The Role of Information and Communication Technology in Implementing a Learning Organization Strategy

Khadra . B . Dahou

Faculty of Economics and Business
Abou Bekr Belkaid University. B. O. Box (230), Imama – Tlemcen. Algeria
E-mail: dahou.khadra@yahoo.fr

Raid Moh'd Al-adaileh

Faculty of Business
Mutah University. B. O. Box (7), Mutah – Al-karak – Jordan
Email: radaileh@mutah.edu.jo

Ishaq . L . Hacini

Faculty of Economics and Business
Mascara University. Mascara. Algeria
E-mail: ishaq_zida@yahoo.fr

Abstract: *The aggregative aim orienting this research was to examine the impact of the information and communication technology (ICT) on the success of the implementation of a learning organization (LO) strategy. From 416 questionnaires, conducted within the strategic Algerian state-owned company: Sonatrach, results indicated that ICT have a significant positive statistical influence on the success of the implementation of the "Learning Sonatrach" strategy. The research provides concrete evidence of the consciousness of the Algerian managers of the importance of transforming their organizations into learning systems and the necessity of fostering up-to-date technologies that would facilitate the transformation process. The study revealed a number of recommendations for academic researchers and managers.*

1. Introduction

In an ever hypercompetitive environment, managers are confronting new challenges, dominating and controlling the rules of business games. One thing is sure in such globalized complex milieu: change, which remains the only invariant.

As a strategic solution that engages the organizations in the long run, managers found that transforming their organizations into learning systems have manifested real impressive results, either in developing competitive advantage and distinctive competencies, or in ensuring real local or global success, continuity and survival.

In developed countries, the concept of LO, as an imperative to respond to the environmental change and globalized market, has reached the maturity phase. Learning strategy is one of the key success factors for organizations to compete within a global fierce competition. This is why, to overcome the postponing of companies in developing countries, especially in Arab countries, companies are imposed to foster and apply a LO strategy.

This paper investigates the role of Information and Communication Technology (ICT), as a strategic success factor and as an exigency in today's organizations, in the adoption and the implementation of a learning organization strategy.

2. Research Significance

Being a LO focuses mainly on the continuous learning process, giving possibility for managers being in touch and keeping pace with the continuous business changes, in internal and external environment. The equation of "Learning/Change" necessitates a number of factors that could make it successful and effective.

Due to the technological shift in contemporary business, this research explores the extent to which the ICT could influence the adoption and the implementation of a LO strategy. This research would provide high contribution in that few LO literature and LO developed models (Marquardt, 1996; Pedler et al., 1991) have taken into study the impact of ICT on

transforming organizations into LOs. In addition, this research is of high significance since it is conducted in a distinct unique context in an Arab developing country like Algeria. Algerian managers are very conscious of the importance of both: ICT and LO which passed in their maturity phase in western business. So, conducting such research in such context where the use of ICT stills insufficient and where the theme of LO remains in its infancy phase, would be one of the first studies contributing in the LO/ICT literature, within developing, more specifically Arab countries.

3. Theoretical Background

3.1. The Learning Organization

The rapidly changing macro and micro-environments oblige the organizations to quickly build the capacity to change. LO are those organizations being able to keep pace with changes and constantly renew themselves by accomplishing needed transformations (Bui, 2009).

LO is seen as one of the best strategic response for the current dynamism and complexity in business environment. The field of LO have received a substantial attention as a successful strategic management of organizations' resources and orientation in capitalizing and renewing distinctive competencies and sustaining a competitive advantage.

3.1.1. Theoretical Roots of Learning Organization

The parent disciplines of LO include the open system theory and resource based theory. Being the cornerstone of the LO is the construct of the systemic view of learning process. From an open system perspective, the organizations are open and intimately affected by their external environment. They represent sub-systems in a whole system with which they are in a continual process of interaction, dependence, and influence by it and influencing on it, in an attempt to exploit opportunities and avoid threats.

On the other hand, founded by Penrose 1959, the resource-based approach has received attention as competitive advantage driver, as a strategic emergent field putting resources at the heart of any organization's competitive advantage (Lake, 2000).

