ICT, KNOWLEDGE ECONOMY AND LEARNING ORGANIZATION: A CASE STUDY OF THREE ORGANIZATIONS

Wael Sh. Basri
wael.basri@nbu.edu.sa
Northern Border University, Arar – Suadi Arabia

ABSTRACT: *Information Communication Technology (ICT) has been accepted that form of improvement and enhancement of knowledge and skills that in an organizational situation, in this knowledge millennium, it can contribute to employee productivity and personal effectiveness. There are diverse aspects of ICT that could be customized in such a manner that organizations can cut operational costs, reduce product obsolescence, prepare knowledge individuals and develop a learning organization. This research paper attempts to uncover the mysteries of ICT and explore its applications in organizational development and organizational change. This study explores how ICT or new learning strategies are aligned with the organizational processes and strategies across its functional units; how it promotes teamwork and cross functional coordination in the organizational network, how it transforms the organization into a learning organization during the course of this study, there will be evidence to show how ICT can boost knowledge economy. The study has adopted a multiple case study qualitative approach to analyze the integration of ICT in the three case organizations. Among findings of this study include that 'learning organization' is a central element of knowledge management and ICT plays a major role in it.*

Key words: organizational change; employee productivity, cross functional alignment

1 INTRODUCTION

Information Communication Technology (ICT) is responsible for a complete transformation and organizational change in modern organizations. ICT operates in order to optimize environments, often by integrating systems and processes in order to produce the desired results that the organization needs to integrate if they are electronically linked and can communicate with each other. After the Y2K experience, organizations changed their system integration, information security, and production life-cycle management and similar other operations on purely technical grounds. It was required to align ICT with the organizational mission and vision, with business goals and objectives. While studying the impact of ICT on organizations it is necessary to investigate how well integrated and automated technology is in today's global business, how well employees understand the use of computers and technology and how the managers manipulate the information to result in growth.

Member nations of Organization for Economic Co-operation and Development (OECD) are gradually transforming into knowledge economies. There are several companies in these nations that have launched knowledge based products (KBPs) and have shared with their customers through mobile apps, interactive knowledge portals and other education websites. More recently, online payment services or direct consumer payment services have also been introduced to switchover to cash less transactions. These are outputs of various skills in subjects like computer programming, R&D, business systems and processes and engineering — most of which generate employment and new jobs to build a strong human capital with superior technical knowhow. In short, knowledge economy is the future vision of several developing countries, but it all depends upon ICT infrastructure and its integration with human knowledge. For this it also has to depend upon organizations that are willing to prioritize organizational learning activities in their organizations and willing to be called learning organizations. This study focuses on these aspects of ICT and highlights a connection between ICT, knowledge economy and learning organization.

1.2 Context of the problem

In this knowledge millennium, there are organizations that do not wish to retain traditional learning environments and have a digitalized learning management system (LMS) integrated to other standard operating procedures (SOPs) and have even reverted to a knowledge intensive work procedures. This study took an initiative and attempted a case study of three organizations belonging to different sectors. The purpose of the study was to find out to the extent to which organizations have adopted ICT patterns in their operations and what are the outcomes of taking this revolutionary step.

1.3 Statement of the problem

ICT has the potential to revolutionize modern day organizations and transform them into knowledge organizations. There is a need to study the nature of activities and patterns that are required to accomplish this transformation. Moreover, alignment between ICT procedures and the organizational strategy is usually non sustainable because the strategic context constantly changes and therefore there is a need for the information technology portfolio to configure itself with this change. There is a need to ensure compatibility of ICT with the organizational systems and procedures in order for both to have a common operating environment. For this purpose, ICT is required to take a knowledge centric perspective, and the organization to be called learning organization.

1.4 Questions of the study

How does ICT contribute to making a knowledge centric learning organization by integrating a cross functional implementation strategy within the organization?

1.5 Objectives of the study

To explore how ICT is aligned to the organizational systems and processes and functional units and to what extent this alignment contributes to making an organization a learning organization and a potential contributor to knowledge economy.

1.6 Significance of the study

The study attempts an empirical foundation for ICT as playing the role of stimulating innovation and competence building in organizations by linking knowledge management

practices to its various functional units like HR, Sales, Operations, R&D and Finance. This implies that ICT has helped organizations to configure their employees in accordance with technological advancement, involving them into a learning process and empower them with knowledge creating tools, hence to be called as human capital. ICT seems to advocate that knowledge management is not to transact processes of knowledge creation but to create such conditions that stimulate agencies within and outside the organisation to engage in interactive learning and create new knowledge. ICT has played a significant role in this process. This study is an attempt to understand the role of ICT in bringing this organizational change.

