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ICT and its impact on organizational learning

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Abstract

This article presents the impact of the Information and Communications Technology – ICT at organizational learning through a review of the state of the art in this field. First, it addresses the basic concepts of knowledge society, the process of change due to a postmodern era and its implications for organizational learning. Additionally, it addresses the concept of ICT, its development, components and a relevant discussion concerning the difference among data, information and knowledge that are necessary for the accuracy of organizational learning. Finally, it presents the definition of organizational learning observed from the organization itself and describes a series of studies of the impact of ICTs on organizational learning and through this into the increasing productivity and innovation.

Keywords:

Knowledge society, Organizational learning, ICT

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Knowledge society

To address the impact of information and communications technologies - ICT in the organizational learning is essential to realize the environment in which organizations operate. Therefore, it will be quickly presented the concept of the knowledge society, the process to access to this type of society, the relations existing between the modernism, still operating at a significant number of organizations, and the new paradigm in which is necessary to perform.

Definition

The so-called knowledge society implies new opportunities and challenges of three core characteristics. They are:

- "global", transcending geographic and political boundaries
- Information based, as an intangible economic factor
- Intensely interconnected (Kelly, 1999).

A study (Tesoro & Arrambari, 2002) concludes that many authors (Shapiro & Varian, 1999; Armstrong & Hagel, 2000; Evans & Wurster, 2000; Handy, 2000; Tapscott, 2000) affirm that this society also complies with the following features:

- Coordinated decentralization: open networks generate favorable social impacts because they drive initiatives that supplement the citizen expectations
- Increasing returns: the value of a network increases as the number of participants
- Conjunction of scope and informative richness: the scope refers to the number of people involved in the exchange of information and wealth refers to the quality of information
- Confidence induction: knowledge society expands and enhances opportunities for sharing information and develops the trust through integrity, accountability and compliance.

According to the Organization for Economic Cooperation and Development – OECD, the term knowledge society is used to describe the growing use of ICT and the social, political, cultural and economic impact that it is having on society, Governments and the economy.

Today's society is becoming a society more networked, interactive, instantaneous, information-rich, informal, and more uncertain (Gualtieri, 1999).

Another approach to the concept of the knowledge society could be raised by the Inter American Development Bank - IADB in a Latin America application manual, where they define it as "a certain level of social, economic and technological development characterized by the participation of various actors; Government, organizations, researchers, technology centers, social organizations and citizens willing to generate disseminate and use information for the production of economically useful knowledge and innovation, for the purposes of development (Valenti, Anta, & Bendersky, 2003).

Given that the literature has continuous references to the concepts of economy and society, it is important to clarify the difference between these two concepts for the purposes of this paper.

The knowledge society is expressed in three facts (Cardona, 2002):

- Organizations rely increasingly on ICT
- Citizens are more and better informed because of the use of ICTs in their daily activity
- It is being consolidated a sector of the knowledge made up of three subsectors:
 - Content
 - Information distribution and access
 - Telematic industry

The knowledge economy has developed a sector that contributes significantly to its growth with powerful industry content, which can access and process information. In contrast, the knowledge society intensively uses knowledge in social, cultural, economic and political life. However, the achievement of a knowledge economy does not guarantee to develop a knowledge society. A country can have a strong knowledge economy without being a knowledge society. The other way around, a society can be made up of citizens and organizations in a society of

knowledge, without being a knowledge economy. In fact, it does indicate a different level of development (Cornella, 2001).

The knowledge society is not the next step. We are already living in this society, which is developing unequal and contradictorily in all parts of the world and it is characterized by be informational, global and connected networks (Castells, 2000).

The unequal and contradictory development status encouraged to consider if this knowledge society will help to reduce the gap between rich and poor when precisely the discrepancies in the level of development make the technological impact not equitable. The vision of a global economy based on knowledge and a universal Commerce, characterized by "the end of the distance" must be contrasted with the reality that half of the world's population has never made a phone call and much less had access to Internet (OECD, 2000).

Postmodernism

The discussion on the impact of ICT in organizational learning should begin working on the definition of changes experienced in the current macroeconomic aspects described by authors as Tapscott (Tapscott & Caston, 1995) and Gates (Gates, 1997) among others. The basic idea is that organizations are facing a paradigm shift that implies the approach to a new technology, a rejuvenated business environment, which implies automatically an organization that gear in the new geopolitical world order.

