the already highly process and product innovative SME sector has the potential to restore Canada’s global competitiveness ranking, from our current #10 position to the #3 position we held in 2001 (World Economic Forum, 2007).

SMEs’ need for international business knowledge is pressing. The Institute for Competitiveness and Prosperity reports that 83% of small enterprises do not have even a basic formal sales and marketing plan (Martin & Milway, 2007), not to mention the more complex business and market intelligence required for successful commercialization in the global marketplace. Research conducted by the Canadian Manufacturers and Exporters group has also identified a range of issues hampering Canadian firms’ export potential. These include lack of qualified

personnel, lack of time to develop new markets, lack of expertise in new markets, and difficulty identifying new markets (Laurier, 2008).

Generally speaking, it can be expected that many if not most SMEs are lacking the following kinds of business knowledge:

- adequate understanding of real customer needs (articulated or unarticulated)
- adequate understanding of the differences in global markets from country to country
- competitive intelligence
- channels of distribution
- sales and marketing planning

These are critical knowledge requirements for any successful business. However, adapting to specific international country and customer needs requires even more specialized training and skills, to the extent that the Forum for International Trade Training (FITT), NASBITE and other organizations have designed specific courses and certification standards to help better prepare students for international trade. SMEs' ability to successfully commercialize and/or adapt their products or services to capitalize on international opportunities depends on their ability to access international business management expertise.

Michael Porter is one innovation scholar who sees publicly owned educational institutions as core elements in healthy regional clusters, and the World Economic Forum also identifies that developed nations can improve their respective global competitiveness by encouraging greater collaboration between business and education (Porter, 2005). Unfortunately, business management and other social science/humanities programs that *could* contribute to the global competitiveness of SMEs are inadvertently shut out of existing innovation funding programs aimed at education/industry linkages. Yet it is precisely business expertise and relationships that we currently need to make the quantum shift in innovation strategy that will keep Canada globally competitive. At this historical moment, the needs of business are changing, and there is now a powerful rationale for encouraging a degree of government investment in connecting the SME sector to foreign markets via college/university partnerships in order to internationalize their business plans.

Multidisciplinary Student Recruitment for Cost-effective Knowledge Innovation

Mobilization of the college and/or university business school (potentially all of the humanities, arts, design and social science disciplines depending on the specific innovation need as determined by the market) as a key component of an overall provincial economic development strategy can mitigate the costs of supporting SME innovation by better utilizing assets the government already funds. The SME/education sector partnerships we are proposing would go far towards improving Canada's ranking in three areas– innovation capacity, university-industry collaboration, and company spending on innovation – in which, according the Global Competitiveness Report, Canada is currently at a competitive disadvantage (World Economic Forum, 2007).

Here in Canada, we can point to two successful market-driven knowledge innovation partnerships already underway. These pilot projects show that education/SME partnerships are relatively simple to mount and can serve as solid foundation on which to build regional 'economic ecosystems'. For example, the five-year *"Atlantic Trade and Investment Partnership"* has already implemented a foreign investment strategy in which business school/business partnerships play a key role in catalysing rapid, sustainable internationalization of SME business activities. The program allowed the International Trade Program at the Marconi campus (Cape Breton) of the Nova Scotia Community College system to connect over 100 students to potential SME exporters. The students helped those firms research new markets, develop web sites, and even accompanied executives on trade missions. Government funding allowed students to gain valuable experience as paid interns and all students who were placed for 12 or 18 months successfully secured full time employment (Atlantic Canada Opportunities Agency, 2007).

Equally exciting are the unprecedented business synergies created out of the eight-month, two-semester post-graduate International Business Management Program at Fanshawe Community College in London, Ontario, Canada, now in its third year. This program requires that applicants already hold a college diploma or university degree. Students are recruited internationally and from within Canada, with cohorts numbering 25-30 students, over half of whom are international students. The cultural and disciplinary diversity represented in the class is key to the success of the program and contributes a dimension to the market and competitive research that cannot be found in statistical indices and country reports. It was determined that the structure of the course materials provided by

the Forum for International Trade Training (FITT) and the project requirement to earn credit towards FITT's Certified International Trade Professional (CITP) designation were ideally suited to the program goals. This is a win-win-win proposition, for students, for industry, and for governments eager to invest in creating an agile, global-ready workforce.

Grounded in 'regional clustering' and 'market-driven innovation' thinking, the long-term goal of the program is for Fanshawe to serve as a local knowledge institution that provides business intelligence to local industry in order to build export capacity that would in turn lead to the development of a healthy regional industry cluster. A London-based firm called Jones Packaging Inc. showed great export potential for their innovative, user-friendly pharmaceutical packaging, and was chosen as one of the first SME partners. The company is based in London, Ontario, Canada, and employed 400 people when the partnership began. In 2005, Jones bought a small distributor of compliance packaging materials for multi-dose prescriptions based in the United Kingdom and their primary clients are pharmacies and hospitals. The project analyzed rapidly changing channel developments across Europe and around the world, the role of government legislation and regulations as well as packaging requirements from country to country. The owners worked with the program coordinator to develop a comprehensive real-world case study using Jones' export goals to focus student learning. Students worked in groups of two, comparing two international markets and opportunities for Jones for a major project in International Trade Research, resulting in a total of 15 teams researching opportunities and competition in over 30 foreign markets. In the second semester, each team developed a one page executive summary and a short five-page PowerPoint presentation on recommended next steps. All summaries were forwarded to Jones Packaging and the best presentations were delivered in person to four members of their executive.

The value of the program to Jones Packaging has been clear, as evidenced by the comments of co-president Chris Jones-Harris:

The market and competitive intelligence supplied by the Fanshawe International business students has contributed to our new strategic plan and our ambitious growth targets in Europe and international markets. The identification of rapidly changing distribution channels in Europe and the emergence of attractive pan-European customer opportunities was important and timely. The detailed research of over 15 countries helped us refine and focus our marketing efforts. Subsequently, we have invested in three new positions and are excited about

profitable growth opportunities in Europe. The hands-on, applied nature of the Fanshawe College student research projects for FITT provided practical, real life learning opportunities for the students and real value for our business. This approach complements the sophisticated, research-oriented initiatives we have collaborated on with the Ivey School of Business and other universities. (Chris Jones-Harris, email correspondence, Dec. 11, 2008)

The collaborative, competitive structure of the program ensures that the firm has benefited from as wide a research purview as possible, and that the knowledge gained is based in existing business networks and real business opportunities that await in foreign markets. For the international and domestic students alike, the collaboration greatly enhanced their learning, offering a rare insight into a real business and how its actual corporate business development efforts could play out across a wide range of markets and regional economic cultures. In the past two years of course evaluations, students generally reported that they invested more effort than they would have on researching historical business cases, and that they were delighted with the corporate involvement, new business contacts and employment opportunities.

Common features drive the success of the Nova Scotia and Fanshawe programs. Both initiatives address the knowledge needs of local SMEs, identify willing SME partners, and adapt curriculum to focus course assignments on the global challenges and opportunities facing partnering firms. The willingness of the partnering firms' executives to participate, collaborate and treat students as equal partners in research and development is another key factor driving the positive results that are now emerging after only one year. As well, these projects are also demonstrating that colleges offer skills and knowledge that complement the more traditional pure research and development role that policy-makers usually assign to universities and pure-research institutions.

The government-funded community college is currently an underutilized resource for economic renewal and the people who learn, work and teach there constitute an available but underutilized source of ideas and expertise that could help to drive regional economic internationalization. Colleges complement universities in that they attract post-graduate international business students and offer programs in "applied knowledge" disciplines also germane to global competitiveness, such as journalism, IT, health care, engineering, and graphic design. More than that, because colleges are a first point of entry for many international students (including those intent on continuing on to earn a university degree), and because colleges frequently hire seasoned international business professionals as faculty, they can offer partnering firms access to invaluable in-

ternational networks. Many faculty and students already possess strong ties to international sources of ideas and expertise through their families and prior business experience abroad.

A recent report commissioned by the Canadian Minister of Finance makes an urgent case for moving forward on more effective partnering between industry and post-secondary institutions, calling on all levels of governments to use “all mechanisms at their disposal” to create new co-ops and internships directed at future labour market needs, undertake incentives to double international student enrollment, and provide more overseas study opportunities for domestic students to build the skills they need to succeed in the global workplace (Government of Canada, 2008, p.68). The Association of Community Colleges (ACCC) has supported such policy for several years now, and is committed to fully participating in their own region’s economic renewal by tailoring curriculum and program offerings to local business needs and accelerating international student recruitment. Because colleges are broadly distributed throughout Canada and provide a key source of job training and business education in several of the most economically challenged regions, the ACCC has argued that colleges are well-positioned to provide business, and specifically SMEs with the knowledge and skilled workers they need to compete and lead in global markets (Association of Canadian Community Colleges, 2007). Similarly, innovation policy needs also to reach out to involve non-science-related disciplines at the universities and international business programs at all post-secondary institutions. The knowledge produced by colleges can complement that offered by universities and other research institutions within a region, providing local business with the full range of expertise and skills they need to internationalize their products and processes.

Collaborating Across Sectors to Win in the Global Economy

We know that Canadian entrepreneurs are in fact highly innovative and in many cases are already exporting or interested in exporting. Based on our research, we know that many Canadian SMEs have designed products that can compete globally and simultaneously have a positive social and environmental impact. As a developed nation, we can offer our world-class expertise in recyclable medical devices, water purification technologies, and other niche markets. Yet, we see five obstacles that make it difficult for Canada to unleash the latent potential of its SME manufacturing base, including:

- a concept of innovation too narrowly focused on R&D investment
- reluctance to see innovation as a systemic issue
- structural barriers that make effective communication and collaboration difficult between colleges, universities, firms, unions, trade councils, think tanks and other agencies and associations charged with enhancing economic development
- innovation funding rationale that supports only those business/education partnerships based in scientific research but discourages projects involving needed business design and research, and other forms of knowledge
- lack of SME marketing and business expertise

Rethinking our existing unidirectional, R&D-intensive concept of innovation would go far towards resolving all five of these factors, each of which translates into lost opportunities for Canadian regional economic development.

For Ontario and Canada to support RIS development requires a coordinated innovation policy that values small as well as large players, and that protects and aggressively fosters intense interaction and learning among diverse stakeholders (Fritsch & Slavtchev, 2006). Redesigning innovation strategy to capture and use the skills, knowledge and experience of all sectors and functions (both here at home and internationally) is crucial to our future success as a province and as a nation. The fruits of a more expansive innovation strategy will position us competitively with other smaller industrialized countries also focused on expanding trade capacity while retaining high-paying jobs domestically. It will also help us to withstand any future downturn in exports to U.S. markets. Additionally, policy measures grounded in the more flexible RIS concept will allow governments to contribute to the design and maintenance of unique RISs in a way that is relevant to a diversity of regions, accountable to taxpayers and allows for tax revenues to be focused on retraining and infrastructure development.

There are practical steps that policy makers in all levels of government can take right now to begin the work of creating RISs across Ontario, without a major new investment of tax dollars. Opening up a fraction of the millions of innovation dollars that currently go toward science-and technology-driven R&D to projects requiring an applied business research element would be a welcome first step in enabling regions to implement any one of the recent *Compete to Win Report's* policy recommendations around amplifying and diversifying market-driven education/business partnerships. A small investment from government, matched by local industry, would enhance the ability of educational institutions to contribute

to regional development while simultaneously training domestic and international business students for a globalized workplace. This creates a win-win scenario for governments facing the realities of recession, labour force distress and the attendant intense scrutiny over resource allocation. Ontario's business community can expect that any government assistance will be sharply scrutinized for its potential return on investment. Approached in the right spirit, many of the *Compete to Win Report's* recommendations can be implemented with minimal investment and with maximum positive impact.

Right now, there is an urgent demand in Ontario and throughout Canada for innovation strategy that will renew and/or replace ailing industries in order to sustain the health of the communities and attract fresh talent to them. In response to that demand, education/SME partnerships could be launched in the most at-risk regions by 2009/10, by disbursing and directing just a fraction of current R&D funds in the following ways:

- expand the criteria for government innovation funding typically directed at science and technology R&D and make funding available to colleges and universities to support SME innovation by providing competitive intelligence, market research, product adaptation, supply chain redesign, web site development, business plans, etc.
- broaden the criteria for internship positions to include market and competitive intelligence and other specific needs as identified by regional SMEs
- encourage a matching formula where businesses can get matching government funds for their choice of required research with nearby colleges and/or universities
- streamline and simplify the approval process

These are short-term targets that can be implemented immediately with minimal changes to innovation policy, funding mechanisms, and communication infrastructure. The pilot education/industry partnerships mentioned above are already contributing to the internationalization of their partnering SMEs business activities, such that these local firms are initiating foreign direct investment and trade in a diverse range of foreign markets as a direct result of the business expertise offered by college-level student researchers/planners.