2. Review of literature
2.1 ICT and Digital literacy
ICT has revolutionized learning by a digital instruction technology [1,2]. Learners have the access to gadgets and electronic audio video material. While they adopt a self-instructional approach and involve themselves in exercises and activities like listening or audios, watching videos, taking down notes, they also visualize themselves as torchbearers of knowledge. Several studies that were carried out on ICT. Some [1,2,3] opine that learners are expected to innovate their learning, find novel and better ways to retain what they learn and even manipulate that learning to the advantage of their organization. Hence, such kinds of learning using digital methods make learning a dynamic activity [4].

Individuals are therefore treated as learning organisms in modern organizations as they grow responding to the change in organizational climate. In [5] author identifies many changes, signaling in the environment that he links with Digital Literacy. The new digital literacy that all individuals seem to master and imbibe in their living environment through smart devices, HD technology and WiFi network system are seen as learning both from within themselves adding to their primary knowledge and subsequently to that of the organizations through interaction and sharing that knowledge with colleagues on knowledge platforms. A need now is felt to institutionalize this knowledge through identifying patterns for multiple growths by linking this knowledge with production processes and other organizational practices. Others [6] describe such learners as creators and conveyors of knowledge which eventually play a big role in bringing an organizational change.

Moreover, Layton [7] epitomizes digital learning as a result of collaborative efforts; [7] calls such learning as situated learning that depends much on group intelligence where digital learners must interact with one another for cognitive understanding and making sense. A constructive approach can be seen in such type of learning as people gain knowledge by exchanging instructions [8]. However, the element of 'self discovery' is also often emphasized in such type of learning when the learners participate actively in their own learning, they take ownership and show commitment to both the process and outcome of the learning [9].

2.2 ICT and knowledge economy
The term 'knowledge economy' symbolizes a transition from traditional economies to such trends where manufacturing of products came to be based on the current state of knowledge

[10] Several authors have a role to play in the coinage of the term 'knowledge economy' [11, 12, 13] related it with his concept of human capital where it was convenient to relate his theory of employees as intellectual assets with knowledge economy. Drucker was inspired by the leading economist who believed in the theory of "scientific management" [14] earlier pioneered by [15] who is also known for talking about "information society" ICT thus correlates knowledge and education and treats knowledge economy as either a business product, or a productive asset. ICT as a driver to higher growth was first discussed by [16] who suggested that information technology can significantly enhance productivity. He suggested in his empirical study that when knowledge is picked up by people in production, they use information technology to enhance their work environment, for instance, improving its supply chain or the operations procedures by creating a knowledge portal on the company intranet. [16] was another expert who also recognized the need of investing in people through training and learning mechanism with the support of technology in order to enhance employee productivity and increase in labor output in the form of new knowledge based products. In addition, the role of information technology to establish a knowledge-based economy has now been established in economic studies [17,18,19] Moreover, due to this technological change and impact of globalization, a new kind of informational economic system seems to have emerged, with knowledge playing a major role in its implementation. All capitalist economies across the globe have experienced this change, including those of Far East countries including Malaysia [20]. Elsewhere, others [17], favor innovation process behind the creation of knowledge which mobilizes the growth of an organization in a knowledge economy. However, some one of Aalborg University [10]   has a different opinion. According to his studies, an excessive dependence on information technology impacts adversely the knowledge management and other learning practices. Information Technology although increases the capability of creating and sustaining knowledge, but it reduces the existence of tacit knowledge which contributes more significantly to 'a learning economy.'

2.3 ICT and Learning organization
Senge refers to learning organizations as the most prepared for scenarios that require a quick response to the market states that people must develop shared thinking and 'a unified corporate vision' [31,32]. Such a vision recommends the organization to stay ahead of their competitors by bringing innovation/ reinvention of their training measures and emphasizing on organizational change through changes in planning, designing, strategy or processes [21,22,23], too, reports that a few organizations that prefer to be called learning organizations, have implemented innovative ICT based learning systems instead of traditional training systems The learning organization is also mentioned by other writers [24,25,26] as the one skilled at creating, acquiring, interpreting, transferring and retaining knowledge, deliberately modifying its behavior to reflect new knowledge. Often a positive relationship between organizational learning and innovation is referred, although not many empirical studies demonstrate it. It is commonly accepted in the

specialized literature that organizational learning occurs in individual, group and organizational levels, [27,28] each level influencing the others. To become organizational, individual and group learning must though be incorporated in the organization in the form of structures, processes, rules and routines. [27] also found that the effect of IT on labor demand increased when used in combination with organizational investments and changes. They studied the three part combinatorial effect of information technology, complementary workplace re-organization and new products on a firm level.