New technology is based on open computing and networked widely described from different authors. It is also based on a need for the integration of input base information of any processes that run the Organization. Short term New Technology will involve the handling of large volumes of data supported ICT, which makes up the concept of computer science at the service of the Organization and the achievement of the objectives.

In the new business environment, no one escapes to globalization present at the global level and that has led organizations to

generate world-class standards to create and maintain a competitive advantage that gives the possibility to engage in international trade machinery.

“Porter diamond” tries to describe how the new business environment means for the Organization the use of certain resources to achieve competitiveness in a globalized market. In this globalized market, it depends on flow given in a specific market the Organization fills with the marketed product. It is therefore important to a delimitation of the business to identify technological variables workflows affectation hosting that is suitable on is "edge".

The Organization must have among others the following resources (Porter, 2000):

- Physical
- Human
- Knowledge
- Capital
- Infrastructure

That classified from a functional perspective would be (Porter, 2000):

- Basic (i.e. natural resources)
- Advanced (i.e. knowledge)

On the other hand, watching them from the specific classification type:

- Generalized
- Specific.

A relevant discussion on the factors in the new environment of business is the fact that basic or general factors do not generate competitiveness, which is easily achievable. The Organization must be able to obtain and use advanced factors and high specialization, as a result of a process of organizational learning.

Each element described in the diamond is going to increment their sophistication, due to the process of disclosure of information by

the mass media and expertise is giving it. This results in customers increasingly demanding on the final terms of the product purchased.

The final product is obviously the result of the internal process of value chain carries out the Organization, which is the reflection of the organizational structure, learning organizational and ICT are using; among other, information systems, creating a clear relationship between the demand and related sectors.

Related sectors incorporated into all areas of support for the Organization should also join the network organizational, as for example suppliers developed up to the concept of single provider, the financial sector and all others that incorporate value to the product of the organization.

Based on these three factors of competitiveness diamond, it reaches the third element of the new paradigm in the new organization is the same, or it coincides with the fourth element of the diamond of competitive Porter, which implies that the Organization must become strategic driving trends in use of the product in specific markets with defined technologies to define strategic sectors and more broadly; strategic segments that take into account the generalities of the market. The Organization must meet several basic features, which include:

- Proactive not reactive
- Adaptable to change and work in research and development
- Exporter, involved in the process of globalization
- Carefully in its strategic management, analyzing its scope and its environment.

In other words, because the organizational learning , proactive organization, must be able to anticipate change and identify situations that possibly will find, with levels of uncertainty under the ones who are not strategic; creating their own future, compared to traditional organizations that respond to changes once they are under a clearly reactive structure.

To round out the new paradigm, and completely relate it to the elements previously described. It is the new geopolitical order

represented by the creation of the global village (Toffler, 1984), the disappearance of some economic policies, and the models that generate new geopolitical regions (i.e. European Union, the block of Asian countries or the basin of the Pacific, the NAFTA market, the consolidation of the Latin American markets through Mercosur) that involve shores of commercial, social and political structures.

Paradigm shift involves "inevitable restructuring of national economies, largely driven by advances in ICT" (Tapscott, 1997). All these changes show that modernism is lagging behind to get inexorably in post modernism, building on strengths and avoiding their drawbacks.

During the modernism, society was serving the organization and now days, in post modernity, the organization is serving society. The welfare of society is achieved by creating personal development environments that combine the objectives of the organization with the objectives of the individual, which among other priorities has the use of free time that only can be achieved with the increase in productivity that allows you the real reduction of working hours. This single process is possible with the incorporation of ICT in the production environment of the organization.

The changing processes in which organization is moving today, and the transition from the old industrial economy to information economy relates to organizational learning. The growth of the organization is centralized in the management of four issues:

- Economic policy and competitiveness (management)
- Reinvestment-retention of profits policy (negotiation)
- Financial policy - how long will the Organization purchase? (Negotiation)
- Funding policy - how much debt? (Negotiation).

The first two elements correspond to the representative of the intrinsic growth variables, and the last two are extrinsic growth.

At the current post modernism, the information is a capital asset and industrial production applied in previous economy, and it is changed by the ICT application at all aspects of production. Capital and

technology of the industrial era or modernist are focused on industrial productivity. In the information age, capital and technology are focused on the productivity of services due to organizational learning and knowledge workers. In other words, the traditional classification of economic sectors according to their location in the supply chain (Porter, 2000):

- Primary Sector – exploitation
- Secondary Sector – production
- Tertiary Sector – services.