Over the long term, our ability as a nation to capture and propel innovation will depend on how well we retool our institutions and their ability to coordinate efforts around preparing regional industries and individual firms for doing business globally. We are recommending three longer-term changes that could be made if

we are to rapidly prototype the RIS thinking and relationships that will make our industries globally competitive with those of other nations. These include:

- revisiting SSHRC, NSERC and other government funding program criteria to enable cross-sector projects that involve aspects of innovation not covered by traditional R&D practices, especially business-related research and consultation and college-level participation (currently in Ontario, no significant funding exists for partnering business school students with industry partners)
- devoting and/or redirecting some infrastructure money to launching and maintaining regional economic “knowledge hubs” that would provide coordination and services directed at documenting and sharing the business knowledge SMEs need to expand their domestic and foreign operations
- supporting the internationalization of post-secondary institutions leading to the creation of curriculum, internships and apprenticeships that focus on developing a strong international business awareness in an innovation-oriented workforce

These adjustments would allow existing education/industry partnering programs to expand, and provide means for the creation of new partnering programs as catalysts for the formation of regional innovation systems province-wide.

Successful nurturing of RISs could lead to the creation of national and provincial innovation councils mandated to coordinate the communication, knowledge sharing and initiatives of all participating councils, networks, industry groups and educational institutions. Coordinating greater linkages among and between colleges, universities and the SME segment of industry will require that we revisit and broaden our current definition of innovation to meaningfully provide a market-based pathway for Canada’s renewed economic prosperity. Engaging new partners in innovation strategy planning will empower all stakeholders in Ontario’s economic renewal to develop new synergies that build on our distinctive strengths as regions, as a province, as a nation. At the same time, these linkages will go far towards creating the kind of holistic, responsive, “transitional” form of innovation policy that can drive Canadian competitiveness in the next stage of globalization.

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Organizational Innovative Capabilities: An Empirical Study of Malaysian Firms

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Abstract

The role and importance of organizational innovativeness or innovative capability, in attaining competitive advantage has widely been discussed. Most research examines innovation activities and their associations with organizational characteristics or investigates certain perspectives of innovative capability, such as product innovation. Much less attention, however, has been paid to validate overall organizational innovativeness, especially in the context of Malaysian organizational innovativeness. A survey has been carried out and the responses have been evaluated to find the level of innovativeness in Malaysian firms. Through an extensive literature survey, five dimensions of an organization's overall innovativeness are identified. These five dimensions form the component factors of the organizational innovativeness construct. Factor analysis has been performed to validate this innovativeness construct.

Keyword: Innovation, Innovativeness, Malaysia,

Introduction

Malaysia has had its rapid industrialization in the past three decades which has transformed its agricultural based economy into manufacturing based economy.

Due to lack of interest or technology the domestic investors have not involved in risky projects with unattractive returns. Respectively, foreign investors were more inclined to get into joint ventures with the government that provided capital subsidies and protection of domestic market. This resulted industrialization became heavily dependent on foreign partners, consultants and contractors. The privileges provided by Malaysian government to big foreign firms kept their business with good returns for their ventures, while local firms with no foreign equity participation, the situation has been different. They were either ignorant of organizational performance or not felt the need to analyse as they were protected significantly. The protective nature and the lack of stiff competition some of these firms enjoyed and due to in-exposure and business naivety for others, euphoria among these firms has kept from any capricious innovation or broadly any organizational innovativeness. Only recently, more specifically since the 1997 economic crisis that some of these organizations started expanding their energy to improving performance in terms of innovativeness.

MASTIC in its 2000-2001 national survey of innovation (published in 2003) reports that the number of patents applications in Malaysia lags behind among of the major OECD countries and in general low by international standard and is heavily dependent on sources/applications. It also reports that its achievement is commensurate with the level of GNP per capita. In order to do this, Malaysia needs to develop human resource in R & D to compete successfully in international market. According to Competitiveness Input Factors (IMD, 1999), one of the eight factors that is used to determine national competitiveness is people. This shows that Malaysia has to invest more in the development of its human capital in order to bridge the competitiveness gap between the nation and other countries. On the technological front, it is worth looking at Malaysian R & D expenditure. Whereas the majority of the R & D expenditure (66.2%) was from private sector, 21.9 % from government agencies and research institutes while the remaining 11.9% came from institutes of higher learning.

Though Malaysia is industrially a prominent country in South-East Asia with a significant share of global business, there is a dearth in the empirical studies on organizational innovativeness in the Malaysia context. However, some fragmented works are available on specific topics such as product innovativeness versus process innovativeness which are factional components of overall organizational components. This work could hopefully cause for further stream of researches on this area which should contribute positively to the industrialise sectors and the overall country.

Research Issues and Objectives

An organization's overall innovativeness is reflected on many characteristics of organization. Measurement of overall organizational innovativeness can be performed by evaluating these characteristics if appropriately identified. From extensive literature review, 48 characteristic variable items are identified that determine an organization's overall innovativeness. These 48 items can be grouped into five main areas of innovativeness. They are product innovativeness, process innovativeness, market innovativeness, behavioural innovativeness and strategic innovativeness. These five aspects together depict an organization's overall innovativeness practices.

The following objective have been set for this research

1. Assess the level of innovativeness in Malaysian firms.
2. Measure organisational innovative capabilities in Malaysian firms.

Literature Survey

Definition of Innovativeness

Innovation may be in various forms such as product or process innovation, radical or incremental innovation, administrative or technological innovation etc. innovation could be defined in terms of something that is invented for the first time and is commercially successful (Hansen and Wakonen, 1997). Catherine and Pervaiz (2004) defines organizational innovativeness as an organization's overall innovative capability of introducing new products to the market, or opening up new markets, through combining strategic orientation with innovative behavioural and process. The vast majority of researchers consider organizational innovativeness as a unidirectional phenomenon (Wilson et al., 1999). In this respect, literature offers numerous definitions that refer to different aspects within the organizational setting, such as technology –related, behaviour-related and product related.

Table 1: Some of the best fitting definitions by various researchers

Item	Definition
Innovation and innovativeness	Innovation seems to incorporate the adoption and/or implementation of “new” defined rather in subjective ways. Whereas innovativeness appears to embody some kind of measurement contingent on an organization’s proclivity towards innovation (Helen , 2004)
Market Innovativeness	<p>A newness of approaches that companies adopt to enter and exploit the targeted market. It emphasises the novelty of market oriented approaches (Sandberg and Hanson, 2004)</p> <p>Uniqueness or novelty of the product to the market. It is the innovativeness related to market research, advertisement and promotion as well as identification of new market opportunities for entry into markets (Andrews and Smith, 1996)</p>
Process Innovativeness	Introduction of new production methods , new management approaches, and new technology that can be used to improve production and management processes(Catherine and Pervaiz, 1998)
Product Innovativeness	<p>Novelty and meaningfulness of new products introduced to the market at a timely fashion. (Cooper , 1998).</p> <p>Perceived newness , novelty , or uniqueness of products (Szymanski, 2001)</p>
Strategic Innovativeness	<p>New competitive strategies that create value for the firm (Besanko et al, 1996).</p> <p>A fundamental reconceptualization of what the business is all about.</p>
Behavioural Innovativeness	A normally disturbed underlying personality construct , which may be interpreted as a willingness to change as a synergy based on the group dynamics (Hurt et al. , 1997)
Organizational Innovativeness	An organization’s overall innovative capability of introducing new products to the market , or opening up new markets, through combining strategic orientation with innovative behaviour and process (Catherine & Pervaiz, 2004)

Importance of Innovation and Innovativeness

The economic potential of a nation is dependent on the quality and quantity of its work force, and its organizational management. The world today is characterized by rapid development in new technologies such as information technology, fu-

sion of application in sciences, cell biotechnology, genetic engineering, new materials, as well as production and management techniques. Historical evidence points clearly to the need for research and development because industries will decline if no efforts are taken to adapt, improve its products and to discover new ones.

Increased innovation brought higher competitiveness and complexities that would lead to next stage of innovation. Innovative strength at specific areas has paved ways to interconnected operations and overall systems as total effective program. Standalone innovative programs have failed to compete with overall innovative programs as the later has churned advantages not only from the innovativeness of none specific component (product or process) but multi-components such as industry networks , management innovativeness , process innovativeness and market innovativeness.

Framework Development

Researchers such as Subraminian and Nilkanta (1996) and North Smallbone (2000) address the concern of measuring organizational innovativeness effectively. However, the primary focus of these studies is not scale development. As such, the measures used are often ad hoc and do not conform to systematic procedures for scale development. Moreover, the scales used in the area of innovative capability often adopt a certain perspective, such as product innovativeness instead of overall innovative capability. A prime interest in the existing literature is to investigate innovation activities and their associations, where adoption of one or more innovations is examined as the dependent variable and linked to attributes of the organization, the individual respondent, and the innovation itself. This had led to confusion in innovation research, either making it difficult to compare findings across studies or leading to biased conclusions (Subramanian and Niktanta, 1996). Due to these reasons, the extant innovation literature often does not arrive at consensus over many issues. Reconciling the contradiction and confront require a validated measurement scale of an organization's overall innovative capability, i.e. propensity or likelihood that an organization produces innovative outcomes. Catherine and Pervaiez, (2004) identified five main areas that determine an organization's overall innovativeness. They are product innovativeness, market innovativeness, process innovativeness, behavioural innovativeness and strategic innovativeness. These five aspects are inter-linked. In particular product and market innovativeness are inter-twined. They are externally focused and market-based, whereas behaviour and process

innovativeness are internally-focused, and underline the need for product and market innovativeness, while strategic innovativeness highlights an organization's ability to identify external opportunities in a timely fashion and match external opportunities with internal capabilities in order to deliver innovative products and explore new markets or market sectors.

The advantage of using organizational innovative capabilities construct of innovation can be demonstrated from three aspects.

1. Organizational innovativeness is represented through certain traits such as newness and novelty etc., and can be easily quantified in terms of the degree that organizations are innovative.
2. Organizational innovativeness can be constructed to cover various key aspects of innovation; a multidimensional measurement build up is more reliable for measuring overall innovativeness.
3. Organizational innovativeness measures capabilities of an organization and indicates the propensity of the organization to introduce new products to the markets, or open up new markets.

Measuring overall innovativeness is not only about measuring new product developed or new market opportunities, but also prescribes the underlying elements of innovation outcomes, i.e. behavioural innovativeness, process innovativeness, and strategic innovative orientation. This organizational construct developed takes a step forward effectively measuring an organization's innovative capability. It can identify and measure strengths /weakness of organizational innovativeness at key component level. It helps an organization to overcome weakness identified at the component level rather than looking at "too many aspects of multidimensional but unidentified areas."

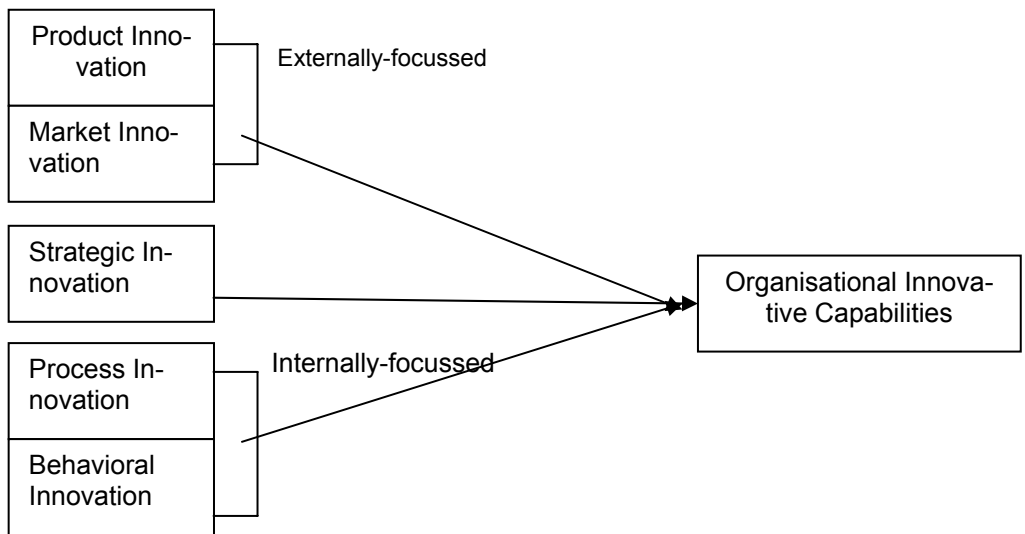


Figure 1. Research Framework

As shown in figure 1 these five innovative components are interlinked in that each item complements and results in innovativeness of other component innovative items. In a typical case when the higher management of an organization with its management innovativeness, strategize to create overall innovativeness, they would bring behavioural changes into organization (though gradual) such as encourage lateral thinking, openness. And coupled with enhanced process innovativeness (partly due to the behavioural changes), products coming out would have newness in nature. These innovative products may help market enhanced with response the products gain.

Measuring behavioural innovativeness of an organization cannot be accompanied simply by examine occasional innovation events, or innovative characteristics of certain small group of an organization. The behavioural dimension should reflect the “sustained behavioural change” of the organization towards innovations (Avlonitis et al. , 1994) .

Significance of the study

An organization’s capability to innovate is acknowledged as one of the crucial factors for it to survive and succeed. The role of information as a crucial force of

social and economic development is widely acknowledged. In particular within the business setting, innovation is often considered to be a vital source of strategic change, by which a firm generates positive outcomes including sustained competitive advantage (Salavou, 2004). This is significantly important for Malaysia as her share of GDP from industry is predominant and that social and economic status can be raised by tremendously by emphasizing on organizing on innovation. Strategically it positions ahead in business leadership across borderless regions.