Fillol (2007) cited that organizations survival implies reflexiveness, exploitation and exploration of its competencies, making from the organizations: "competencies portfolios", which have to be valued, articulated and sustained. So, this perspective points out that resources are the key source of the organizational learning and then sustaining competitive advantage.

3.1.2. The Learning Organization and Change

The two previous theories implies the notion of "change" which represents one of the major incentives behind the emergence of LO as the best and ever appropriate strategy to cope, adapt and survive. Change has become a continuous process in management, reflecting the necessity of creating an organizational capacity of change, permitting flexible adaptation to environmental dynamics.

Alonderiené and Pundziené (2008) linked what is called formal, informal and non-formal learning with the acquisition of the change management competence. The three types of learning are classified on a continuum representing their relationships with change stages, modeled by Lewin, as shown in figure 1:

Figure.1. Relationship between the types of learning and Change stages
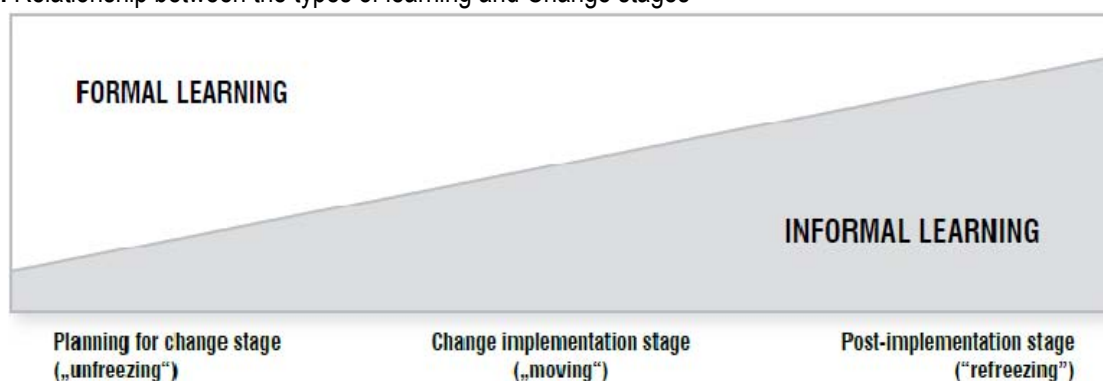
In unfreezing phase, one needs a prior knowledge, and competencies to plan change and analyze special issues, which might be acquired through formal learning. Reaching change phase, as changes begin, managers need more specific competencies and search in additional sources that could be reflected by learning informally. At the refreezing phase, learners go beyond the formal learning and rely on informal learning to consolidate improvements learnt and institutionalize the new approaches and values.

3.1.3. The Learning Organization Defined

The field of LO was the subject of large researches and area of interest of a number of important researchers, especially: Argyris and Schon (Organizational learning: a theory of action perspective, 1978), Senge (The fifth discipline: the art and practice of learning organization, 1990), Pedler et al. (The learning company: a strategy for sustainable development, 1991) and Watkins and Marsick (Sculpting the learning organization: threats and science of systemic change, 1993).

"The notion of the learning organization has received considerable concentration in scholarly literature because advanced organizational learning processes have been heralded as a foundation of competitive advantage" (Song, 2008: p15). It has been an unparalleled and phenomenal interest in becoming a LO. This has made the agreement upon one approval definition difficult. However, the review of the extensive literature has permitted the development of the following definition:

"Learning Organization is an open system that is supported by organizational learning-oriented strategy, developed to respond reactively and proactively to a hypercompetitive environment, and easily transform itself to exceedingly deal with change. This organization possesses an extraordinary combination of interrelated systems and processes, by which individual and organizational learning dynamics and interactions become the organization distinctive competency that could insure its position in the future and sustain its competitive advantage." (Dahou, 2010)

In the essence of the LO is the "learning": "a process of enhancing learners' capability, individually or collectively, to produce results they truly want to produce" (Senge, 2006: p.364).