It is extended incorporating information and its use as a primary element.

In this new scale of productive activity in which information is the pillar and pivot where are developed the activities of the organization, and where can only be efficiently handle incorporating ICT working under new network organizations parameters. The organizational boundaries are not imposed by traditional physical parameters; they are extended as far as reaching the requirement of the employer, which is supported by the new networking technology tools that let you work on virtual organizations and concepts as CAN, Data Warehouse and Data Mining that have the potential to be anywhere and everywhere at the same time. As a result, these tools reduce traditionally costs considered fixed as physical infrastructure, communications, stationery, closing customers with producers. In this scenario, knowledge becomes the basis of value, and human communication is scanned to travel on the information highway (Tapscott, 1997). Organization is virtualized, creating fundamental changes on it, nearing the end of the chain of command and control by scrolling to molecular structures.

The different elements of networked organizations communicate with each other and with external ones based on ICT, achieving disintermediation in favor of consumers based on the convergence of new economy key sectors such as computing, content managers and suppliers of communications. For being at the forefront of this wave of change, the communication will be in continuous innovation, taking into account consumers requirements, getting consumers to participate in the production process of goods and services that will consume. An

important element of shifting from modernity to post modernity is that postmodernist as digital society is in real time.

“We are not in a change of era, we are at an era of change” (Toffler, 1984), which requires that organizations, based on organizational learning, must be flexible or has been in danger of disappearance. On the other hand, "the birth of the information age offers the best chance to create organizations and progress" (Gates, 1997), as well as "ICT enable organizations to have a high performance team structure to function as business integrated regardless of great autonomy of each business and reach and develop new relationships with external organizations in order to become an extended one" (Tapscott, 1997).

Clearly defined by Tapscott when explain that in this era of change, the organization is facing a new economy that handles 12 basic precepts, in some way each of every one of these elements affects organizational learning under the use of ICT to respond effectively and efficiently. To complete this initial presentation on the relationship between modernism and Post modernism with organizational structures, there are playing the change issue and the inherent organizational resistance to it, which is natural if you consider that “change does not have a built-in benefit, old reality wasn't necessarily bad; the new reality is not necessarily good" (Noer, 1997) and that any impairment to the environment automatically generates rejection. Business leaders must be prepared to face this situation to achieve mainstream organizations in the new postmodern structure.

Information and communications technologies Definition

From the semantic point of view and without the specification of the information and communications, technology corresponds to inventions that solve problems directly, through a set of specialized knowledge type, science, manifested in machines, programs or procedures and involving a pattern of activities development (Tapscott, 1997).

From a production perspective, technology is the use of the required knowledge to produce a good or service (Tapscott & Caston, 1995). This knowledge is not necessarily academic, it can also be based on experience, and it is always present in any process no matter the complexity level. Technology can be adapted or modified having always in mind that technology does not be imposed. It comes through its incorporation in the goods or services, and in the training of the human group of the Organization. . Technology can be acquire internally or externally, and even copy applying organizational learning.

As economy, technology is continuously changing. Normally, it will not be possible to do the same before using a different technology because technology does not provide its own neutral idiosyncrasies, which are not possible to remove because it would involve changing technology. This is not bad, just take into account this situation when you are in a technology implementation processes and evaluate cost benefit of joining and avoiding Blaauw law: "established technology tends to remain despite the new technology" (Bloch, 2005).

In the incorporation of technology in production, it is necessary to take into account that extremes are dangerous. Therefore cannot be carried away by the technological "fashion" that leads us to do things as usual but with new technology, and the opposite that is changing the ways of doing things simply because of the technology requirement. Both cases lead to productive inefficiencies flowing in the loss of competitiveness of the Organization and thus into technology obsolescence. In other words, "A complex system developed from scratch never works and may not be mending to make it work. We should start over, on the basis of a simple functional system" (Gall, 1977).

In addition, technology incorporation should be avoided "per se" , and it is allegorically defined as the Act of Putt: "technology is dominated by two types of people: those who understand that does not manage, and those that handle they do not understand" (Bloch, 2005) and can also occur Clark Law: "any sufficiently advanced technology is not differentiable of magic" (Bloch, 2005).