Becoming innovative demands more than debate and resources; it requires an organizational culture that constantly guides organizational members to strive for innovation and a climate that is conducive to creativity (Levent & Mehmet , 2004) . If the notion of innovation culture is to be useful, it is important to be clear about what we mean by the term. Innovation culture is pertinent and complex. Innovation is best described as a pervasive attitude that allows business to see beyond the present and create the future. The key driver of the organization's ability to change is innovation. However, simply deciding that the organization has to be innovative is not sufficient. That decision must be backed by actions that create an environment in which people are comfortable with innovation they create it.

Virtually all companies talk about innovation and the importance of carrying out innovation, many actually try to do it, and only a few actually succeeded. The reality is that innovation, for the most part, frightens organizations because it is inevitably linked to risk. Many companies pay lip service to the power and benefits of innovation. To a large extent most remain averse to the aggressive investment and commitment that innovation demands. Even though innovation is debated at senior level meeting as being the lifeblood of the company, and occasional resources and R& D funds are thrown at it, often commitment usually ends there! This is even intangible and poses bigger hurdle in the case of overall organizational innovativeness as it is holistic in nature and requires an organizational culture that constantly guide organizational members to strive for innovation.

Organizational Innovation

Various approaches to creating an innovative organization or transforming stagnated organizations into innovative ones have become established in the past decades (Drucker, 1999). The rationale behind this is that high level of organizational innovativeness lead to better organizational performance. According to

Drucker (1999), few empirical studies have closely examined the relationship between level of organizational innovativeness and business performance especially in areas such as sales and employment growth. However, the focus has remained predominantly on issues of finance, cost, profitability and revenues (Tidd et al 1998, Drucker, 1999). Even fewer studies have addressed the impact of change in organizational innovativeness on organizational performance (Damanpour and Gopalakrishnan, 2001). In the Malaysian scenario, there is hardly any study available on performance innovativeness focused on Malaysian organization operating in local soil or foreign soil.

Research into innovativeness has become multidisciplinary effort, including sociology, psychology, organizational behaviour, economics and marketing. It has also been approached in a variety of ways, such as through customer and /or provider perspective (Drucker 1999) , or levels of innovation in terms of individuals , teams /projects and organizations (Subramanian 1996). Lam (2004) argues that even though the existing literature on organizational innovation is indeed very divers, it is not well integrated into a coherent theoretical framework; the literature of organizational innovation can be broadly classified into three different streams , each with a different focus and a set of different questions which it addresses.

Organizational design theories focus predominately on the link between structural forms and the propensity of an organization to innovate. The unit of analysis is organization and the main research aim is to identify the structural characteristics of an innovative organization, or to determine the effects of organizational structural variables on product and process innovation.

Theories of organizational cognition and learning by contrast, tend to focus on the micro-level process of how organizations develop new ideas for problem solving. They emphasise the cognitive foundations organizational innovation which is seen to relate to learning and organizational knowledge creation process. This camp of research provides a micro-lens for understanding the capacity of organizations to create and exploit new knowledge necessary for innovative activities.

A third strand of research concern organizational change and adaptation, processes underlying the creation of new organizational forms. Its main focus is to understand whether originations can overcome inertia and adapt in the face of radical environment shift and technological changes, and

whether organizational change occurs principally at the population level through selection. (Tushman 1994).

Organizational innovation may be a necessary pre-condition for technological innovation, and thus it is important to take greater account of the role of endogenous organizational forces such as capacity for learning, value, interests and power in shaping organizational transformation and technological change (Lam, 2004).

Research Design and Methodology

To provide avenues to fulfil the purpose of this study, a survey has been carried out and data collected in order to find the research objectives. No specific type of company /industry has been targeted as the purpose was to find overall organizational innovativeness of any company operating in Malaysia. The analysis was based purely on the responded perception of participants and hence an error of non-uniformity of expression of facts, though typical of any survey, is unavoidable.

A set of 48 items questionnaire generated from extensive literature review was used to collect empirical data. Questionnaire was distributed by modes of mail, e-mail and self-administered. The lists of company were available from industrial sources and Ministry of International, Trade and Industry.

A total of 442 respondents were given questionnaire of which the break down of questionnaire is shown in table 2.

Table 2: Summary of Questionnaires extended

NO	Delivery Mode	Number of Questionnaire	Percentage of Questionnaire
1	Post	312	71%
2	E-mail	96	22%
3	Hand Over	34	8%
4	Total	442	100%

Data collected are from Kuala Lumpur Metropolitan area. The researcher used convenient sampling to get as much respondent as possible from the Golden Triangle of Malaysia, where business are concentrated in the capital city. It is also noted that firms understudy have subsidiaries and branch offices scattered throughout Malaysia. .

As this study was to find the level of overall innovativeness (overall aspects /activities of the organizations) and also to find the structural relationship among the component innovativeness , the questionnaire was targeted to CEOs or any competent senior executive level who is aware of overall aspects of his organizations.

Data Analysis

A single factor analysis was performed on all the 48 variables using Varimax rotation with Kaiser Normalization to reduce the item variables into same meaningful groups. Kaiser criterion was adopted to determine the number of factors chosen. Kaiser rule is to drop all components with eigenvalues under 1.0. Though literature review was to map overall innovativeness into five main components, exploratory factor analysis (EFA) was used for finding the number of component factors the item can be collapsed to. The extraction method used was principal component analysis.

Varimax rotation was chosen to maximise the variance of squared loadings of factors on all the variables in a factor matrix which has the effect of differentiating the original variables by extracting factor. Loadings at initial condition and after rotation were performed though number of factors remained the same on both cases. This meets the requirements of at least three variables per factor (Kim and Mueller, 1978b, 77). It is to be highlighted here that the purpose of analysis is to find the number of factors related to data on Malaysian scenario.

Table 3.

Questions	1	2	3	4	5	6
We are constantly improving or business	.598					
When we cannot solve a problem using conventional methods, we improve on new methods	.557					
We get a lot of support from management if we try new ways of doing things	.521					
We are willing to try new ways of doing things and seek						

unusual novel solutions	.837	
We encourage people to think and behave in original and novel ways	.804	
Our corporate philosophy emphasises and encourage innovation	.697	
We allow acceptance of mistakes while doing new and uncertain things	.548	
In our company, ideas and suggestions of employees are valued and respected	.751	
In our company, management induce culture that encourage innovation	.834	
Our company management is outward looking with greater degree of willingness to accept external ideas	.822	
Our company executives are willing to take risks by unusual novel solutions to seize and explore chancy growth problem	.795	
We are dedicated to providing opportunities for leadership at levels in our organisation	.723	
New Products and services in our company often take us against competitor	.744	
In comparison with our competitors, our products most recent marketing programs is revolutionary in the market	.721	
In new product and service introduction, our company is often at the cutting edge of technology	.780	
The technology of our main machinery in use is very uptodate	.624	
Our future investments in new machinery and equipment are are significant compared with our annual turnover	.798	
Our future investment in new methods of production are significant compared with our annual turnover	.840	
In product and service introduction, our company is often first to the market	.714	
Our new products and services are often perceived as very novel by customers	.633	
In comparison with our competitors, our company has introduced more innovative products during the past 5 years	.501	
During the past 5 years, our company has developed many new management approaches	.600	
Key executives of the firm are willing to take risks to seize and explore chancy growth opportunities	.617	
During the past 5 years, our company has conducted many programs to impart awareness on innovativeness and creativity on products	.617	
When we locate a new location, consideration has been given on factors such as human competency and cluster related innovation	.865	
Our company's most recent new product introduction required a new form of advertising and promotion.	.793	
Our company provides individual freedom in decision making responsibility	.561	
Individuals are rewarded more intrinsically (ie personally thanked by CEO/recognised for award than extrinsically	.841	

Findings and Discussions

Company Information

Data collection showed, based on type of industry, industrial project sector has the highest innovative scale followed by service and manufacturing sectors while government sector has the lowest scale in innovativeness. Based on the size of companies, the largest with over 1000 employee, recorded highest innovative scale of 3.76 out of 5 and similarly based on the paid-up capital, the innovative scale is the highest with above US \$ 50 million.

Innovative Component Factors

48 variable items are mapped for innovative components based on literature review. The mean values of components items are shown in table 3. Though all five components have close range scale measures, market & product innovativeness have the lowest scales, whereas behaviour innovativeness has the highest scale. External focus measures are more difficult to implement due to customer/government regulations on environmental or market conditions, while internal focus measures are easier to implement.

Table 3: Component factor

Innovative Component	Mean
Product innovativeness	3.20
Process innovativeness	3.50
Market innovativeness	3.19
Strategy innovativeness	3.31
Behaviour innovativeness	3.55

From factor analysis, the study reveal that 6 factors have been loaded from the 5 original clusters.

From

To

Product innovation

Process Orientation

Process innovation

Market-based Orientation

Market innovation

Technology Orientation

Strategic Innovation

Product Orientation

Behavioral Innovation

Strategic Orientation

Operations-based Orientation

Conclusion and Recommendation

Conclusions

The organizational innovativeness construct developed in this research takes a step forward towards effectively measuring an organization's innovative capability. The significance is primarily three-fold. First, departing from the majority of existing researches that focuses on one or two aspects of innovation, this organizational innovativeness construct captures the principal elements of innovative capabilities, and thus depicts an organization's overall ability to innovate outcomes. Second, the construct (innovative model) incorporates an organization's strategic orientation as a prime factor of innovation capability. This essentially means that the construct assesses the potential innovative capability and demonstrates a future orientation. Another feature of the construct is a demarcation of general organizational innovativeness factor and five component factors. This evaluates a thorough assessment of an organization's innovative capability..

Recommendations

Organizational innovativeness construct needs to be subject to further research for validation. Future research may consider additional aspects such as industry networks, management innovation. Considering addition of testing casual relationship between organizational innovativeness and organisational parameters would enable to test predictive validity. On survey, it is advisable to use sample

size as big as statistically satisfying and almost equal number from each type of industry so that each industry can be analysed and evaluated on an unbiased manner. This can evaluate the preciseness of convergent validity of constructs.

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Contextualising the Growth and Diversity of Minority Ethnic Entrepreneurship in Britain

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Abstract

This paper contextualises the growth and spread of minority ethnic entrepreneurship in Britain under the impact of demographic, institutional and economic changes that have taken place over the past 50 years. Employing Sample of Anonymised Records (SARs) 2001 census data a landscape of minority ethnic entrepreneurship is sketched for the five main ethnic groups against the White British population. The entrepreneurial characteristics of various ethnic groups are evaluated. In an earlier study we tested hypotheses derived from the middleman minority theory and the ethnic enclave model and found that self-employment in these groups is inversely related to minority share in the regional economically active population for England and Wales (McEvoy and Hafeez, 2009). We characterise regional ethnic enclaves as a set of four market spaces, namely, *ethnic enclosure*, *local non-ethnic* niche, *ethnic non-local* market; *non-ethnic non-local* market. In this paper we explore the population data from the SARs to compare and contrast the relative employment patterns of different minority communities against the majority population by introducing Multidimensional Scaling (MDS) technique. We argue that MDS allow us to better understand the “breakout” phenomenon of ethnic business by representing the concentration and diversity of sectoral business in a pictorial format and clearly explain co-ethnic competition. We observe that the ethnic enclosures are limited in their profitability by co-ethnic poverty, the size of the community. We argue that such innovative use of MDS provides an efficient way to compare entrepreneurial characteristics, skills sets, sectoral presence and operating markets for different ethnic groups.

Keywords: Ethnic enclave model, Middleman theory, Sample of Anonymised Records (SARS), Multidimensional Scaling (MDS)

Ethnic Minority in Britain

Most of Britain's ethnic minorities have their origins in the imperial past. In the two decades after 1945 streams of migrants from the Caribbean, from South Asia, from Hong Kong, and from other quarters of the disappearing Empire, were established. Most of these newcomers, as citizens of former or current British colonies, held British passports. In spite of recurring moral panics, most notoriously characterised by the 1968 "Rivers of Blood" speech of the maverick Conservative politician Enoch Powell, these migrations were a response to vacant job niches in the British economy. In a period of economic growth and full employment, positions which were poorly paid, or involved long hours or unpleasant conditions, no longer attracted sufficient numbers of the indigenous population. Industries such as engineering in the West Midlands and textiles in Lancashire and Yorkshire relied on immigrants to maintain their competitiveness. Male newcomers, sometimes actively recruited from overseas, often staffed night shifts which were unattractive to white males, and illegal for female workers (Kalra 2000, 96). Similarly the National Health Service and train and bus operators plugged staffing gaps with immigrants of both sexes.

This replacement labour phase did not however continue. Primary immigration became much more difficult in laws of 1962, 1968 and 1971 which changed the passport entitlements of colonial and former colonial citizens. Nevertheless family reunification continued to be allowed, so that wives and children were able to join men who, for reasons of economy, had originally migrated alone. The passage of decades, with births and education in Britain, had the unintended consequence of turning possibly temporary migrant populations into settled ethnic minority communities. The sojourner mentality of the original migrants, and the associated "Myth of Return" (Anwar 1979), was supplanted by a recognition that minorities were "Here to Stay" (Bradford Heritage Recording Unit 1994). Meanwhile immigration on the basis of work permits, for those with professional qualifications or specialist skills, continued on a restricted basis, and some foreign students and asylum seekers were also able to gain admission.