If employees are offered a "learning" environment, it will unleash their potential and make them more productive since they would be using innovative learning practices. This premise has been strongly supported by workers in [27], who declares in his global survey of 100 companies that ICT must support organizations on their "defined strategic path." The findings of this survey further strengthen the concept that ICT helps to find innovative solutions and formulate new strategies or to meet business needs and ultimately lead to organizational profitability.

2.4 ICT and Organizational Change

ICT has forced top management and organizational leadership to share a vision in which major elements across the service will operate within a single integrated system. Such a vision statement requires an integrated environment, with all types of information processing systems are aligned with organizational learning. Hence, for achieving this vision it requires organizational change to optimize the organizational environments by integrating systems and produce the exact effects which the organization needs. Several writers [2,29,30] examine the role of ICT in bringing this dynamic change when it interacts with the organizational functional units. For instance, any functional unit that earlier might be using Tally or any other simple accounting software, it now requires ERP tools and other advanced accounting softwares. This necessitates the availability of resources and top management commitment to provide those resources.

Author in [2] recommends a complete alignment between the information technology and business strategy because strategic context constantly changes according to market requirements. They discussed the example of ERP tools in contributing to a social order based n such an alignment. ICT helps organizations to make investments since it helps in developing expertise in such investments, thus bringing a dynamic change. It also assumes right directions for the organizational units to maximize the value of their time, effort and energy that they put into the production.

Elsewhere [30] in his PhD dissertation discusses the role of ICT for organizational change in the public sector. He finds out that information systems reinforce hierarchical control,power and authority, leading to changes in the systems and control. It also leads to infrastructure development and standardization. Similarly, in a working paper [29] examines the transformation of business by the implementation of ICT in the production function of organizations, thus contributing to the knowledge based economy, e-business and digital technologies.

3. METHOD OF STUDY

3.1 Sample of study

The study was restricted to three Malaysian telecom companies. A purposive sampling method was used to select the companies. Maxis Communication, Digi Communications and Telekom Malaysia were selected for this study. The rationale behind the selection of these companies is their size, business expansion and usage of innovative practices. The size of the sample was kept to 120 respondents to whom questionnaires were sent. Simple random sampling was applied while selecting respondents and questionnaires were emailed to them electronically in each organization.

Characteristics of the sample

The characteristics of the sample are illustrated in the following table:

Table 1: Characteristics of the sample

Company	Frequency	Valid percentage
Maxis Communication	45	37.25%
Digi Communications	39	32.5%
Telekom Malaysia	36	30%

Table 1 exhibits that out of 120, 37.25% respondents belonged to Maxis Communications, 32.5% were from Digi Communication and 30% participated from Telekom Malaysia. The sample size was maintained equivalent to ensure the validity and applicability of the findings

Age of respondents

The age distribution of respondects is exhibited in Table 2:

Table 2: Age of repsondents

Age	Frequency	Valid percentage
21-28	27	22.5%
29-35	45	37.25%
36-45	39	32.5%
46-55	6	5%
56-60	3	2.5%

The data reveals that that 27 responsdents were between 21 to 28 and 48 respondents were between 29 to 35 years of age, both representing 70%, forming the majority. Only 39 respondents were between 36 to 45 years of age representing 32.5%. The rest were elderly between 46 to 60 years of age. The results reveal that case companies priority are the young people in employment.

Educational Backround of the repondents

The Educational Backround of the repondents of the case companies reveal the data as exhitedin Table 3:

Table 3 : Educational Backround of the repondents

Educational Level	Frequency	Valid percentage
Diploma	66	55%
Degree	36	30%
Above Degree level	18	15%

It is evident from Table 3 that there is a very wide range of educational qualifications of the respondents of this study. There are diploma holders and also those who possess degree or above qualifications. A majority of 66 respondents representing 55% of the sample had education up to the diploma level, 36 respondents equal to 30% had education until the degree level and only 18 respondents or 15% had education above degree level. This is evident of the high

concentration of degree and diploma holders who are technically trained for the telecom sector.