Technology in the field of information and communication has difficulties due to its continuous development and daily expansion. Assume that the information and communications technology – ICT correspond to activities that facilitate electronic archiving, processing, transmission and interactive display of information (OECD, 2000). According to the report of the Group of political action of the Government of United Kingdom (British Government, 1996), ICT were transformed into focus at the moment in which PC became a utility for easy access in first part of the 80's. After the development of agriculture and industrial revolution and coincides with the process of incorporating in the knowledge society, this situation is known as "The third wave" (Toffler, 1984). In the third wave, ICT offer lower costs, communication and access more efficient and secure information (Castells, 1999). According to the OECD; ICT have as fortress speed, compression of time and distance, and informality, as well as its easy access and low cost (Gualtieri, 1999) that are expressed in potential and specific benefits (Ballard, 2001).

As shown, ICT are no more than a new expression of the importance that are becoming so-called intangible factors such as knowledge, versus the traditional balance of the production factors, land, labor and capital (Salvador, 2002). Finally, we must remember that steam was to industry as electronics is to information systems. The managerial Sciences evolved at the end of 17th century involved technology of that time (i.e. paper, pencil and printing), as well ancient technologies support the muscles, the physical, while modern technologies support the abstract, the mind. You must therefore move from atoms to bits, "brick to click" (Negroponte, 1999).

By these basics is relevant to consider as technological innovation is carried out according to Freeman in six basic strategies (Mullin Consulting, 1996):

- Offensive
- Defensive
- Imitative
- Dependent
- Traditional
- Opportunist

The first one is designed to achieve the technical leadership of market ahead of the competitors in the introduction of new products, and it is own intensive in research. As a defensive strategy, it does not want to be the first in the world. It simply follows the leaders from the distance differing from the imitative. It is not in the innovative process, but it is taking advantage of the errors of innovators. Similar to the above, it is dependent on strategy, which accepts subordinate role regarding other stronger firms. Organizations that assume a traditional position do not see any reason to change the product taking into account neither the market nor the competence required. Finally, the opportunist picks a niche market and generates advantages to develop it.

Evolution

Once it is clear the concept of ICT to address its relationship to organizational learning, it would be describing the evolution they have had.

Doing a quick coverage of technology evolution; during 50's and 60's, paradigm corresponded to the traditional data processing using Mainframes with a lack of integration between the various components interacting in the system and produces producing a non user friendly interface, but getting as fundamental benefit the end of manual work.

Ending the 60's and over the next decade, Time Sharing replaces the paradigm of the traditional data processing improving the relationship between the technical and the final user.

For the 80's, the paradigm migrates to the concept of information centre, where the user receives the attention required without having to interact with systems creating a protection to the non-technical user.

During the closure of the 20th century, the paradigm meets guidelines set during the 80's by Bill Gates having a computer in the house of anyone and that ran under the figure of the personal computer PC in client/server environments that are operating thanks to the existence of networks that lead to a total interactivity between any user

and computational tools generating an effect technologically called Down Sizing, i.e. reducing team sizes.

Currently, involves the use of the benefits of the communications era represented in elements such as the Internet/Intranet/Extranet and Computing Network Architecture – CNA leading to unimaginable connection speeds and returning to the paradigm of computer equipment of high performance under the philosophy of large servers that process little robust customer information i.e. It reconsiders the organization from the technological point of view to a Right Sizing that is the choice of the correct size of the computations elements associated with the technology.

ICT advances present a paradox: the promise of more competitive, efficient and profitable organizations, the threat of an implementation problem caused by components not standards, proprietary platforms and limited development environments.

Reviewing the historical process of technology in the world, the above elements have been evolving from “hardware” to the service and knowledge, “jelly ware”, via the “software”.

The relative importance of hardware has been diminished in front of software and an important contribution to the information and service. This trend can be corroborate for the behavior of "IBM" who was the hardware giant (La nota economica, 1996), which has had to enter important organizational contraction processes (Portfolio, 1997), while "Microsoft", Colossus of technology is the King of the software. However, it is a fact that software is giving ground at high speed that is won by the information and all their performances including Internet (Gates, 1997).

Lastly, it is the service as a form of technology that is associated with the chance to win market and being more important than the software, hardware and even than information. It is important to note how it is possible that technology and organizational learning support all processes of conversion being experienced by organizations not just at the level of so-called hard technologies but corresponding to the level of

the soft technologies and knowledge as a representation of this latter type.