As the pioneers of organizational learning, Argyris and Schon (1978) introduced the famous typology of learning, developing the two models I and II, and presented the theory-in-use as a foundation to organizational learning. The first type of learning is the "Single-Loop Learning": "The process of responding to internal and external changes by detecting errors which they then correct so as to maintain the central features of organizational theory-in-use" (Argyris & Schon, 1978: p.18). The second type is the "Double-Loop Learning": "sorts of organizational inquiry which resolve incompatible requirements by creating new understandings of the conflicting requirements, their resources, conditions and consequences". A third type was proposed is the Deutero-learning by which organizations use a combination of single and double loop learning processes.

Furthermore, the same time, the learning process was categorized into three levels: individual, team and organizational level. The individual learning is a continuous life-long process naturally rooted in individuals, helping them discover environment's discrepancies or challenges, adopt strategies relying on cognitive and effective understanding of the challenges, implement and evaluate their effectiveness. This process is the cornerstone of the organizational learning: "…Individual learning has both an obvious and subtle importance for organizational learning –obvious because organizations are composed of individuals and subtle because organizations can learn independently of any one individual but not independently of all individuals." (McCafferey, 2008: p65).

The individual learning can't be converted into organizational learning before transforming it into team learning which represent the convergent point, defined as follow: "a group of people who functioned together in an extraordinary way – who trusted one another, who complemented one another's strengths and compensated for one another's limitations, who had common goal that were larger than individual goals, and who produced extraordinary results" (Senge, 2006: p.4). Passing from individual to team learning, this later will be transformed into organizational learning: "a metaphor whose spelling out requires us to reexamine the very idea of organization" … it "occurs when members of organization act as learning agents for the organization, responding to changes in the internal and external environment of the organization by detecting and correcting errors in organizational theory-in-use, and embedding the results of their inquiry in private images and shared maps of organization" (Argyris and schon, 1978: p.28-29).

3.2. Information and Communication Technology

ICT is a strategic organizational asset which boosts organizations performance to higher level, improves business processes and pilots organizational change in function of their environments. Technology is one of the main

transformation forces of organizations into learning ones. ICT has improved the speed, capability of an asynchronous communication and production, Knowledge economy's expansion, great intention to employees' training and learning by transforming the organization of work and workplace. ICT has drastically enhanced information flow and knowledge sharing process.

Possessing an up-to-date technology infrastructure – all the hardware (computer equipment), software (computer programs), databases, telecommunications, networks, internet, extranet, intranet, people, procedures that are configured to collect, manipulate, store, and process data into information (Stair &Reynolds,2003: p16)- has become a key success factor for organizations.

ICT is a mixture of hardware (buildings and equipments), software (the way to operate the hardware) and know-how (skills, knowledge and experience, together with appropriate organizational and institutional understanding) (Aldhmour, 2007: p32). ICT has become a strategic asset and a competitiveness necessity which can help improve business processes and change the function of markets. IT can enable more flexibility in   adapting organizations' activities to market's changes as a result of competition and customer needs (Aldhmour, 2007: p39).

The use of ICT, especially the internet, can help organizations to build communities of interest by improving the quality of interactions across time and space, bringing people closer together, creating teams, and knowing down walls" (Buranasin, 2001: p19). ICT has a growing impact on how organizations learn. Their application supports hugely OL process. Real, Leal & Roldan (2006) argued that for the firms to succeed, they have to complement ICT and OL. They presented ICT as an OL's determinant. Nonaka has conceptualized that fostering ICT to elicit and practice new information and knowledge, as with analysis of OL processes. ICT will be one of the major enablers of OL (Templeton, Schmidt & Taylor, 2008).

As a subsystem in his model, Marquardt (2000, reported by Bui, 2009, p29), described the technology as the supporting, integrated technological networks and information tools that allow access to and exchange of information and learning.

Pedler et al, made from ICT one of the LO dimensions, expressed in the term 'informating' through information dissemination, formats of data and databases that are interesting and lead to learning. ICT, through the use of computer-based infrastructure, creates and maintains effective information and knowledge generation within organizations and the delivery of learning programs. It encompasses electronic tools and advanced methods of learning (simulation, computer conferencing, collaboration, mobile audio and video applications). It allows what is called 'e_learning' or online learning. It represents an efficient means for distant learning and virtual work.