Functional unit of respondents

The Table 4 represents the functional units of the respondents of this study of the telecommunication companies in Malaysia.

Table 4: Functional unit of respondents

Functional Unit	Frequency	Valid percentage
HR	12	10%
Operations	24	20%
Sales	18	15%
R&D	18	15%
IT	24	20%
Telecom	24	20%

The results in the table reveal that respondents from IT, Telecom and Operations formed the majority with a total of 72 participants, with 24 from each sector, representing 60% of the respondents. In addition, there were 36 respondents, 18 each from Sales and R&D, equivalent to 30% of the total respondents. There were only 12 respondents or 10% of the total number from HR sector. These results show that the case companies focus more on technical disciplines like telecom and IT and therefore ICT was found to be a significant tool in the case organizations.

4. Design of study

The purpose of this research was to assess the presence of ICT in the telecommunication industry, in general and in sampled organizations, in particular. The focus was also to evaluate how ICT has contributed to executing an organizational change through its knowledge intensive processes, transforming the case organization into a learning organization.

This research was based on three case studies belonging to the Telecom sector in Malaysia. This study used a structured questionnaire comprising 21 open ended questions administered on 120 respondents of the case organizations. The study followed a qualitative research approach. After the study was completed on this sample, it was found that ICT was intensely aligned to learning and knowledge creation in the case organizations by a cross functional alignment of its various functional units. An organizational framework was prepared to illustrate the interconnectedness and this alignment based on the responses (See Fig 1).

A multiple case study method was used to carry out this qualitative study and study the alignment between ICT and knowledge creation processes and evaluate learning organization as an outcome of this synergy. The framework shows that ICT is aligned through cross functional implementation with various functional units of the organization such as IT, R&D, HR, Telecom, Sales and Operations, but there is a uniformity in the outcome in the form of organizational change reflected through Knowledge management practices and Learning organizational principles as evidence of this synergy.
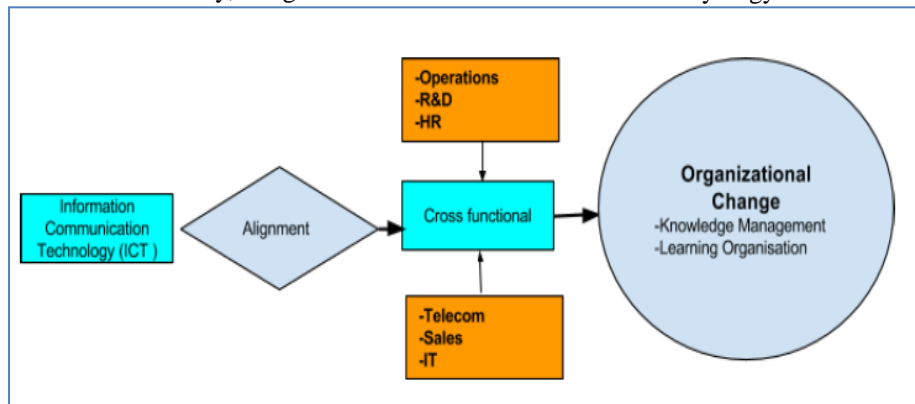

Fig 1 An organizational framework of ICT alignment with functional units
Source Researcher

5. RESULTS AND DISCUSSION

The main objective of this study was to examine the level of involvement of ICT in an intra-organizational knowledge transfer and learning among its functional units. A major realization of this study was to use the right technology, aligned with the organization's internal processes and cross functional units. The following results are based on the organizational framework prepared on the basis of the data collected through questionnaire which contained open ended questions. A few answers to the questions were thought provoking, while the rest offered rich information about the interaction of ICT with the functional units of the organization.

(a)   ICT and Knowledge Economy in case companies

The respondents almost unanimously agreed that ICT impacts all the organizational structure elements and functional units, and therefore becoming a generic factor for the organizational change. One of the respondents commented that ICT inter-relates learning and knowledge creation. Knowledge in an organization is both a crucial input, through R&D activities and a crucial output through production processes. A few other respondents listed such facilitating factors like labor market flexibility, developing an effective communication system, investing in R&D, building the ICT compatible infrastructure and promoting the growth of the organization that contributes to building a knowledge based economy. Respondents also indicated that ICT can assist in developing a model of shared leadership that could facilitate infusion of ICT into strategic decision making as well. One respondent suggested that all employees in an organization should be seen as a team, adopting an organizational approach, pursuing a common vision , and therefore can unitedly foster the development of ICT skills and knowledge across the organization through initiatives like knowledge portals, newsletters, LMS and like .