Components

In the new paradigm, ICT plays a role to handle efficiently large volumes of information for analysis and subsequent conversion into information to be used by Organization according to parameters of directives to become it knowledge. In this sense, technology is the incorporation of three critical elements for the Organization creating a tripod base for development; data, computing and communications. The implementation of those elements seek productivity and effectiveness, and it is reflected in competitiveness in which effective individuals develop equipments of high performance organizations integrated under the concept of extended organizations or networked organizations. It has to be taking into account that it is necessary to work with the appropriate technology, and that does not mean necessarily the newest technology as Lerman law says: "any technical problem can be solved if you have enough money and time" (Bloch, 2005).

From the vertex of computing understood as one of the main components of ICT, it is incorporated hardware and software including procedures. Hardware associated with the technological process has evolved from the main frames of high cost until the personal computers of great capacity. Today, a PC commercial has the same or greater computational capacity than a main frame of two decades ago. This component development has been so great that costs will have declined substantially compared with increases process speed, storage capacity, reliability of the elements and physical size of the equipment. Also, it has been lost their relative importance compared to another element as knowledge, which is a fundamental basis of post-modern society. Additionally, as hardware become cheaper and processing capabilities increase, there is a possibility to leave behind paradigm client/server, where data processing burden rested on the client to return to the schema in which the processing load returns to be the responsibility of servers and only client requires a good connection to receive the processed data. This follows a postmodern society schema that works under the concept of data processed at high speeds on central servers

that are able to answer in acceptable time to the user, due existence of networks and efficient on large bandwidths communications. Software is restricted almost entirely to an efficient tool for incorporation, administration, storage, analysis and presentation of results obtained accomplishing clear rules of openness, scalability and portability. Associated with software, there are “applications” which correspond to the formalization on a tool of development of the necessary procedures for the analysis of data defined by the end user so that the developer is able to implement it. This idea incorporates the concept of knowledge as a key component of the technology. The emergence of Internet created another wave of technology based on low-cost and easy to distribute WEB technology with high bandwidth networks. The initial explosion of WEB was driven by documents containing graphics high fidelity and text interlaced powerfully. The technology was first distributed with documents intertwining contained on servers using a centralized method schema "glass house" or "mainframe", where the corporate servers were accessed by millions of clients, browsers. This document technology is well entrenched providing a powerful and highly successful platform to handle documents with "browsing" and "surfing" as essential application, and it was the first distributed application to large-scale open and multiple vendors. Now in wide use in corporate Intranets and the Internet, it is rapidly evolving to add more functionality and better functioning and to make it easy to create, explore, share and manage documents.

From the vertex of communications, it is necessary to take into account that it is the basis of current technology, and it is the pillar on which it is developed the theory of the centralized processing that seeks the CNA with real expressions like the large bandwidths for transmission, impulse to Internet philosophy and its corporate Intranet and Extranet representations. Software seeks to develop and deploy applications focused on the network based on objects through networked economy. In the Centre of architecture there must be open and “de facto” standards recognized by industry as the most advanced and flexible technology to implement an environment for distributed objects as independent code and data packets contributing to safety and quality of products, since objects can do a number of actions on data handling. Under this concept, it can be obtained reductions in cost and

development time. The rapid adoption of Internet has progressed from screening stage to browsing at real commercial applications, some of which are already being implemented using various extensions to basic technology incorporating social networks concepts.

The last vertex incorporates the concepts of data, information and knowledge, which only have meaning because human factor interact analyzing it. As you can see, discussing this element at the end of the description is due to the need to include the concept of ICT content. The content comes from data, which should be handled according to parameters of detail, accuracy, complexity, localization, update, collection method and number of sources, describing whether they are primary, secondary, external or internal. Data analysis creates information concept underpinning knowledge and thus content vertex of tripod. Now, analysis process is responsibility of system users.

Data, information and knowledge

In the developed discussion, information is a central improving element of the Organization through the use of ICT. But, what is information?

In the process of decision-making at managerial level, one of the key elements is the use of information for reducing uncertainty. In modern organizations, the use of information systems as support in decision making must be gaining ground to decision making using "sense" which is the traditional methodology for decision making, according to a research (Andreu, 1996).

A first approach to the concept of information, indicate that it is data set that uses Organization to develop their products, whether good or service,. However, it would be an error because data itself does not fill the definition of information. It is vital for supplementing this definition the concept of analysis, so they become necessary for the Organization and thus are considered information. For example, the fact that interest rates fall does not add value to our activity; is a simple fact. However, that same data revised in the general management of a financial institution automatically generates a series of activities that seek to

exploit this type of behavior, as a result there is no data, but there is information.