The demographic and economic context

Government data have struggled to define these evolving populations. Until the 1971 census only birthplace and previous residence were recorded. Continuing this practice would have rendered the growing number of children, born in Britain of immigrant parentage, statistically invisible. In 1971 a census question was asked about parental birthplace. The 1981 census dealt with the matter by inference: ethnic minorities were identified on the basis of the birthplace of the head of the household in which a person resided (Coleman and Salt 1992, 483-486). Only in 1991 were census respondents asked directly about ethnicity. This was repeated in 2001, although the results have been classified slightly differently from ten years earlier. Additional complications arise from differences between the categories enumerated and reported in Scotland and those used in England and Wales. Northern Ireland even has a separate census, resulting in further variations in ethnic classification (NISRA 2003).

It is nevertheless possible to produce national figures by amalgamating some of the categories used in the component countries. We have constructed such a Table for Great Britain (that is the United Kingdom minus Northern Ireland), which is not included here due to space limitations, however further details are provided elsewhere (McEvoy and Hafeez, 2009). It is confined to the age group 16 to 74, which contains the majority of the working population. It can be seen that those identified as White British by their household's census respondent amounted to approximately 88 per cent of the potential workforce. Other white groups, including the Irish, other Europeans and those from the worldwide European diaspora made up just over another three per cent. Indians are the largest non-European group, with almost two per cent of the working age population, while their fellow South Asians from Pakistan and Bangladesh comprise respectively 1.2 per cent and 0.4 per cent. Black Caribbean and Black Africans contribute 1.1 per cent and 0.9 per cent of the total, and the Chinese 0.5 per cent. Those of ethnically mixed descent amount to 0.8 per cent, and the three remaining 'Other' groups aggregate all remaining Asians (0.5 per cent), all remaining Black populations (0.1 per cent), and all those not covered by any more specific classes (0.4 per cent). It should be noted that these Asian and Black categories include those identified as British Asian or British Black; these forms of identification represent an assertion that British nationality is more important in characterising individuals than their ancestral homeland.

Ethnic minorities self-employment sectoral analysis

Individual minorities have concentrated in specific economic sectors, mostly, but not exclusively, in service industries. We have constructed such a Table using the Labour Force Survey (LFS) a quarterly continuous survey based on household interviews conducted by the Office of National Statistics⁴ (space limitation prohibits to show the Table) . The overall sample size for those in work (employed or self-employed) is about 62000, and for the self-employed about 6800. When the latter figure is tabulated by industrial sector and ethnic group the size of the sample in many cells becomes very small, with consequent uncertainty as to reliability. This can be appreciated by examining the sample sizes indicated in the final row of the table. Gender disaggregation becomes impossible because the number of females in some ethnic groups becomes vanishingly small, quite literally so in the Bangladeshi case. Only the most obvious points are therefore made about this table. Indians, Pakistanis, Bangladeshis and Chinese are all strongly represented in distribution, hotels and restaurants. Information not presented here allows us to say that for Indians and Pakistanis the principal involvement is in retailing, especially convenience grocery stores and newsagents (McEvoy and Hafeez, 2009).

The Chinese and Bangladeshis are more prominent in the restaurant trade (Barrett *et al.* 2003). Pakistanis are also very strongly represented in transport and communication, with taxi driving as the predominant activity. This is an extremely marginal form of self-employment. The most common form of taxi driving followed is private hire, whereby the taxi is booked through a telephone office, rather than hailed on the street. Arguably the owner-drivers are engaged in a form of labour-only sub-contracting. The cabby is forced to take on the costs of illness and capital, together with the risks of slack business periods and illness, thus protecting the owner of the office and the radio service, which passes bookings to drivers, from many business difficulties. For the driver "...the potential of violence is added to the indeterminate number of customers and insecure daily income..." (Kalra 2000, 188-189). By 1991, one in eight Pakistani males was already a taxi driver, compared with one in a hundred in the whole population (Cabinet Office 2002, 56).

⁴ 1. The Labour Force Survey data were obtained from the UK Data Archive at Essex University. Neither the archive nor ONS bear any responsibility for the interpretations presented here

Changing Ethnic Markets

Protected markets also allowed the first Indian and Pakistani food retailers to be established in parts of inner cities where these communities had settled. Specialist demand, derived from religious norms and cultural preferences, encouraged co-ethnic shops to become established. For example Muslims do not eat pork, and require their meat to be slaughtered in *halal* (permitted) fashion. More generally, South Asian communities required ingredients suitable for the cuisine of their country of origin, which traditional independent British food shops and supermarkets did not supply. Nor in the 1960s did mainstream cinemas or music stores provide for immigrant entertainment needs. In the case of the 'Curry Mile', a restaurant-dominated ribbon of consumer businesses in Rusholme, Manchester, the catalyst for the establishment of South Asian firms was the renting on Sundays in the 1960s of two declining suburban cinemas to show Bombay movies to South Asians from the wider metropolitan area. The flow of customers this generated allowed the founding of a whole series of food shops, clothing stores, travel agents and other firms supplying South Asian preferences (Barrett and McEvoy, forthcoming 2006). Clothing and jewellery suppliers remain a protected market for South Asian businesses in most areas of South Asian residence, as mainstream suppliers have never attuned to the culturally-specific demands for South Asian female attire. Even in communities without a strong tradition of business involvement unique preferences can allow some businesses to be sustained. Hairdressing and beauty salons are among the most common business activities among the Black Caribbean community. Similarly Nwankwo (2005) observes that Black African firms, which are growing rapidly London, are confined to mainly to co-ethnic markets.

Ethnic niches have their limitations however. The size of the minorities served is very small compared with the overall British market, even when some minorities are rapidly growing. Moreover some minorities are poor, as evidenced by their unemployment and economic activity rates which also constrains the value of a protected market (Smallbone *et al.*, 2005). In these circumstances the key to expansion and prosperity is 'breakout', the entry into serving mainstream markets (Ward 1985, Ethnic Minority Business Initiative 1991, Ram and Hillin (1994). In many ways this equates to the 'Middleman Minority' model initiated in the United States by Bonacich (1973). It is a strategy followed by Korean Americans, and by each of the ethnic minorities in Britain with a higher than average share of self-employment. We have already seen how Bangladeshis and Chinese have dispersed geographically in order to serve the general population. Many Indians operate convenience stores selling newspapers, cigarettes, alcohol and foods in

predominantly white residential areas, especially those localities within easy travelling distance of Indian population concentrations. This proximity allows the retailer to retain access to community life while serving non-community markets. Pharmacy retailing is also a sector which has attracted Indians (Hassell *et al.* 1998). Pakistanis are also prominent in convenience retailing, and are also heavily involved in running market stalls selling clothing. These markets typically operate on one or more days a week on sites in small rural towns, and in the major cities. Markets often have a history long predating twentieth century immigration. Traders typically move from one market to another with days of the week, thus accumulating a level of custom that could not be attracted to a permanent stall in any one location. Indians and Pakistanis can also be found in a variety of other businesses serving non-ethnic markets, including filling stations for cars, travel agencies, and retail opticians. A final example of Pakistanis entry to mainstream markets is the taxi business. The pattern described by Kalra (2000) in Oldham is replicated throughout most of the towns and cities in Lancashire and Yorkshire. The majority of the clientele, whether business travellers, or supermarket shoppers with heavy loads but no car, or late night drinkers and revellers, returning home long after public transport has ceased operation, are white.

The process of breakout has been conceptualised as a set of four market spaces (Jones and McEvoy 1992, Barrett *et al.* 1996, Barrett *et al.* 2001)). The initial situation of ethnic minority enterprise is labelled the *ethnic enclosure*, an essentially local market of co-ethnics, found in areas where a particular group is residentially concentrated. Ethnic enclosures are limited in their profitability by co-ethnic poverty, the size of the community, and often by intense co-ethnic competition. Breakout can be achieved by moving to one of three alternative market spaces. The first of these is the *local non-ethnic* niche, which we equated with typical middleman activities such as convenience retailing and hot food 'take aways'. Here the enterprise has escaped the limitations of serving only the ethnic minority population, but it is still restricted to small-scale low-order activities by the neighbourhood effect. The second alternative is the *ethnic non-local* market; this incorporates those firms which continue to sell mainly to co-ethnics, but draw their custom from geographically wider markets. These businesses retain some advantages provided by ethnic networking, but avoid the restrictions of a local market. Such businesses include the fashion and jewellery retailers found in the Curry Mile and other South Asian business quarters such as Green Street in the Newham district of east London (Shaw *et al.* 2004), Southall High Street in west London, and Belgrave Road in Leicester. Finally, there is the *non-ethnic non-local* market where minority firms have entered the economic main-

stream by selling to the open general market. Examples of businesses in this market space include food manufacturers in Birmingham (McEwan *et al.* 2005) and elsewhere who sell both ethnic and non-ethnic packaged foods to national supermarket chains and to multinational markets. An apparently parallel development occurred in the Batley area of West Yorkshire. Here a virtual tripling of the number of South Asian firms manufacturing beds occurred in the period from 1989 to 1999. The main customers, both regionally and nationally, are furniture retailers. Ostensibly this is a very positive development, illustrating the triumph of ethnic minority entrepreneurship in a locality which has suffered heavily from deindustrialisation. A more pessimistic interpretation is that this low-tech industry, making heavy use of co-ethnic labour on low wages, is an ingenious survival mechanism rather than a model for ethnic minorities and others elsewhere. It may be that it is only the bulk of the product, making it difficult to import cheaply, which has allowed the industry to grow (Barrett *et al.* 2002).

Ethnic Diversity: Co-ethnic and Inter-ethnic Group Competition

Are labour force participants of different race/ethnicity distributed differently across the major sectors of the economy? Several different general theories suggest that such differences are likely. First, different ethnic communities grew in different regions at different times in recent history; at these historical moments, differing sectors may have been growing, and hence were more likely to provide employment opportunities for new immigrants. Second, there may be propensities for persons of a given ethnicity to be drawn to particular sectors by the presence of co-ethnics in that field; information about employment opportunities, job references, and access to entrepreneurial opportunities in particular lines of work may pass along social ties within an ethnic group. Third, it is possible that discrimination against certain ethnicities by others results in the effective exclusion of some from employment opportunities in a particular field.

Research Methodology: Multidimensional Scaling (MDS)

To examine these hypotheses at the regional scale, we will make use of published census figures from 2001. These enable us to correlate the sectoral characteristics of various ethnic groups in the Bradford regional population. Sample of Anonymised Records (SARs) is used. SARs is an approximately three per cent sample of all census returns available to academic users under license (<http://www.ccsr.ac.uk/sars>). The data are individual so that users can create cross-tabulations not appearing in published census output. In order to guaran-

tee confidentiality of census respondents however, limits are placed on the number of variables for smaller geographical areas. Thus we can correlate sectoral diversity among ethnic minority firms with population share to test our second hypothesis on the regional scale, but not more locally. But our first hypothesis makes use of data exclusively from published tables, so that regional analysis can be replicated for local government districts.

Multidimensional Scaling (MDS) (Borg and Groenen, 2005) is used in the subsequent analysis. By employing MDS technique we seek to understand the regional ethnic sectoral concentration and diversity; and try to investigate inter-ethnic and co-ethnic competition. The MDS application on the census data could show (in a geometric way) which ethnic groups are "close" to one another. This could possible explain if these ethnic groups have similar patterns of economic participation, and therefore, competing in the same sector(s) for business. On the other hand, the analysis could reveal if some of the ethnic groups are "distant" or dissimilar to one another having different patterns of economic participation, and therefore serve different markets, and possibly have a better chance of survival. Therefore MDs analysis could characterise the strategic positioning of different ethnic groups on the national economic landscape of Britain in a visual format.

Results and Analysis

A total of 91,692 individuals belonging to different ethnic groups participated in the self employed pattern taken from SARs 2001 (see Table 1). From the observed data White British ethnic group take 93.1 % (85,386) of the self employed population in England and Wales. The self employment pattern for other ethnic groups range from 0.8 % (Chinese) to 2.6% (Indian). 'Others' sector has the highest percentage of the self employed economic activity (40.3%). Real Estate and Renting and Business Activities (EsREnBuAc) is the second largest sector with self employment for across the seven ethnic groups' consists 16.9%. Whereas, Distributive Trades & Automobiles (DisTraAuo) is the third largest sector employing 16.0% of the economic active population. For the purpose of MDS the numbers of persons in each employment category (i.e. sectors) for each ethnic group were expressed as proportions of the total numbers of persons in that ethnic group (i.e. normalised values). This allows a comparison of the similarity in the "structure" of the employment patterns across ethnic groups, therefore, disregarding the actual numbers of persons in each ethnic group. Table 2 provide normalised values of Table 1 data to conduct like for like MDS analysis.