For this reason, this research seeks to explore the impact of ICT on facilitating and succeeding the implementing a LO strategy. Accordingly, the following main hypotheses were proposed:

**H1.** ICT has a significant statistical impact on implementing LO strategy.

This hypothesis is divided into the following two sub-hypotheses:

H1.1: IT has significant statistical impact on implementing LO strategy.

H1.2: CT has significant statistical impact on implementing LO strategy.

The review of the literature concerning the main research issues has allowed the development of a model reflecting the potential impact of ICT on the success of a LO strategy implementation (see figure 2).

Figure.2. Research Model
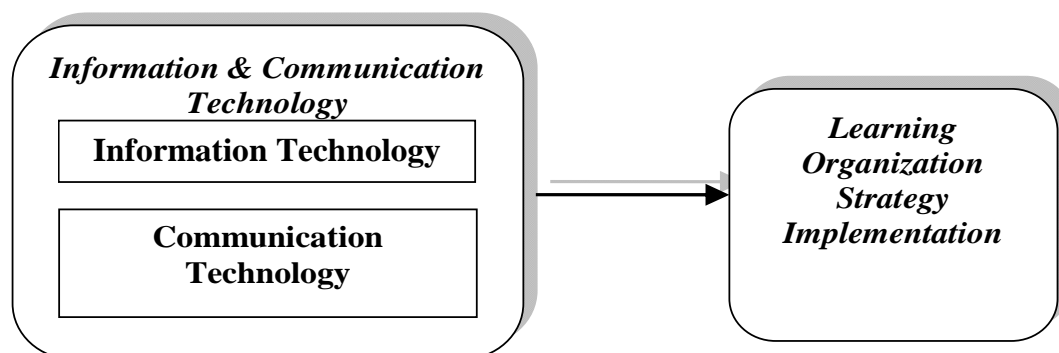
The definition of the research variables are summed in table.1 with the sources of definitions and items used in measuring them.

Table.1. Variables' Definitions and Items' Sources Measuring Them.

	Operational Definition	Sources
ICT	The technical enablers, composed of all the hardware, software, intranet, extranet and the internet –entailing telecommunications and networks-, that are the organization adopts, installs and applies for the access, sharing and ease flow of information, and as facilitator of the learning process.	Stair & Reynolds, 2003; Real, Leal & Rolda, 2006; McCafferey, 2008; bui, 2009; internet ICT surveys.
LO	A company that has powerful capacity to generate its knowledge creation and conversion processes, reflected in the four modes of socialization, externalization, combination and internalization. It builds on supportive organizational elements including strategy, structure, culture, empowerment and collaborative teamwork environment. It fosters information and communication technology as a key to optimize its learning capacity, either, individual or organizational capacity.	Watkins & Marsick's LODQ, 1993; Real, Leal & Rolda, 2006.

4. Research Metodology

This research adopted a case study approach to test the proposed model. Furthermore, the research is a non-causal, correlational, non-contrived, cross-sectional (one shot) field study research, exploring the relationship and effect of ICT on LO strategy implementation. The company Sonatrach represents the research unit of analysis. Three months were donated for data gathering, from September 2009 to November 2009. Researchers have used non-probability purposive judgment sampling, in which 2500 managers within Sonatrach represent the population of interest.

500 surveys with 26 items to respond on was specified and distributed by agents from Human Resource Management (HRM) department to managers. A total of 416 valid surveys resulted from this process, representing a response rate of 83.2%. Table 2 describes the research sample characteristics.

Table.2. Sample Characteristics.

Measure	Value	Frequency (N=416)	Percentage
Gender	Male	284	68.3
	Female	132	31.7
Age	20-29	96	23.1
	30-39	176	42.3
	40-49	121	29.1
	50 and more	23	5.5
Academic Qualification	PhD	3	.7
	Master	151	36.3
	BSc	262	63
Job Status	Senior Management	120	28.8
	Middle Management	275	66.1
	First-Level Management	21	5
Revenue (Algerian Dinars AD)	Less than 50000	23	5.5
	50000-99999	256	63.7
	100000-150000	99	23.8
	More than 150000	29	7
Experience	3-8 years	79	19
	9-14 years	196	47.1
	15-25 years	91	21.9
	More than 25 years	50	12

The primary data were analyzed using SPSS version 16.0. Research data was also collected from secondary sources including the company's journals, publications, web site. Additionally, some primary data was gathered using informal interviews which supported the interpretation of the research findings.