Based on these responses, the researcher concludes that the information technology has revolutionized the role of knowledge in today's economy. ICT has made knowledge databases much more accessible all over the world through search engines and storage capacity through cloud computing technology. It has made the task of handling information much easier and utilizes it for advancing processes of knowledge creation and globalization of the world economy.

(b)   ICT and Learning Organization in case companies
Respondents identified several best practices and strategies to support learning in an organization with the help of ICT. For instance, a large number of respondents suggested to align the ICT with employees professional development. Employees may be monitored by a digitalized LMS which assesses the employees' competence from time to time and suggest skills development courses for their current as well as their future job responsibilities. This will not only help in the career enhancement of employees but also keep them up to date with trends. A few respondents also identified responsibilities within specific leadership and top management positions for supporting ICT in learning and knowledge creation in the form of new products development, providing opportunities for innovation and creativity. A few others suggested introducing mentoring programs, training in scientific processes of staff and helping them to acquire high-level skills. Leadership was thus identified as playing a key role to play in organizational change.

Many respondents talked about linkages between leadership and organizational change leading to linkages with the knowledge based economy and learning organization A few participants even went to the extent of accepting the role of ICT in helping to make decisions based on the broader perspectives of the vision, strategic plan, and the organizational structures if they include ICT network or infrastructure in the implementation of its strategies. Organisational structures identified by respondents supporting the integration of ICT with learning include a cross functional relationships across the organizational operational units. The study concluded that in order to achieve organizational learning, employees must constantly develop new competencies and ICT plays a significant role in this development.

6. Limitations
There were however a few limitations to this study. The study was focused only on the telecom sector while ICT is significantly making an impact across all sectors. Secondly, this study focused on the interrelationship of ICT with functional units of an organization to evaluate the interrelationship between ICT and knowledge creation and learning as an output. But this study does not venture into designing such activities and programs that are required for such an alignment. Lastly, this study also does not consider the drawbacks of the use of technology and impact of the rapid growth of technology in knowledge creation. Respondents were also apprehensive about adverse implications of ICT as a tool of organizational learning. It was feared that the speed with which new knowledge based products are entering into the market, it will be difficult for ICT in an organization to remain abreast of technological developments in their field of operation. Future research should look into all these challenges and limitations. A few suggestions for future research may also relate to networking and information sharing between two or more organizations to enrich knowledge creation and learning expertise through innovations projects and experimentations for growth of learning.

7. Ethical issues
The ethical use of ICT in teaching and learning was identified by a few respondents of the study. It was felt that there is a need to be more tangible on ethics and ensure avoidance of such practices that might affect the moral and ethical considerations in an organization. Among ethical issues hinted were the copyright issue with software and other knowledge based products. Cyber privacy and cyber reforms were also discussed by a few participants as the increased access to information might lead to breach of copyright laws and intellectual property regulations.

8. CONCLUSION
This research study thus opens a new avenue by studying how ICT can be linked with knowledge creation process in a learning organization by focusing on the cross functional linkages in the organization. The paper argues that an appropriate use of ICT infrastructure can bring various functional units closer in an organization and reduce conflicts and tensions in the larger interest of the organization.

REFERENCES
[1] Barrett Michael, David Grant and Nick Wailes (2006) ICT and Organizational Change Introduction to the Special Issue The Journal of Applied Behavioral Science 42, 40-57.
[2] Wagner, E. L., & Newell, Sue. (2006). Repairing ERP: Producing social order to create a working information system. The Journal of Applied Behavioral Science, 42, 40-57.
[3] Wanda J. Orlikowski and JoAnne Yates (2006) ICT and Organizational Change A Commentary Massachusetts Institute of Technology (special issue of The Journal of Applied Behavioral Science ol. 42 No. 1, March 2006 127-134.
[4] Resnick, Mitchel. (2002). *Rethinking Learning in the Digital Age*. [Online] Available: From http://www.cid.harvard.edu/cr/pdf/gitrr2002_ch03.pdf (December 10, 2007).
[5] Siemens, G. (2005). Meaning making, learning, subjectivity. [Online] Available: From
[6] Brown, S. J. and Duguid, P. (1996). The University in the Digital Age. *Change*: July-August,10-19.[Online]Available: http://www.sociollifeinformation.com
[7] Layton, Thomas G. (2000). Digital Learning: Why tomorrow's schools must learn to let go of the past.[Online] Available: From http://www.electronic-school.com/2000/09/0900f1.html (June 12,2007).
[8] Tapscott, D. and A.D. Williams, Wikinomics: How mass collaboration changes everything2006: Portfolio.
[9] St. Louis, Rubena. (2006). Helping Students Become Autonomous Learners: Can Technology Help?.