Table 1: England and Wales ethnic groups 2001: self-employment by sector

	Man	Dis- TraAuo	Hotel- REst	Trans- StoCom	EsREn- BuAc	Hea- SociW	Others	Total	
White British	7765	12930	3723	5085	14683	5379	35821	85386	93.1%
Indian	161	1029	119	195	290	248	371	2413	2.6%
Pakistani	97	326	84	351	127	52	140	1177	1.3%
Bangladeshi	12	40	141	37	29	10	32	301	0.3%
Other Asian	34	147	53	56	61	61	91	503	0.5%
Black	96	156	31	125	264	108	414	1194	1.3%
Chinese	27	81	422	4	78	40	66	718	0.8%
Total	8192	14709	4573	5853	15532	5898	36935	91692 (100%)	
	8.9%	16.0%	5.0%	6.4%	16.9%	6.4%	40.3%		

Keywords:

Man	Manufacturing	EsREnBuAc	Real Estate, Renting and Business Activities
DisTraAuo	Distributive trades & automobiles	HeaSociW	Health and Social Work
HotelREst	Hotels and Restaurants	Others	All other sectors
TransStoCom	Transport, Storage and Communication		

Total numbers of group's total self-employed by sector

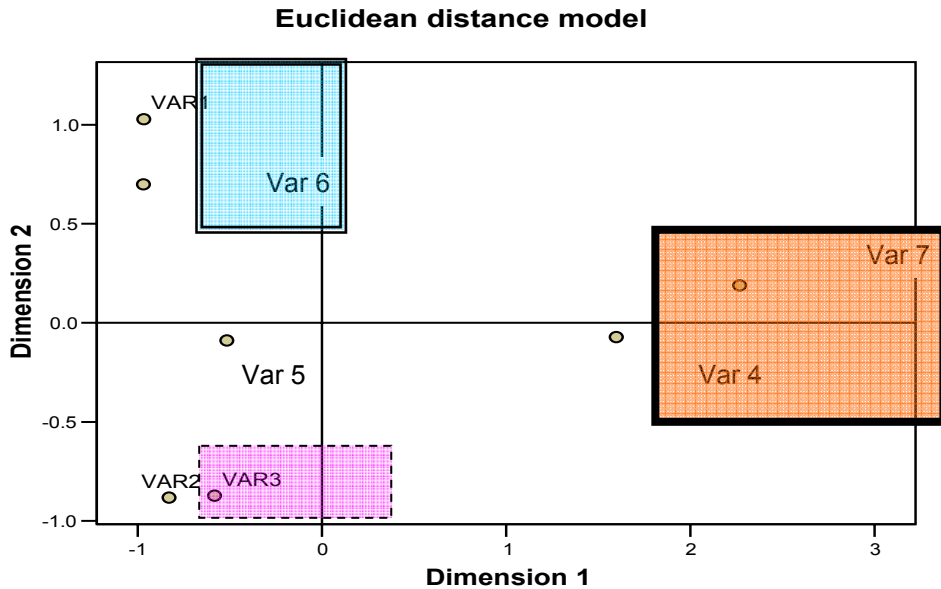
Source: 2001 Census: Sample of Anonymised Records (SARs) (Licensed) (England, Wales, Scotland and Northern Ireland. Census output is Crown copyright and is reproduced with the permission of the Controller of HMSO and the Queen's Printer for Scotland.

Table 2: Normalised weights for different Groups in England and Wales: self-employment by sector

Proportions of group's total self-employed by ethnic groups

	Man	Dis- TraA- uo	Hotel- REst	Trans- StoCom	EsREN- BuAc	Hea- SociW	Others	Total
White Bri- tish (VAR1)	0.091	0.151	0.044	0.060	0.172	0.063	0.420	1.000
Indian (VAR2)	0.067	0.426	0.049	0.081	0.120	0.103	0.154	1.000
Pakistani (VAR3)	0.082	0.277	0.071	0.298	0.108	0.044	0.119	1.000
Bangladeshi (VAR4)	0.040	0.133	0.468	0.123	0.096	0.033	0.106	1.000
Other Asian (VAR5)	0.068	0.292	0.105	0.111	0.121	0.121	0.181	1.000
Black (VAR6)	0.080	0.131	0.026	0.105	0.221	0.090	0.347	1.000
Chinese (VAR7)	0.038	0.113	0.588	0.006	0.109	0.056	0.092	1.000

Derived Stimulus Configuration



Key: Var1 = White British; Var 2 = Indian; Var 3 = Pakistani; Var 4 = Bangladeshi; Var 5 = Other Asian; Var 6 = Black; Var 7= Chinese

Figure 1: Relative similarity/dissimilarity of ethnic groups according to sectoral diversity for England and Wales

From Figure 1 we observe that interestingly the White British (VAR1) and Black ethnic (VAR6) groups have relatively closely matched characteristics with regards to sectoral diversity compared to other ethnic groups. This can be explained looking at the normalised values in Table. Comparing with other ethnic groups, White British and Black ethnic groups have relatively similar proportion of population engaged in the six (out of seven) studied sectors, namely, Man, DisTraAuo, HotelREst, TransStoCom, EsREnBuAc and HeaSociW. The only observable difference exists in the Others' sector category, where White British (0.420) has a relatively higher concentration compared to Black (0.347), therefore, occupying slightly higher position along Dimension 2.

We also observe that the Indian (VAR2) and Pakistani (VAR3) groups are placed very close to each other in Figure 1. This is due to similar economic activity, and perhaps having very similar skill sets and cultural and social values as outlined earlier. This is confirmed by looking at Table 2 data, where the two groups score similar indices for the Man, HotelREst, EsREnBuAc, HeaSociW and Others sectors (Table 2). The observable differentiating factor is that Indians have relatively higher proportion of population engaged in DisTraAuo (0.426 compared to 0.277 for Pakistanis) – while Pakistani have slightly higher proportion engaged in TransStoCom (0.298 compared to 0.08 for Indians). The analysis also tease out the similarity in between Bangladeshi and Chinese ethnic groups, as these have relatively pronounced proportion working in the HotelREst sector compared to all other groups. The relative positioning of Chinese group (positioned slightly higher up along Dimension 2) relates to relatively a higher percentage (0.588) engaged with this activity compared to Bangladeshi ethnic group (0.468).

Results from the Multi Dimension Scaling (MDS) analysis reveals that White British group has a very high presence in 'Others' sectors which differentiate it from the Indian, Pakistani and Other Asian ethnic groups. (Others Sector consists of the ten sectors combined together). Therefore, overall the White British group has relatively higher sectoral diversity compared to the rest of the ethnic groups, and dominantly operate in different markets. As for minority ethnic groups are concerned (namely, Indian, Pakistani, Bangladeshi, Chinese) each has a strong presence in a single sector. Whereas, Other Asian is the only group which is relatively more evenly dispersed across all sectors. The analysis clearly shows that Indians and Pakistanis are competing in the similar market place, and possibly have very similar skill sets and entrepreneurial attitudes. Also clearly Chinese and Bangladeshi groups have comparatively less sectoral diversity then the other groups and competing in a cut throat HotelRes market. Among the minority ethnics, Black is the most diverse group for spread of its economic activity, followed by Other Asians, Indians, Pakistanis, Bangladeshis and Chinese. However, these results don't not necessarily linked to the economic well-being of different groups while operating in these sectors.

Conclusion

Political and legal frameworks are seen as a vital instrument which can completely change the number, types, and significance of minority enterprise in any

economy. This paper contextualises the growth and diversity of minority ethnic entrepreneurship in Britain under the impact of demographic, institutional and economic changes that have taken place over the past 50 years. Employing Sample of Anonymised Records (SARs) 2001 census data a landscape of minority ethnic entrepreneurship is sketched for the five main ethnic groups against the White British population. We characterise ethnic enclaves as a set of four market spaces, namely, *ethnic enclosure*, *local non-ethnic* niche, *ethnic non-local* market; *non-ethnic non-local* market. In order to evaluate comparable sectoral concentration and diversity of minority ethnic economic active population against the White British, Multidimensional Scaling (MDS) is employed. We identify co-ethnic competition among the pairs of Pakistani and Indian groups, and Chinese and Bangladeshi groups. We conclude that the ethnic enclosures are limited in their profitability by co-ethnic poverty, the size of the community, and often by intense co-ethnic competition. Breakout can be achieved by moving to one of three alternative market spaces. We argue that innovative use of MDS provides an efficient way to compare ethnic groups entrepreneurial characteristics, skills sets, sectoral presence and operating markets. We argue that results of this study have implications in the context of ethnic groups, regional and sector specific policy making.

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II RESEARCH NOTES

Transforming Higher Education for a Sustainable Tomorrow: the Experience of Universiti Sains Malaysia

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Abstract

The paper discusses three aspects of the responses by the Universiti Sains Malaysia to the globalisation process of liberalisation and internationalisation that enabled it to take innovative measures to transform its role in higher education in the country and beyond. Firstly through a scenario-building exercise it adopted the University in the Garden scenario that conveyed the merging of learning with the natural environment. Secondly with the establishment of USAINS@USM, a modified science park, it was able to optimise the use of learning space for the studies of arts and the sciences. Thirdly the transformational road led to the APEX (Accelerated Programme of Excellence) status being conferred upon it in recognition of the University's readiness and preparedness in achieving excellence in all areas of higher education. Leadership played a critical role in moving the Universiti Sains Malaysia from a traditional university to a sustainability-led university.

Keywords: Transformation; Higher Education; Leadership

Introduction

Higher education and universities are critical to the economic and social futures of countries like Malaysia. In the knowledge economy, demands for the pursuit of knowledge and innovation as well as a highly specialised and educated people have made university education highly important priority for the Malaysian government (Ministry of Higher Education Malaysia, 2007). Together with the

challenges of globalisation Malaysian universities must confront the new realities by creating and structuring appropriate models that can determine the role of universities in the future.

We begin this paper by discussing the development of Malaysian universities and the changes in the system that had occurred since 1950s (Zailan, 2007). The changes are meant to implement specific government policy for education in particular the need for expansion of universities, privatisation, competitiveness and improvements in efficiency.

The first university in Malaysia (then Malaya), the University of Malaya (UM), was founded in late 1950s. Arguably, the establishment of this university in Kuala Lumpur was of decisive importance for the Malaysian higher education system and since independence in 1957 and up to late 1960s, the Malaysian higher education system was centred around this university.⁽¹⁾ It is interesting to note that many of Malaysia's past and current political leaders, top civil servants and corporate figures are alumni of this university. In the seventies, three universities were established specifically to cater for the need to have sufficient pool of trained human capital, which were highly relevant to the socio-economic development of Malaysia at that time. Thus, Universiti Sains Malaysia (USM) was established in 1969 specifically to train human capital in the sciences and related fields. As an emerging nation, Malaysia needs to project its identity and sovereignty, which understandably could only be realised through the use of the national language as the medium of instruction at the university level. University Kebangsaan Malaysia (UKM) was established in 1970 to realise this national aspiration. The main task of producing human capital in agriculture and related fields relevant to the need of an agriculture-based economy undergoing transformation was given to Universiti Pertanian Malaysia (UPM), which was established in 1971. Universiti Teknologi Malaysia (UTM), established in 1975, was mandated to produce skilled human capital in the field of engineering and technology.

Between 1957 and late 1970s, the higher education system in Malaysia has expanded with the establishment of universities offering a diverse academic and technical disciplines relevant to national development. It is important to note that before 1980s, higher education in Malaysia was primarily provided by the public sector. While the private providers were very active in the education sector, their involvement in the provision of higher education was very minimal. In other words, higher education in Malaysia before mid 1980s has not diversified but it is important to note that in the late 1980s, the trend towards diversification in the provision of higher education was very evident. Foreign universities and colleges

were actively involved with local partners in offering academic and technical programmes in Malaysia. By early 1990s, the important role of the private providers of higher education in the Malaysian higher education system was very evident.⁽²⁾ With the intensification of globalisation process and the internationalisation of higher education, the higher education system seems incapable of coping with the demands of transnational higher education. Thus, educational reforms governing both the public and private higher education in Malaysia were carried out in 1996. The Education Act 1996, Private Higher Educational Act 1996, National Council on Higher Education Act 1996, National Accreditation Board Act 1996 and Universities and University Colleges (Amendment) Act 1996 were timely as higher education was seen as vital to Malaysia's economic growth and these reforms provide the necessary regulatory framework for the liberalisation and privatisation of higher education on a larger scale to meet Malaysia's national development objectives.

Indeed the global era and the increasing tendency towards internationalisation of higher education have led to the introduction of several models to encapsulate various higher education systems in the USA, Europe and Asia. Similarly, in the case of Malaysia, the higher education system as a whole is in need of models which would provide a basis or framework in which to realise national aspirations in the area of higher education, from the perspectives of meeting national human capital development and as an important source of economic growth.