5. Data Analysis

The results of Cronbach alpha (table 3) were satisfied in that all items values were over 70%, ranging between 73.4% and 85.1%.

Table.3. Variables' Reliability

Variable	Cronbach's Alpha
IT	.734
CT	.851
LO	.788

In order to test the model hypotheses, a multiple linear regression was used and results were summed in table 4:

Table 4. Multiple Stepwise/Enter Regression Results

R^2 : .241 Adj R^2 : .238		F-statistic: 65.651 Probability : 0.0000	
Variable	**Coefficient**	**T-Statistic**	**Probability**
IT	.199	4.025	.000
CT	.415	8.836	.000

From results of table 4, information technology and communication technology explain 24.1% of the variance in the LO strategy implementation at 1% of significance level. This leads to accept the proposed main hypothesis as well as its sub-hypotheses which means that both: information technology and communication technology have a significant statistical impact on the implementation of a learning organization strategy.

6. Discussion

ICT is found to influence 'Learning Sonatrach', and explains 24.1% of the variance in LO, from which both IT and CT affect LO. ICT has an important role within the company. All the company's units are equipped with up-to-date technologies, hardware or software, and programs necessary for the computerization of its documents: Data mining, video-conf erencing, Office software, graphics software, spreadsheet, databases... the company has already installed the electronic documentation, and adopted new information systems, like the Finance and Audit Information System, for a more fluid and effective information management. The company develops now the e-KBook (electronic knowledge book) which would articulate and transform the explicit knowledge in a more complex and sophisticated knowledge, but stills in the phase of implementation within the entire company. In addition, the company has put into experimentation the e-Prolearn: a conception of a learning platform e-learning, inscribed within an Informatic Environment for Human Learning 'EIAH'.

ICT are considered as a powerful organizational vector that ameliorates the company reactivity. The company is conscious of the significance of a communication system, this is why it has made available all the essential telecommunication and media instruments. It has its special intranet, blog and portal, put in the service of the personnel needs. It also has its own extranet, relating it to its major stakeholders. And Internet of course is one of the different sources that Sonatrach uses for various reasons, most importantly for those used by its intelligence system concerning main competitors.

What is noticed is the absence of an ERP within the company's group. In effect, the company has launched a global transformation of ICT infrastructure. This transformation imposed on the company the necessity of the implantation of the "Common Environment System 'COE'" (Sonatrach Journal, N0.58, p.38, April 2009) as one of the structuring projects offering a collective collaborative working environment, using unified communication technologies. COE is operating in the ministry of energy and mines and within the general administration of the company. COE has demonstrated large efficacy in promoting service quality, through the available accessible information and the highly flexible and available hardware whatever the work is located. COE is now in its second installation phase at Pipeline Transportation (TRC).

7. Conclusion

Numerous are the transformations witnessed by the organizations that place learning forward as response to an ever changing environment, exposing them to a diversity of large challenges, either locally or globally, and as a priory of learning is how to take advantage and profit from these challenges by continually expanding individual and organizational capacity, creating truly desired results, nurturing new patterns of thinking, and promoting collective spirituality.

The theme of LO is the debate of large number of business researches, studies, and master and PhD dissertations around the world. This research investigated the role of ICT as a success factor of a LO strategy implementation. Oriented with this objective in mind, the research is empirically examined within the context of Sonatrach, an owned-state, one of the ten best global oil companies.

From 416 valid recuperated surveys, the results of the research revealed that ICT participated in the building of a "Learning Sonatrach", explaining 24.1% of the variance in LO.