Now, working under the concept that knowledge allows product development at Organization then there is doubt about the relationship between data and information with knowledge. Being simplistic, it can be concluded that knowledge is incorporating information at productive processes, which optimized cycle times and improve intrinsic quality of final product. In other words, knowledge is an advanced state of information that corresponds to a data analysis.

Information management becomes one of the main problems for organization managers, because its basis, data, is everywhere and at huge volumes, hindering its incorporation, administration, analysis and results generation. Therefore, it is necessary the generation of organizational learning that supports the process described above, so enabling optimal use of this essential input. Today, data are much more accessible than a few years ago and the availability of data has improved substantially; however, it does not have the security of quality, relevance and reliability of data contained.

In addition to the problems in the use of information and its conversion from data into knowledge, the situation that "information deteriorates upward direction of bureaucracies" (Bloch, 2005), objective information without correct management generates wrong knowledge that can lead to wrong decisions. The object of Organization's information must be incorporate knowledge and technology to the product or service produced reducing uncertainty in decision making, which only can be achieved through the use of organizational learning as a fundamental tool of management in the organization.

Organizational learning Organization

Organization is "A social invention which brings together different people, knowledge and materials of any kind, which are given a structure and system for integrating them into a whole" and "Organization is created to obtain something that Social system does not

have" (Litterer, 1996). Under these traditional assumptions, Organization should be capable to adjust the scope and environment requirements to respond to the needs of customers, employers, providers, competition and workers. For this reason, traditional bureaucratic organization of end of 19th century can be effective today; however, it is expected that it has to reassess under the principle of digital organizations. "There is not optimally to organize. Final form is the complex product of organization history, strategy and external circumstances" (Nadler, 1994), then Organization should accept the challenge of changing its structures due to environment requirements allowing creation of a structure or organizational architecture meeting new challenges.

Organization generates a complex culture which includes knowledge, beliefs, arts, law, morals, custom, habits and attitudes identified and acquired being a social aspect of human behavior, which helps to understand categories and relationships between them.

Inherent to organizational culture, there are constituent elements classified into four large blocks (Nadler, 1994):

- Tasks: basic activity of Organization
- Persons: running work and require individual skills.
- Formal organization: structure and procedures developed explicitly to ensure that individuals play tasks.
- Informal organization: created in parallel and tacit manner to formal, exercising considerable influence over the behavior and it is represented mainly by the organizational culture.

A fundamental problem in Organization during the modernist or industrial stage was the growth in the functional structure, leading to increasingly larger number of partners, progressively generating complex coordination problems that should be supported by appropriate organizational forms, including an efficient system of organizational learning. For growth, it requires several conditions; in particular the ability to adapt those organizations to survive. The postmodernist era, the use of ICT, as well as virtualization processes, is leading to the decline of the human group looking for the optimization of this expensive resource through the high specialization.

However, as it has been mentioned in previous comments, the internal culture organization creates mechanisms of rejection that somehow become stabilizing forces governing the processes of change and should be handled by the directives of the Organization, so that they do not become forces to halt necessary processes of change. The organization should be incorporate technology in order to shift traditional organizations into digital organizations supported in efficient organizational learning systems networked.

Organization must cope changes that occur and therefore must become an intelligent organization, i.e.; to learn, on the basis of efficient organizational systems, learning of problem solution, competition, workers, experimentation, experience and consumers. Smart organizations should take smart people able to meet challenges of third wave (Toffler, 1984) that involves organizations characterized by flexibility, not bureaucratic, empowered, coordinated, and committed in research, development and innovation.

Organization of high competition must be able to be a consumer-oriented organization with high learning ability, which gives ability to achieve better standards in its intrinsic quality, equivalent cost of their products and the response time to customers (Lawler, 1972). In other words, to respond efficiently to continuous and rapid flows of information modern organizations have to do be based on its organizational system:

- Referencing competition
- Using difference compared to the reference to raise possible objective
- Creating working groups to identify problems that move away from goals
- Seeking the root causes of problems
- Designing systems of evaluation performance based on individual contribution to reduce the cycle time.

As noted, organization in terms of its structure should changes to accommodate new environment developments "traditional hierarchical organization is very controversial" (Quinn, 1991), must therefore migrate from organizations in which persons are classified into two groups;

governed and governors into flexible and linked organizations with flats and autonomous structures as Open Network Organization – ONO described by Caston (Caston, 1987) to perform tasks and not to design organizations for monitoring responsibilities (Tapscott & Caston, 1995).