Malaysia's Experience with Models of Universities

This paper reports on a major work undertaken recently on developing models for higher education system and universities in Malaysia (Morshidi, 2007). It is important to note that with education reforms in 1996 and the subsequent establishment of a separate Ministry of Higher Education in 2004, several studies have been undertaken to investigate important aspects of the provision of higher education in Malaysia (Morshidi 2006; World Bank and Economic Planning Unit 2007). Initially, policy-makers were very comfortable with public and private role in the provision of higher education, but with concern for better governance of universities, demands for academic and financial autonomy, and innovative ways of financing and funding higher education, a simple division of public and private provision of higher education becomes highly inappropriate. Appropriate models need to be developed to describe and guide higher education system and universities in the future. While there is a great desire to develop a model which is indigenous in character (a Malaysian Model), adapting and borrowing

from the many models which describe the system in the USA, Europe and Japan is inevitable for learning from the experiences of others is highly necessary. The Malaysian model as described in this article may not be a model answer to the various intricacies of the current higher education and university system in Malaysia, but its appropriateness and logic becomes apparent when read in conjunction with the higher education scenarios as presented in the National Higher Education Research Institute's (IPPTN), located in Universiti Sains Malaysia, study entitled *Futures of Higher Education in Malaysia*. In addition to this study, the recently launched *The National Higher Education Strategic Plan 2020*, and *The National Higher Education Action Plan, 2007-2010* provide important policy contexts of this paper. It has to be recognised that while the higher education system and Malaysian universities as a whole are necessarily a dynamic one and traditional in character now, they may be in the forefront of great transformations in the not to distant future.

Table 1: Malaysian Experience with 'Models' of Universities

Year	Description of Era	University 'Model'
1957 – 1980	Intellectual	Traditional Teaching University (TU)
1981 – 2004	Government Intervention	Skills-based University College/ Polytechnic (UC/P)
	Corporatisation	Corporate
2006	Marketisation	Research-intensive Research University (RU)
2007 – 2020	Technology University – Industry	Invisible Ala Carte Vision

The Scenario-building Exercise and Future Models of Universities

The term “scenario” as used in this paper and by futurists has a different meaning from the term as used in dramaturgy, which essentially refers to storyline (Universiti Sains Malaysia 2007). In the context of this paper, scenarios are focussed sharply on the projection of a given sequence of hypothetical events to test how a given set of promises might play in a given future world (Wagar 1992, cited in Universiti Sains Malaysia 2007: 19). In essence, the scenario-building is built upon a process that captures a particular aspect of possible and probable futures, and adds to the other progressively in a sequential manner. The process comprise of five pillars representing a five-stage set of activities as follows: Mapping the future (M); Anticipating the future (A); Deepening the future (D); Creating alternatives (C); and Transforming the future (T) (Universiti Sains Malaysia 2007).

As Malaysia steps into the final decades of realising its Vision 2020, it is imperative for the Government to move towards bringing the uncertainties of the future under some control. One such method is to imagine a variety of possible futures. These are actually stories referred to as scenarios and they give us some impressions about our future, a shorthand as it were, about what the future can look like. Stories on the future can assist policy-makers in matching the problems with the solutions in hand. Arguably, as scenarios they capture our ideas about trends and emerging issues around us. They are also able to convey our preferences and expectations of things that will affect us in the future.

Scenario-makers begin with the notion that we can control some aspects of the conceivable, possible, probable, and desirable futures by imposing on the stories that we create, with our sense of values on the main issue under consideration (Miller 2003). Based on the literature, scenarios can be constructed in several ways: simple, complex and strategic (Universiti Sains Malaysia, 2007)

For the purpose of the paper since we discussing a strategic response expected from the Government, we can say that trategic scenarios build upon the simple and complex versions of stories. These are formed on the basis of what can

possibly happen as compared to the simple or complex variety. The latter only convey trends and expectation or value-based preferences. Such strategic scenarios can expand the range of possibilities imaginable including the probable and the desirable. Scenarios can only be extracted from these possibilities by the introduction of the contextual element (Miller, 2003)

Continuing with the context of evolving a university model for Malaysia, the key issue identified is the mode of governance. Three different modes have been categorised namely bureaucratic governance for the University Colleges/Polytechnics (U/UC/P), deregulated governance for the Teaching Universities (TU) and societal-market governance for the Research Universities (RU). The instrument for the operationalisation of the three modes of governance resides in the policy of corporatisation that was exercised by the government initially in 1998 and devolution since 2006. In so far as devolution is concerned, one can trace three different speeds at which the devolution objective has been implemented: from one extreme of the guided form of devolution to the other extreme of a developmental devolution. The above framework is presented in a matrix format (Table 3). From this matrix, the horizontal axis can be made to represent the degree of governance in place whether they are of the centralised, decentralised or marketised forms corresponding to a least desirable trend, most desirable trend and most likely trend. In this case it has been determined to be either of a low or a high probability. On the other hand the vertical axis will include aspects of the different timing of devolution taking place that correspond to low, medium and high. From this matrix, scenarios could be extracted further to serve as the future model of a university that combines different aspects of governance and devolution together.

Table 2: Matrix of the Different Scenarios (S)

	UNIVERSITY MODELS					
Mode of Governance	U/UC/POLY	Centra- lised	TU	Decentralised	RU	Marke- tised
	Low	High	Low	High	Low	High
Low Devolution	S 1	S 2	S 3	S 4	S 5	S 6
Medium Devolution	S 7	S 8	S 9	S 10	S 11	S 12
High devolution	S 13	S 14	S 15	S 16	S 17	S 18

By way of illustrating an example, if scenarios 5 and 9 were to be adopted as the basis for model for universities in Malaysia, this model would necessarily comprise of the following aspects: speed of glocalisation from slow to moderate and the preferred option would be for 'national university of Malaysia' and not a 'melting-pot university'. A more meaningful choice would be to combine characteristics of both types of universities where the final model is highly dependent on the government or sponsors of the university. The 'ideal' choice is scenario 4. However scenarios 8 and 10 are generally acceptable while scenario 12 is the one that is 'in- between' the two options.

What are the implications of the above-mentioned scenarios for the development of models for universities in Malaysia? What are the preferred types of universities in Malaysia with respect to form and future? What are the trends or events that are going to determine the trajectories of higher education and universities in Malaysia? These issues have been elaborated upon in numerous government reports and plans. Subsequently, by combining important and relevant issues from these documents with possible scenarios as outlined in Table 4, we would then be able to generate broader and most desirable scenarios for the future trajectory of higher education in Malaysia.

Universities in Malaysia face numerous challenges and thus a new future. The development of the model of universities will be conditioned by the universities

relationship to the economy and the society. Central to this broad condition is the need for expansion and internationalisation of Malaysian universities and, in large part as a consequences, improvements in efficiency. In addition, the models developed will be seen as recognition to the scenarios and changes that have taken place in the global higher education system. Any model adopted will make the Malaysian university system more competitive. The models developed based on the selected scenarios should lead not only to organisational efficiency but also to diversification in terms of types and functions of universities whereby there is an increase emphasis on research, vocationalisation and professionalisation of the Malaysian university system.

Universiti Sains Malaysia Experience: Traditional to Sustainability-led

The transformation of Universiti Sains Malaysia from a traditional to a sustainability-led university started in 2002. Before this year efforts have been undertaken by the university leadership to begin moving away from traditional features of a University. In 1969 when it was established as one of the country's public Universities, it opted for naming the various departments of teaching and research as Schools instead of the normal 'faculties' to indicate that the process of knowledge-transmission should be multidisciplinary and trans-disciplinary. Other similar features that attempted to bring the learning environment closer to nature were brought in such as having the student residences to be known as Community Learning centres. Such efforts helped instilled 'green' values among students and staff that the learning environment to be provided must be sustainable and conducive to learning, teaching and research, in short, a holistic development is preferred.

Constructing Future Scenarios

The University in the Garden image was made synonymous with the university from then on. It became the official tag-line from 2000 onwards. But with the onset of the globalisation process a conscious move was directed at modelling a response to the demands of internationalisation and liberalisation. Discussions about creating a model for the future were started and culminated with a series of scenario-building workshops in 2004. Using the MADCT framework for scenario-building the University was able to develop five different models of a University for the future: a la carte, invisible, corporate, state and university in the garden. Each had a distinct characteristic and were defined by their respective

drivers, myths, constraints and pushes and pulls. Both the a la carte and invisible models were recognisable as the products of the ICT revolution. The university-business partnership was underlined in the case of the models for the state and the corporate universities. The university in the garden remained distinct and stands on its own and indeed was later to be chosen as the preferred scenario.

For the University this meant that it now had the model to move forward the process of transformation further. For the first time since it was first founded, the University came to be conscious of the need to properly define the concept of the learning space. This is in line with the realisation that learning and nurturing can never take place in an environment that is devoid of feelings, emotions and values and compassion. Sustainability demands that the learning space has to offer the optimum surroundings for each of the functions of the university, learning, teaching and research to effectively serve the students and staff. There was one additional factor however, and this has to do with the element of the community as exemplified by the existence of civil society and the university's function in relating to it. It was observed for example, that the gap between the sciences and the humanities was widening and that the learning space concept that works to restore the brain nexus has to be brought in to move the process forward again.

USAINS@USM – the new innovative educational opportunity

The opportunity came in 2007 when the University was able to acquire a tract of land close to its present location and was found to be suitable in 2008, for the purpose of constructing a learning space aptly called the Universiti Sains and Arts Innovation Space, USAINS for short. Physically the architecture of the whole complex which resembles that of a normal science park, will have features to bring the elements of Arts and Science learning together once again. It is envisaged for the future that here is where the scientists and the humanists will one day converge and begin a process of nurturing knowledge in an environment that is as close to nature as can be possible. Apart from knowledge incubators and advanced research laboratories the site will also house cultural and sports arenas, experimental and neuro-economics labs and a genome lab.

In the space will also be sited all the Centres of Excellence that are presently situated inside the University's campus. An aspect that will become a reality soon will be the programme for the mentoring and training of young entrepreneurs for small and medium-scale industries as well as an exchange for entre-

preneurs. In the coming years an international school will start operation and a feeder college will begin enrolling students for absorption into the university in the years to come. All the projects identified thus far will put the university in a state of readiness and preparedness for it to undertake a much bigger role in society. Already it has shown that it could take on more and more responsibilities.

One such role is to spearhead research in fields that can benefit the most number of the country's citizens. This fits in into the newly-directed need of a sustainability-led University which is to reach out to the bottom-billion of the community and society. In this role as well the University has to do four things that will enable it to commit itself to this new role: respond convincingly to the demands of globalisation, engage with civil society positively, introduce new pedagogic standards and challenge the multiplicity of spheres in religion to survive the diversity and the multiculturalism in religion, languages and culture.

APEX Transformation Process

From the foregoing we can discern two important building blocks that have assisted in the transformation process for the University. The first, the scenario-building, from 2004 -2007, helped developed awareness of the various strengths and shortcomings of the university which its leadership was able to address. Having identified a preferred scenario the university moved forward to rectify the most significant ones. With the second of the building block, the USAINS learning space concept, in place since 2008 the university hoped to gain from this bold undertaking, by fusing the arts and the sciences in the pursuit of knowledge excellence once again.

APEX recognition came to the Universiti Sains Malaysia as a mark of its continuous and consistent efforts to build itself for the future based on the needs of sustainability. It was bestowed with the APEX status in September of 2008 against three other public universities in the country running for the recognition. The rationale is there for all to see. Right from its beginning in 1969, the university had decided to go for change and sustainability even before the term has become widely-used.. Credit must go to its visionary leadership even until today.

With the APEX status, the University has set itself the target of striving to achieve the rank of a top-100 University in the world by 2015 and the top-50 University by 2020 globally. This will come through planning and strategising actions dubbed the APEX Transformation Plan. The way forward is constructed on a strategic canvas that has eight elements namely, talents, quality, account-

ability, global agenda, future relevance, people-led and sustainability. The strategy is based on the need to eliminate, reduce, raise, increase, and create wherever possible in each of the elements identified. To illustrate as of this year the University has begun to identify various people, institutions and organisations that it can engage in, work with and expand on from all over the world. The idea is to eventually make the university as a hub, home or partner for such individuals, groups, institutions and organisations throughout the globe thus widening its reach in and beyond the country.

An interesting example of such a strategy is to link up with the Right Livelihood Award Foundation based in Sweden, the institution that awards the Alternative Nobel Awards annually to Laureates all over the world. The recipients are individuals and organisations that have distinguished themselves and are committed to raise the well-being of the community or society. Founded by Jakob von Uexkull in the early 1980's the Foundation has to date awarded 133 laureates in 57 countries. The University has teamed up with the Foundation to establish in the University's campus in Penang the Right Livelihood College. As host the University will assist in passing on the skills by working with the Laureates to the new generation of students.

Conclusion

So much still remains to be done. While the University will busy itself with putting in the requirements of an APEX university such as governance structure, scheme of service, new constitution and talents, it has to finalise its new students intake, new curriculum based on the need to introduce sustainable development for education elements and of course a new branding. The outcome is more-or-less certain as the University has been adhering to a specified plan that its leadership has promoted and the buying process has been proceeding without any hitches. What is now needed is for the university to mount a new exercise upon which it can seek to present all the details of its transformation plans and the four demands of responding to globalisation, reaching out to civil society, advancing pedagogic excellence and finally engaging religion and diversity in its multi-spheres context, as a new school of thought for alternative globalisation with its own body of knowledge and theoretical arguments. This will finally resonate with the university's aim of transforming higher education for a sustainable tomorrow.

End Notes

⁽¹⁾ See Abdul Rahman and Mahani (2007) for a comprehensive historical account of the development of universities in Malaysia.

⁽²⁾ See Morshidi (2006) and Lee (2004) for a detailed account of the role of the private providers in the Malaysian higher education sector since the late 1980s.

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Innovating through building a knowledge cross-border region

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Project manager in strategic planning.