ICT has participated in the transformation into a Learning Sonatrach. The company and its managers have emphasized on the importance of the imperative of exploiting and intelligently gearing ICT in the company objectives' realization. Managers are awake that ICT are becoming one of the pillars of the organizations' strategies to confront the global challenges and sustain competitive advantage. They realize that for effective and efficient management and learning the organization needs up-to-date technology. The installation of high-performance unified information systems, and COE, e-KBook, e-Prolearn are some of these initiatives. All what is needed from research point of view is a more dynamizing and vitalizing of the role of ICT to enforce learning.

8. Recommendations

- Managers, in Arab countries, within any organization have to be conscious of the strategic option of becoming a LO. This strategy is working efficiently in developed countries' businesses. This is why managers "must" adopt a learning strategy, support a learning culture and deploy all possible technologies and systems to promote their organizations into learning ones
- Managers have to install and utilize intelligently up-to-date business related ICT before engaging in a LO strategy.
- This research was a cross sectional study with a small sample. Conducting a longitudinal study with a large sample could be of useful results.
- Because of the scarcity of such research in Arab context, testing this model within another Arab country could permit the generalization of the model.

References

Aldhmour, F. (2007). *Towards understanding the relationships between information and communication technology (ICT) and competitive advantage (CA) in a developing economy.* (Doctoral Dissertation, Leeds Metropolitian University, UK, 2007).

Alonderiené, R. & Pundziené, A. (2008). The significance of formal, informal and non-formal learning for the acquisition of the change management competence. *Profesinis rengimas: tyrimai ir realijos, 15*, 173-180.

Argyris, C. & Schon, D. (1978). *Organizational learning: a theory of action perspective.* Addison-Wesley Publishing Company.

Bui, C., T. (2009). *Discovering the factors for organizational success: an investigation of learning organization attributes within minority-owned small businesses in New England.* (Doctoral Dissertation, Capella University, 2009)

Buranasin, B. (2001). *Relationships between internal usage and learning organization characteristics in American and Thai universities.* (Doctoral Dissertation, University of New Haven, 2001)

Dahou, K. B. (2010). *An empirical investigation of factors determining a learning organization : The context of Sonatrach.* (Master Dissertation, Mutah University, Jordan, 2010).

Fillol, C. (2007). *L'emergence de l'entreprise apprenante et son instrumentation : Étude de cas chez EDF*. (Doctoral Dissertation, Université Paris Dauphine, 2007).

Lake, L., J-A. (2000). *The competitiveness of Canada's food processing industry: a resource-based approach*. (Doctoral Dissertation, University of Guelph, 2000)

Marquardt, M. J. (2002). *Building the learning organization: Mastering the 5 elements for corporate learning* (2nd Ed). Palo Alto, CA: Davies-Black Publishers.

McCaffrey, J. (2008). *The extent to which clubs are perceived as learning organizations*. (Doctoral Dissertation, University of Canberra, Australia, 2008).

Pedler, M., Burgoyne, J., & Boydell, T. (1997). *The learning company: A strategy for sustainable development* (2nd Ed). London: McGraw-Hill.

Pedler, M., Boydell, T., & Burgoyne, J. (1991). *The learning company*. London: McGraw-Hill.

Real, J., C., Leal, A., & Roldan, J., L. (2006). Information technology as a determinant of organizational learning and technological distinctive competencies. *Industrial Marketing Management, 35*(4), 505-521.

Tempelton, G., F., Schmidt, M., B., & Taylor, G., S. (2008). *Managing the diffusion of organizational learning behavior*. Inf Syst Front. Available on http://www.spingerlink.com.

Senge, P., M. (2006). *The fifth discipline: the art and practice of the learning organization*. UK: Random House –Business Books.

Senge, P., M. (1990). *The fifth discipline: The art & practice of the learning organization.* New York: Doubleday.

Song, J., H. (2008). *The integrative determinants of organizational performance improvement: the impact of dimensions of learning organization and dynamic knowledge creation.* (Doctoral Dissertation, The Pennsylvania State University, 2008).

Stair, R., M., & Reynolds, G., W. (2003). *Information Systems, a managerial approach* (6thEd). Canada: Thomson.

Watkins, K., & Marsick, V. (1993). *Sculpting the learning organization: Lessons in the art and science of systemic change*. San Francisco: Jossey-Bass.

Sonatrach Journal, 58, pp.38, April 2009.