ICT state of the art allows organizations to stop behind the paradigm of hierarchical organization and migrate to Open Network Organization to identify from the technological point of view t open systems, which allow the opening of the Organization as an extended organization. ICT and organizational learning affect Organization because provide modular component integration as well as distributed computing generates empowerment and organizational authorization.

Finally, thanks to ICT and globalization of network the organization acquires a ubiquitous feature by being independent of time and space. In summary, the Organization must meet the challenge imposed by the development of ICT welcoming these developments within its structure, in such a way that is able to respond to the changing environment in which is not to mention lessons leave theorists on organizational structures such as Taylor, Fayol or Litterer of organizational learning. "The remnants of the culture of the information systems of the first era with hierarchical structure and its bureaucratic mentality of services are not applicable now days. Those remnants must be replaced by a group of information systems as a joint partner motivated by the same needs of performance to its business customers." (Tapscott & Caston, 1995).

Definition

Research on organizational learning has been contributed significantly to the development of the theory of organization and strategic management. Contributions from organization theory resource-based and knowledge-based vision suggest that competitive advantage comes from skills and capacities of the Organization , making organizational learning a fundamental strategic aspect. However, given that this issue has been studied by various disciplines, there is no consensus on a definition (Tsang, 1997). However, a review of literature (Argyris & Schön, 1978; Hedberg, 1981; Daft & Weick, 1984; Teece et

al., 1994, Simon, 1969; Dixon, 1994; Cavaleri & Fearon, 1996) identifies at least the following common elements:

- It is related to knowledge acquisition
- The amount of learning at a given time is direct function of learning accumulated up to that time
- It pursues improvement in Organization development through the identification of new technological, productive and commercial opportunities
- It covers entire organization and not isolated individuals. Individual learning must be communicated, shared and integrated into the routines to be considered organizational.

Organizational learning is a dynamic process of creation, acquisition and integration of knowledge led to development of resources and capabilities to enable Organization an improvement in its performance, distinguishing four constituent phases (Huber, 1991, Slater & Narver, 1995, Tippins & Sohi, 2003):

- Acquisition
- Distribution
- Interpretation
- Organizational memory.

Knowledge acquisition can be done externally or generating it internally through other organizations experience, recruitment of new workers and through research and development. Distribution of knowledge acquired throughout Organization must be developed via an appropriate network design enabling individuals of various specialties, cultures and languages, separated geographically to access the same information. Additionally, transfer tacit knowledge requires greater interaction among individuals and as a consequence it is necessary to develop mechanisms to promote it (Brown & Duguid, 1991; Wash & Wenger, 1991; Cook & Yanow, 1993; Wenger, 1998; Fox, 2000; Gherardi & Nicolini, 2002; Chiva & Nightgown, 2003). Interpretation is a consistent and collective action towards a shared vision of organizational members. Thus, everybody throughout Organization perceives the same purpose, expresses its principles and defines what is important. Its purpose is to view and to move Organization's mission to the improvement and transformation of concrete actions (Revilla et al.,

2005). Finally, many authors have shown the importance of storage and reuse of knowledge (Levitt & March, 1988; Huber, 1991; Simon, 1991; Casey, 1997; Cross & Baird, 2000). Organizational learning, understood as historical information stored and used for current decision-making must replace knowledge inserted at individual minds. It is intended to recover and dispose existing organization's knowledge depending on the accessibility degree for those parts that require it.

Productivity

Today's businesses around the world are facing an economic crisis. Besides global tensions in the financial system, many economies align a crisis in its growth model, which is unsuitable for the competition in the knowledge society markets (Torrent & Vilaseca, 2008).

In this context of change, productivity measured through organizational learning is an indicator that explains the potential of a company's long-term growth. As economic theory and empirical evidence demonstrated on several occasions, economic growth has two basic sources: investment in production factors; physical, human, technological and organizational capital and innovation or efficiency that combines these factors (Vilaseca & Torrent, 2006). Due to the presence of diminishing returns, accumulation of factors ends up weakening the sources of economic expansion in long term. Only when accumulation of factors is complemented with more efficient combinations of productive factors, growth model becomes intensive and sustainable in the long term (Jorgenson et al., 2005; More & Quesada, 2005; Torrent, 2006). Thus, an efficient and competitive economy will have sources of growth, inefficient and uncompetitive economy will have problems of long-term growth, affecting the society. Analysis of ICT impact on organizational learning highlights that ICT investment return rates are relatively high in other physical components when it is accompanied by other efforts such as improvement of human capital and change in organizational structures (Brynjolfsson & Hitt, 2000, 2002; OECD, 2003; Fuentelsaz et al., 2005).