Sub-theme: Tools for Innovation

Innovating through building a knowledge cross-border region

Euroregions are administrative-territorial structures intended to promote cross-border cooperation between neighbouring local or regional authorities of different countries located along the shared state borders. They are widely known co-operation mechanisms between the regions.

This paper explores knowledge management aspects in cross-border region based on the cross-border cooperation organisation. First, it conceptualizes euroregions and cross-border cooperation regions. Second, the article analyses management of CBC organisations and knowledge management in general. Thirdly, the article analyses how knowledge management can be used for development and management of CBC organisations based on the case study of Helsinki-Tallinn Euregio. The article concludes by presenting how a knowledge organisation can be *a tool for cross-border regional integration* and how it could contribute to the development of a common knowledge region.

Keywords: cross-border co-operation organisation, knowledge management, triple helix

Entrepreneurial Institutes: Promoting innovation and collaboration

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Sub themes: Innovation Networks and Alliances

Dr. Clive Winters

Clive was appointed as Programmes Director at Coventry University Enterprises Ltd in April 2003 and has been Assistant Director since February 2007. Clive has responsibility for the Creativity and Enterprise Division and Business Innovation Centre with a team of 25 staff delivering international and national projects, consultancy and university related activities in the fields of pre-incubation and incubation support, innovation support for SMEs and regional economic development. From 1 August 2008, Clive is also the Co-Director of the IAE.

Dr Gideon Maas

Gideon is the Co-Director of IAE from 1 August 2008. Previously, he was a Principal lecturer: Enterprise and Entrepreneurship within the Student Enterprise Centre as well as the Director of that Centre. Before joining Coventry University, he was the owner-manager of his own consulting company, GEB Consultants, which focused on entrepreneurship and family business and more specifically on innovation and growth strategies. Leading up to this he was the first International Chair in Entrepreneurship in South Africa which was a joint venture between two South African institutions and an Irish university

Keywords: University, Enterprise, Networks, Innovation, Entrepreneurship

Topic: What is the submission about?

This paper will review the national aims of the University Enterprise Networks (UENs) announced by the United Kingdom government in November 2008 and specifically highlight the work of the Innovation UEN led by Coventry University. The overall aim of this initiative is to develop a cluster of University Enterprise Networks (UENs) across the United Kingdom as exemplars in terms of engagement between universities, industry and the public sector to bring tangible benefits to industry and support universities to provide quality enterprise and entrepreneurship education to students, graduates and employees.

Problem: What specific problem does the submission focus on?

Despite a national growth in enterprise and entrepreneurship activity in UK Universities over the last 10 years the student engagement rate in these activities is low at only 11% nationally. While 61% of provision is in business and management schools there is only 9% and 8% in engineering and creative industries disciplines respectively, with 64% of activity being extra-curriculum. Despite this graduates are of significant importance to a UK and regional economy. Of the UK's 200 fastest growing companies in 2008, 85% of the fastest 100 growing technology companies and 70% of the fastest growing private companies were founded by graduates.

Current understanding: What is known about this problem?

Linking the importance of graduate development and the engagement of the private sector with universities, the UK University Enterprise Networks are to be based on the experience of the Kauffman Foundation. Kauffman is the largest Foundation in the US with a focus on enterprise and entrepreneurship. The foundation has been for several years supporting the Kauffman Campus Initiative for embedding enterprise and entrepreneurship across universities. They see this as essential for the continued success of US economy and for individuals to fulfil their potential. Learning from Kauffman supports why University Enterprise Networks are needed and has helped shape thinking on how they

should be structured. For example, the Initiative should be seen as long term, universities involved must have senior level commitment and be prepared to make a financial contribution, and business involvement is crucial.

Research question: What is the submission's goal?

Business requires greater knowledge transfer from the knowledge base to drive innovation in order to provide companies with a competitive edge and encourage a culture change for both, with the University the central focus and catalyst to this process. The Innovation UEN will address this by aligning its activities to support the recognised needs of business in product, process and skills development, establishing a centre for change in the provision and development of a more innovative and creative workforce. The Innovation UEN addresses the fundamental questions regarding the root cause of the lack of growth in Business Collaboration of poor productivity and the shortfall of graduate jobs in the context of universities integrating within the business community.

Design/methodology/approach: How was the study/work executed?

While UK entrepreneurial activity has seen a significant increase in interest over the last decade we believe the focus of supporting entrepreneurs has often been fragmented with support for business start-ups separated from the innovation support mechanisms that enable creativity and product, process and service development. Where innovation has been linked into entrepreneurship the focus has been on support for high-growth start-ups rather than across the entrepreneurial spectrum. As a result Innovation to many has become inaccessible and considered an "engineering discipline" linked to product development.

The Innovation UEN takes a wider perspective on the role of innovation in entrepreneurship starting from the integration of creativity tools and techniques "Creative Spark" and the embedding of new ways of working e.g. collaborative tools and new technologies to support the introduction of both services and products to markets. In this context the focus is on supporting entrepreneurship but embedding Innovation through the use of working tools and techniques that enable products and services to be developed and become commercially successful in shorter timescales and on budget.

With this in mind the Innovation UEN through its partners will bring a client focus e.g. Micro Enterprise, Womens' Enterprise and Small and Medium-Sized Enter-

prises who often are excluded from the traditional view and support for Innovation that is widely promoted. In addition the Large Enterprises included within the UEN provide a mechanism for the development and enhancement of collaboration tools and product and service development approaches that will enhance the innovation capacity of the target client group.

In the delivery of the UEN this perspective on the integration of innovation and entrepreneurship will be further challenged and developed with the inclusion of further Large Enterprises and specialist agencies.

The Innovation UEN is essential at a national level for supporting knowledge based entrepreneurship and intrapreneurship. With significant changes in the structure of the economy it is vital that individual entrepreneurs, micro companies and SMEs are supported to enhance their product and service offerings and ways of working to meet new market conditions and trading circumstances and that reduce the risk of business failure and personal liability. Significantly the Innovation UEN will support Universities in establishing strategic and operational objectives that will enable institutions to define new approaches to academic-business collaboration in particular modernisation, diversification and the creation of new economic sectors. As a direct result UK businesses will benefit from improved productivity and competitiveness through the availability of more innovative graduates and a "work-ready" employee base enabling business to be better able to operate successfully in global markets.

Findings: What are the main outcomes?

The Innovation UEN will promote collaborative links which will be at a depth and quality well beyond the normal levels of Business University Collaborations. Specific solutions are:

- i) Stimulating direct business collaboration opportunities enabling companies and University to work together on real problems, this will be through a bespoke work package for each business.
- ii) Enhancing graduate experience by offering them the benefits of working with real companies and increasing the level of graduate recruitment in West Midlands companies.
- iii) Through Innovation – creating new and sustainable routes to market

iv) Addressing the need for culture change within the University, ensuring the personnel have the skills to deliver the overall vision to become the UK's foremost Entrepreneurial University.

Contribution: What does the submission add to current understanding?

With significant growth in entrepreneurial activity and employer engagement approaches within Universities the establishment of UEN's provides a timely intervention to explore how such approaches can be further developed. The Innovation UEN in this context will provide a framework by which higher and further education institutions can develop strategic approaches to supporting innovation in their local and regional economies to support economic transformation e.g. modernisation, diversification or new business creation. As a result Institutions will be able to explore and develop further their engagement processes for working with business and in redefining their product offer. Significantly the UEN will develop new models of enterprise and entrepreneurial education developing employability and entrepreneurial skills in students. In particular this will see the development of framework systems for degree programmes with specific content added to courses on a reactive basis to student enquiry and student business needs alongside the provision of generic course materials. In addition such programmes will be hosted within "Hot House" incubator environments enabling students to develop their businesses within the same environment as their lectures are delivered.

Practical implications: Who will gain why and in which way from the findings?

For both Higher Education and Further Education Partners the Network will; firstly provide a mechanism for evaluating and contrasting the approach of an individual Institution in business engagement and specifically their Innovation and Entrepreneurial Support provision; secondly enable them to redefine their approach to business and entrepreneurial engagement through the development of provision for flexible and collaborative working tools and techniques through education and business assistance and finally exchange good practice in entrepreneurial, intrapreneurial and innovation support established internally within institutions and available to the external business community.

Asymmetry of In-bound and Out-bound Open Innovation: What are the Determinants of the Effectiveness of Open Innovation?

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Since the term “open innovation” (OI) was coined by Chesbrough (2003), researchers have started to focus attention on the concept of OI. However, no large-scale survey has been conducted as pointed in Chesbrough (2006). This paper is the first to conduct a mail survey targeting Japanese manufacturers. First, the scales to measure in-bound and out-bound OI performances are developed; further, the correlation between in-bound and out-bound OI performances is found to be 0.316, suggesting that while there is a positive correlation, the two types of OI performances constitute distinct dimensions. Through an extensive literature survey, more than sixty variables are identified as the determinants of OI performance; these are categorized into the following factors: environmental, organizational, strategic, R&D process, relational, inner R&D activities, and alliance R&D activities. A step-wise regression analysis reveals that absorptive capacity, stage-gate process, trust in a firm, and R&D in alliance with the customer are positive and significant for both in-bound and out-bound OI performances. On the contrary, the validity of patent with respect to the industry and new product development in alliance with external institutions are *negative* and significant with respect to in-bound OI performance and *positive* and significant with respect to out-bound OI performance. This means that in the case of industries where patenting is an effective measure to protect one’s intellectual property, out-bound OI is effective, whereas in-bound OI is ineffective. The implications and future research are also discussed.

Strategy On the Couch: psychotherapy for strategic renewal

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Keywords: psychotherapy, self concept, strategic renewal

Abstract

Creative strategy formulation can be hindered by the unconsciously self-imposed restriction of an overly bound concept of the organisation held by its senior management. Normative traditions of management literature offer models that prescribe strategy within dominant logics that are incapable of path-breaking responses to a turbulent environment. The concepts of cognitive inertia, systems of meaning and self-reflexive identity are explored in human and organisational contexts. The notion of applying psycho-therapeutic techniques to encourage senior management to become more aware of their current organisational self-concept and its constraints is then developed. Person-centred psychotherapy proposes three selves : the self-concept, the real self, and the ideal self towards which the each individual strives. A poor self concept may constrain personal growth and limit self-actualisation. Implicit in this is an understanding that their beliefs about reality (the "map") are not reality itself ("the territory"). This paper proposes that workshops that apply selected psycho-therapeutic techniques, in combination with creativity techniques such as synectics, QFD and TRIZ, to strategy formulation may result in positive results by reframing an organisation's self-concept, relieving cognitive constraints and thus increasing the "degrees of freedom" for strategic renewal.

Innovative development of an environment for innovations

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Mr. Joel Peltonen and Mr. Pekka Piispanen are project workers in the OIBS development project. They study in the information systems degree programme in TAMK University of Applied Sciences.

Sub-themes:

Innovative Organisational Culture

Facilitating and Sustaining Innovation Environments

Tools for Innovation

Innovative development of an environment for innovations

Keywords: innovation, education, open source

1 Introduction

In 2008, a number of Finnish higher education institutions decided to join their forces in order to develop a new generation environment for innovation in higher education. The development of the Open Innovation Banking System (OIBS) was started based on the concept developed in Laurea University of Applied Sciences and Turku School of Economics (Santonen et al. 2007). The OIBS project is funded by the European Social Fund (ESF) and the participating higher education institutions.

TAMK University of Applied Sciences took the responsibility of the technical development of the OIBS software. The main goal for this technology development subproject is to figure out a way of developing this kind of web based application collaboratively.

The OIBS technology subproject is entirely open source, released under the GPL v2. The source codes are available to anyone, anywhere via our SourceForge project (<http://sourceforge.net/projects/oibs>).

2 User requirements for open innovation support software

The idea is to provide an environment for innovation as an integrated part of studies in higher education institutions. OIBS can be taken into use as part of any study programme and any individual course whenever the time is right for looking at trends of development and needs for new solutions related to the topics of the study programme. The users of OIBS are ordinary teachers and students in higher education institutions.

The intended widespread use of OIBS makes the design of the user interaction challenging. The system should be easy to learn and use. Still it should have very powerful features for the management, processing and presentation of huge amounts of fairly unstructured data. Advanced reasoning mechanisms

have been applied successfully in the engineering domain (Heino 1999) and could be taken into use in the OIBS environment in the future.

3 The developer community approach

The basic idea is that the development team releases the core application, which is also made partly by the OIBS community. After the initial release, everybody can join the community as a developer. The whole process is documented in OIBS Wiki. For community interaction and discussion, the development community uses e-mail, a forum and a live IRC channel.

After the initial launch of the OIBS platform, the development key persons will concentrate on distributing the development and maintaining the community, and hopefully the community will be active enough to support entirely distributed development. As with most projects, the OIBS technical development will most likely never be considered complete. As new trends emerge in social networking, internet communities and distributed development, the community will hopefully keep our project up to date and interesting as well. An infinite number of mash-up possibilities, features that would benefit users and an ever-changing environment will ensure that updates are always needed.

4 Overview of the OIBS software architecture

As the development community develops, so does the architecture. Currently, the OIBS release platform, forum and wiki run on a single Linux server, the codes are centrally located at a SVN repository in SourceForge, and development can be done nearly anywhere.

The user interface can also be developed by any interested party, documenting to the wiki as the new user interface ideas and revisions are thought up.