Teaching English with Technology. A Journal for Teachers of English, 6(3). [Online] Available: From http://www.iatefl.org.pl/call/j_esp25.htm (May 28,2007).

[10] Lundvall, B.Å. (2003), 'Why the New Economy is a Learning Economy', Economia e Politica Industriale : Rassegna trimestrale diretta da Sergio Vaccà, (Nr. 117), pp 173-185.

[11] Imiefoh, Pedro (2012) Knowledge–Based Economy in Nigeria: The Role of ICT. *Journal of Emerging Trends in Engineering and Applied Sciences* (JETEAS) 3 (2): 315-318

[12] Neffati, Mohamed (2012) 1ICT, Informational Innovation And Knowledge-Based Economy *Annales Universitatis Apulensis Series Oeconomica*, 14(1), 2012.

[13] Drucker, P. F.(1985). *Innovation and Entrepreneurship*. Harper Collins Publishers.

[14] Haberler. "Fritz Machlup In Memoriam." *Cato Journal*, vol. 3, #1, 1983, p. 11.

[15] Frederick (1911) Scientific Management , "The Principles of Scientific Management" Routledge, 2003,

[16] Brynjolfsson, Erik and McAfee, Andrew (2011). Race Against The Machine: How the Digital Revolution is Accelerating Innovation, Driving Productivity, and Irreversibly Transforming Employment and the Economy. Digital Frontier Press.

[17] Nonaka I. Konnon. and Toyama R., (2001): A conceptual Framework for the continuous and self-transcending Process of Knowledge Creation, pp. 24-40.

[18] UNCTAD (2008), Information Economy Report 2007-2008 Science and technology for development: the new paradigm of ICT, report prepared by UNCTAD secretariat, United Nations.

[19] Nonaka and Toshihiro Nishiguchi, (2001), Knowledge Emergence: Social, Technical, and Evolutionary Dimensions of Knowledge Creation, Oxford University Press.

[20] van der Zee, Frans A. (2012). East Asian Growth: ICT for Growth and Cohesion in a Global Knowledge-based Economy. *JRC Technical Reports.* New york

[21] Harigopal, K. (2006). Management of Organizational Change: Leveraging Transformation Published by SAGE Publications.

[22] Ghoshal, S., Piramal, G. & Bartlett, C. (2002).Managing Radical Change. Penguin.

[23] Myler, L.(2012). Strategy: It's All About Alignment, Entrepreneurs *Forbes*16 October.

[24] Argyris, C. and D. Schön, *Organizational learning: A theory of action perspective*. 1978. Reading, Mass: Addison Wesley.

[25] Nevis, E.C., A.J. DiBella, and J.M. Gould (1995) Understanding organizations as learning systems. Sloan Management Review, 1995. 36(2).

[26] Rosenberg, M.J., *Beyond e-learning: Approaches and technologies to enhance organizational knowledge, learning, and performance.* 2006: Pfeiffer.

[27] Yang, B., K.E. Watkins, and V.J. Marsick, The construct of the learning organization: Dimensions, measurement, and validation. *Human Resource Development Quarterly*, 2004. 15(1): p. 31-55.

[28] Chiva, R., J. Alegre, and R. Lapiedra (2007). Measuring organizational learning capability among the workforce. *International Journal of Manpower*, 2007. 28: p. 224 - 242.

[29] Vilaseca , Joan Torrent , Ángel Díaz (2002) ICTs and strategic and organizational changes in Catalan business A review of select evidence for Catalonia, Spain and international data.

[30] Chongthammakun, Radaphat 2013 ICT Development and Organizational Change in the Thai Public Sector.

[31] Fulmer, Robert M., Keys, J. Bernard. (1998). A Conversation with Peter Senge: New Developments in Organizational Learning Organizational Dynamics, 27 (2), 33-42.

[32] Senge, Peter (2006). The Fifth Discipline. Routledge, 3rd edition.