A group of authors, have contrasted relations of causality between ICT investment and organizational learning in productivity

explanation (Draca et al., 2007), causation has also been evidenced in other research for performance or organizational success (Piñeiro, 2006; Gargallo & Galve, 2007).

United States case (Black & Lynch, 2004) certified the decisive importance of ICT and the explanation of organizational efficiency. Organizational learning (Bresnahan et al., 2002) demonstrate that intensive ICT use and organizations with a high implementation of organizational learning processes presented productivity level superior to organizations that do not innovate in these respects. Other authors (Atrostic & Nguyen, 2005) found a positive impact on the labor productivity in those organizations that intensively use computer networks and telecommunications. In Australia, (Gretton et al., 2004) found a positive impact of business uses of ICT on productivity. In the UK and France (Caroli & Van Reenen, 2001) was demonstrated a link between innovation and productivity of the organization increases that takes advantage of organizational learning. Germany, United Kingdom (Matteucci et al., 2005) corroborated a strong impact of ICT investment on productivity. Italy, (Leoni 2008) showed as ICT investment allows implementing ongoing changes in production processes, strategy, organizational structures and relationships; requiring changes in Organization for its effective implementation. It was concluded that ICT and organizational change not determine value added increases if adopted independently, ICT determine a significant increase in productivity of labor in Organization only combined with the adoption of practices that favor the delegation of responsibilities and greater autonomy of workers and there is a complementary very significant effect on productivity in organizations where organizational learning is evident (Cristini et al., 2003).

Finally, an analysis of the impact of ICT investment on productivity of small and medium-sized organizations in Italy stressed the importance of investment in software and that telecommunications investment has an impact on the generation of product and process innovations (Becchetti et al., 2003). In Switzerland, another study corroborated the establishment of positive effects between organizational learning and productivity of labor (Arvanitis, 2005). Germany, also confirmed the existence of dependency relationships between productivity and investment in ICT (Hempell & Zwick, 2008).

Spain showed that the use of ICT has had a positive and significant contribution in increasing productivity (Hernando & Núñez, 2004). Other works (López-Sánchez et al., 2006) also suggested a positive influence of ICT on productivity growth. Other side of the coin shows that some studies do not find causal relationship between ICT investment and increase organizational productivity (Badescu & Garcés-Ayerbe, 2009).

Innovation

From an empirical point of view, there are works that have explored the relationship among ICT investment, organizational learning and innovation.

Direct link (Abrahamson, 1996; Grint, 1997; Thomas, 2003) indicates that investment in ICT improves organizational performance. Organizations that build organizational learning get improvements in innovation performance due to the rivalry between the organizations, which takes them to identify new needs and expectations in customers and introduce new products (Mahesh, 1993; Tang, 1998; (Roffe, 1999). Organizational learning has positive impact on innovation performance, in particular developing new products (Nakajima & Shirase, 1992). Innovation plays an important role in the survival of organizations (Caves, 1998).

Indirect relationship implies that investment in ICT and organizational learning present a negative association results of innovation and competitiveness of organizations (Christensen & Raynor, 2003). Invest in ICT generates growth in sales, increased productivity and increased exports, but it does not generate improvement in innovation performance in new product development in organizations (Terziovski, Samson, Dow, 1997). In addition, direct and indirect relationships arise, and it is also a neutral position (Lam, 2005), which indicates that investment in ICT is associated with organizational learning processes relate to organizational forms have various limitations and their results are associated with the kind of taken structures. Ultimately, investment in ICT does not generate competitive advantage, but it is required the existence of complementary strategic capacities as

organizational learning to increase its impact on productivity. The senior management of the organizations should concern not only to invest in ICT, but it is important that they generate organizational learning, developing a policy that identifies what knowledge is important for the Organization and under what circumstances should be disseminated. Promote the transfer and integration of knowledge among workers by exploiting the interrelationships between working groups; as well as develop a knowledge map to determine in which people and systems is the accumulated knowledge base of the organization.

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