The entire OIBS codebase is located on our SourceForge repository, with the exception of databases, which are location-specific. The database guidelines and specifications are distributed via the development wiki – anyone can set up their own OIBS environment using their own servers. Figure 1 illustrates the technical architecture of the OIBS system.

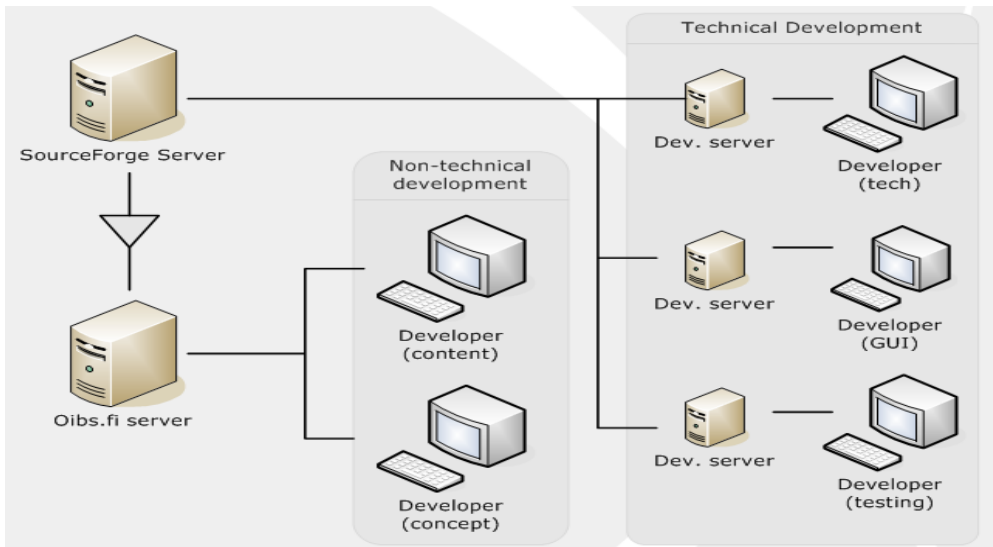


Figure 1. The OIBS technical network

The OIBS technical network consists of two central servers and a variable amount of developer participants. The oibs.fi server hosts the release version of the code and the primary database of users and content. On the SourceForge server, the development community hosts three code branches, one for technical and user interface development, one for testing and one for the release version.

The technical developers check out the development or testing version, work on their part of the system and commit working code to the repository or discuss changes within the community. Once the development and testing are complete, a release version is copied to the release branch and downloaded to the release server.

The non-technical subprojects, such as administration and content production use the oibs.fi server directly for communication and releases; however e-mail and personal contact are often used as well.

5 Conclusions

As a relatively new concept, the project does not have a great pull for developers, getting people interested in the concept and development is a large challenge in the first steps of the OIBS project. At least at this stage, the simple re-

ward of participating and learning is not enough for most people to join the community. However, we that have joined and are active in the project are cautiously confident that some day our little project might grow to be a widely known service – one seemingly impossible dream is to rank in the Alexa top 500 list of most popular websites.

One extremely interesting topic for further research is the extension of the OIBS system with intelligent knowledge processing features. Once the user community gets large, the OIBS system will contain huge amounts of valuable pieces of information just waiting to be combined intelligently to form innovative solutions to the needs of companies and the society.

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Santonen, T., Kaivo-oja, J. and Suomala, J. (2007), Introduction to National Open Innovation System (NOIS) Paradigm. A Preliminary Concept for Interchange, FFRC eBooks 8/2007. Finland Futures Research Centre, Turku School of Economics. Turku. 37 p.

www.oibs.fi/wiki

Innovative way of learning in a project

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Keywords: Learning, knowledge, teamwork

Abstract

Learning is no longer tied to stacks of books. Books are merely accessories on the journey towards success. The most important thing is to absorb knowledge from the community. The basic principle is; One's knowledge is everyone's knowledge. Learning through projects present an innovative, efficient and interesting way of studying that has big potential in many ways. Learning in a project is an innovative way of learning social skills and team work.

Theory based studies provide a large variety of specific information about certain subject. One of the noticeable weaknesses in theory based studies is the contrast between theory and concrete field work. This gap is often tried to fill with different kind of internships between and after the studies. What if the scenario was following: Studies would be so integrated in real life projects that basically the whole time of studying would be a long variable internship. After the studies student would have a touch to the changing work environment.

Still it is absolutely crucial, that the studies are combined with theory material. Student has also to learn to sit down and concentrate on complex things. This is usually achieved only by reading theory material written by the professionals of the subject.

To be a professional, student has to start living the subject that he or she is studying. Student has to adapt and embrace how the subject really works, reacts and how it develops. Especially in the business sector, one must understand how the business sector moves and develops. Student has to develop instincts towards the subjects, and instincts are usually develop by doing the work itself.

Others may think that the traditional way of studying is a better way to prepare for the future when others may think that it has certain limitations

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APPENDICES

Programme Outline

Besides the refereed competitive paper presentations of the highest quality and stimulating plenary sessions, the versatile social programme stemming from local culture offers the perfect opportunity for interacting and networking. BDI2009 offers also a variety of activities every day for accompanying guests and a Post Conference Programme.

Sunday, 14 June 2009

16.00 - 20.00 Delegate registration open

20.00 - 22.30 Get-together Party for BDI2009 participants at the Conference hotel Sveitsi

Sponsored by the City of Hyvinkää

Have your go at a game of Mölkky (<http://www.mm-molkky.fi/fi/etusivu/english>)

Finnish folk songs

Refreshments and savoury available

Monday, 15 June 2009

8.30 - 13.00 Delegate registration open

8.45-9.15 Press Conference: Meeting Room 8

9.30 Welcome: Meeting room 10

Vice President Jouni Koski, Vantaa Regional Unit, Laurea

Mayor Raimo Lahti, City of Hyvinkää

9.50 Opening Remarks: Meeting room 10

Conference General Chair

10.00-12.40 Plenary Sessions

10.00 Invited Speaker Prof. Khalid Hafeez (the UK)

Innovation in the Knowledge Economy: Do Contemporary Management Theories provide a Way Forward?

10.40 Meeting coffee

Live Finnish zither music and singing

11.00 The interrelationship of education, innovation and entrepreneurship

Dr Anas Al Natsheh, Kajaani University of Applied Sciences

11.20 Universities: spaces and places for interaction and innovation

Policy Analyst Alastair Blyth, Organisation for Economic Co-operation and Development OECD

11.40 Public-Private-Partnership - a way to implement innovations in public service delivery

Director Aatos Hallipeltö, PricewaterhouseCooper, Finland

12.00 Innovative educational co-creation in practise

Invited Speaker CEO Jarno Tuimala, Hyria, Finland

12.20 - 12.40 Regional innovation governance, innovation capabilities and global distribution

Professor Henrique Diz, University of Aveiro

12.45 Luncheon Open Innovation Bank System (OIBS) for supporting the Finnish national system of innovation (NIS)

Dr. Teemu Santonen, LAUREA University of Applied Sciences, Finland

14.00 - 15.30 Parallel Sessions: Competitive paper presentations

Meeting room 11: Session Chair Prof. Sulaiman

Managing social networks innovation: a case study of hospitals (Spain)

Quality systems for global business as a competitive advantage (Portugal)

End-Users' Satisfaction Attributes: An Approach to Assess Information System Performance in Firms (Malaysia)

Meeting room 14: Session Chair Prof. Diz

Organizational Innovations in hospitals: A case study (Spain)

Innovating to Win: Partnering Post-secondary International Business Students with Small/Medium Enterprises to Spur Market-driven Innovation and Global Competitiveness (Canada)

Knowledge based economic initiatives towards innovated Europe (Lithuania)

15.30 - 16.00 Tea and Biscuits

Live Finnish zither music

16.00 - 17.30 Plenary Session

Panel Discussion on “*Global warming creating true demand for innovation - Ways and Whys of innovative solution variables*”

Moderated by Jan-Henrik Johansson, WikiVision, Finland

This plenary session will get behind the fundamentals and essentials of innovation. One of the expected outcomes of this panel discussion is to provide concrete tools for innovative solution creation and business model development in the context of climate change.

17.30-19.00 Multicultural Multisensory Space open & networking opportunity

Creates the possibility to visit to different environments in a space where landscape, sounds and objects lead visitors through different cultural environments

Created and hosted by Minttu Rätty and her project team, Laurea University of Applied Sciences

Refreshments available

18.00 - 19.30 Experience the Finnish sauna and other networking opportunities

Water fun park and outdoor pool available

Hosted by the BDI2009 Secretariat

Or would you rather try Nordic Walking with an English speaking tour guide in the Sveitsi nature park?

20.00 - 23.30 Best Paper Award Gala Dinner, *pre-registration required*

Finnish Folk Dancing extravaganza

Introductory dance lessons for the innovative and the creative

Ballroom Dances

Tuesday, 16 June 2009

8.30 - 13.00 Delegate registration open

9.00 - 10.30 Parallel Sessions: Competitive Paper Presentations and Oral presentations based on submitted abstracts

Meeting room 11: Session Chair Prof. Barrell

Organizational Innovative Capabilities: An Empirical Study of Malaysian Firms (Malaysia)

Innovative way of learning in a project (Finland)

Innovating through building a knowledge cross-border region (Estonia)

Meeting room 14: Session Chair Dr Gideon Maas

Entrepreneurial institutes: Promoting innovation and collaboration (the UK)

Innovate development of an environment for innovations (Finland)

Implementing RFID technology in triage system (Finland)

10.30 - 10.50 Meeting Coffee

10.50 - 12.20 Parallel Sessions: Competitive Paper Presentations and Oral presentations based on submitted abstracts

Meeting room 11: Session Chair Prof. Hafeez

Service content and context affecting the dimension of seamless mobile service interface: case errors (Finland)

Transforming higher education for a sustainable tomorrow (Malaysia)

Contextualising the Growth and Diversity of Minority Ethnic Entrepreneurship in Britain (the UK)

Meeting room 14: Session Chair Prof. Mattila

Asymmetry of In-bound and Out-bound Open Innovation -What are the Determinants of the Effectiveness of Open Innovation? (Japan)

Strategy On the Couch : psychotherapy for strategic renewal (the UK)

Acceptance of Innovation - Developing the UR-TAM model (Malaysia, Finland)

12.30 Luncheon, theme: building innovative user-centric service concept

Invited Speaker Development Director Jukka Ahtikari, Logica, Finland

14.00-15.20 Plenary Sessions, meeting room 10

14.00 Keynote Speaker Prof. Ainin Sulaiman (Malaysia) on technology adoption and digital divide

14.40 - 15.20 Keynote Speaker Prof. Alan Barrell (the UK/China) on stimulating entrepreneurship and creativity

15.20 - 15.30 Wrap-up Session: Key lessons learnt and next steps

Conference General Chair

15.30 - 16.00 Tea and Biscuits

Live Finnish music

Additional evening programme (cost pricing):

Guided shopping tour to Helsinki, the capital city of Finland,
Golfing opportunity near BDI2009 location

After registration has been completed by mid-May, the BDI2009 Attendees will be called for expressions of interest towards this additional Tuesday evening programme. The transportation cost using private charter service tailored for the group, is estimated to be around 15 Euros per person.

Wednesday 17.6.2009

Pre-registration required for either one of the programme options of this day, must have a minimum of 10 or will be cancelled.

Seating is limited, assigned on a first come, first served basis.

9.00 Bus leaves for a pre-arranged site visit

10.00 - 12.00 Site visit to Technology Centre Innopark, Introduction of innovative digital business and eLearning projects

Technology Centre Innopark offers the expert companies possibility to operate in a new innovative environment in which they have the best possible opportunities to concentrate on their own field of expertise http://www.innopark.fi/portal/innopark/in_english/

12.30 - 14.00 Lunch at Häme Castle restaurant

14.00 Guided tour in English inside Häme Castle

Souvenir shopping opportunity at Museum Shop (http://www.nba.fi/en/hame_castle)

17.00 Estimated time of return to the Conference [hotel Sveitsi](#)

Post Conference Programme

After the conference, conference guests have a great opportunity to spend Midsummer (read more: <http://finland.fi/netcomm/news/showarticle.asp?intNWSAID=26052>) in Finland or in neighbouring countries by joining the unique BDI2009 Post Conference Programme.

The post conference programme includes five options:

Lapland	www.laplandfinland.com
Åland	www.visitaland.com/en
Seurasaari	www.seurasaarisaatio.fi
Tallinn	www.tourism.tallinn.ee/eng
Stockholm	www.stockholmtown.com

Beyond the Dawn of Innovation highlighted not only current research but also the business opportunities, and future perspectives on the development, management, and sustainable deployment of innovative solutions. This International Conference emphasised creativity and innovativeness as sources of competitive edge. Furthermore, it was an important forum for knowledge co-creation and intellectual exchange as the participants created new information and brought their experience in innovation activities for common sharing.

All the published articles have been subject to a double-blind, international peer review process whereas the research notes are non-refereed abstract presentation synopses.

Beyond the Dawn of Innovation - an International Conference was hosted by Laurea University of Applied Sciences in Hyvinkää, Finland, 15-17 June 2009.

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