Business Architecture and Technological Innovation: Foundations for the Development of Dynamic Absorption Capacities

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Abstract **– This article identifies the advances in the integration of organizational structure and technological innovation in order to establish a participatory design of business architecture. The purpose is to strengthen dynamic knowledge absorption capacities through interactive learning processes which accelerate the identification of opportunities in the environment, and which promote innovation to achieve and to sustain competitive advantages that generate growth and economic development in organizations.**

Keywords **– Business architecture, technological innovation, dynamic absorption capacity, competitive advantage.**

1. Introduction

In a dynamic and competitive environment such as the current one, organizations make efforts aiming to create value, which makes it necessary to renew and reorient their capacities and competencies as a response and to adapt to that environment [1], [2], [3]. The potential of business capabilities that have allowed it to move forward are thus identified and recognized in order to review routines, optimize processes and develop new schemes that facilitate knowledge management and the construction of competitive advantages [4].

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Adapting to the unpredictable environment requires the organization to obtain, assimilate and apply external knowledge through dynamic engagement, in order to improve processes, the manufacture of products and the provision of services [5]. The combination of people's resources and capabilities, generated by individual and collective learning, integrated with the organizational systems and processes, constitutes a solid basis for innovation.

An adequate organizational structure that fits the strategy, as well as the technological infrastructure (IT) - including information and computing technologies (ICT) and social networks - are part of the resources available to the company [6] which have been specially evolving in the last three decades.

Consequently, when resources are used independently, they fulfill their functional role for which they were designed and implemented. The organization requires agility, possible to obtain with a synergy of all the factors, thus multiplying the possibilities of exploring new forms of production and business opportunities. Agility materializes through a logical, unconventional architectural integration within the same structure.

Business architecture (BA) proposes strategy logic in complex environments [7]. The flexible configuration and integration between the value of IT, strategies, designs, and organizational structures is described, in order to obtain agility and efficiency in business processes as a strategic value of information technology when searching and learning relevant information.

The participatory redesign pursues the integration of information systems to reach greater architectural maturity and relate and impact all its processes and organizational results through innovation mainly based on the absorption capacity that the organization has developed [5].

Finally, when making decisions and solving problems in organizations, all resources are used in an integrative process with knowledge, aimed at implementing new ideas that materialize in

sustainable competitive advantages that allow it to differentiate itself from its competitors.

2. Materials and Methods

2.1. Study Design

Based on the proposed objective and considering the degree of depth of the approach to the phenomenon, the research is considered exploratory descriptive. Likewise, it is of a bibliographic nature, as it analyzes specific literature about the object of study.

2.2. Instruments

In the present investigation, the data record form applied to books and articles that were used as sources to collect data on the categories of interest was used as an information collection tool. This instrument allowed the registration and identification of sources of information, as well as collection of data or evidence.

2.3. Procedures

The information was analyzed according to the proposed objectives, looking for the relationship of the variables (business architecture, technological innovation, dynamic absorption capacities) and their interaction.

3. Results and Discussion

3.1. Organization and Information Technologies

Business architecture (BA) is the term used to describe how a company strategically organizes its information technology (IT), infrastructure capabilities and processes to address its IT needs, business process standardization, and integration [8].

Independently, the organizational structure and ITs meet their objectives, but they must be designed to work synergistically with the strategy, processes and information systems [9], [10]. This is when BA, a discipline which faces challenges arising from this integration, becomes relevant. It improves organizational management and strengthens the capacity of knowledge absorption, which will eventually lead to the construction of a competitive sustainable advantage.

The sustainable value of IT emerges from its integration with organizational strategies, designs, structures and competencies, and that this value focuses on business “agility”, understood as the ability to detect and take advantage of opportunities in the market and the environment with speed, surprise and frequency, thus making innovation processes more dynamic, always in the search for competitive advantages [11].

True BA must be based on an integral vision of the organization and information systems. It is necessary to define a strategic plan taking into account its business focus, the sector to which it belongs, the relevant information it owns or manages, the applications it has and its technological infrastructure, since it is part of that structure [12].

This should be associated with the identification of the logic of a strategy to be considered, which allows it to adapt and move easily in dynamic environments. This logic of the strategy corresponds to what Porter [13] calls "positioning", which considers the nature of the competitive forces of the industry, the strategic positioning and the integration of activity systems as determinants of performance.

3.2. Technological and Organizational Innovation

There are many definitions of innovation, starting from Schumpeter, who considered innovation exceeded the creation of new products, services and processes, and included the creation of new forms of organization, new markets, and new sources of raw materials [14].

Nonaka and Takeuchi [15] propose a different concept of innovation. According to the authors, innovation in companies arises from the exchange between human knowledge created and expanded through the social intercommunication of tacit knowledge and explicit knowledge. This correlation is called knowledge conversion and the interaction of these types of knowledge facilitates the innovation process: socialization, externalization, combination and internalization (see Figure 1.).

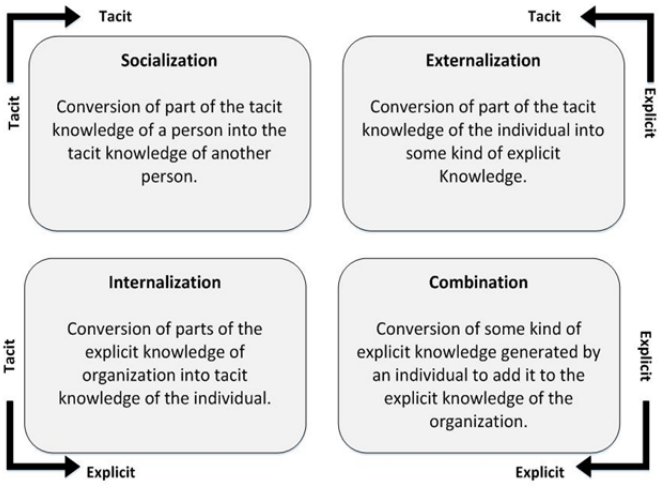

Figure 1. Nonaka and Takeuchi Knowledge Management Model

Several types of innovations have been identified. The most common is product and process technologies. According to the classification of Burgelman et al. [16], this can be due to its scope and penetration: incremental, supported by programs of continuous improvement, adaptation, refinement and improvement of existing products and services; radical or ruptural, which bring entire categories of new products or production or delivery systems; and architectural, which refers to reconfigurations of the system of components that constitute the product.

When innovation is differentiated by novelty or intensity of the technical change, it can be classified into incremental and radical. It is possible to argue that there is a conceptual difference between continuous improvement and incremental innovation (see Table 1.). Some authors consider that it is not necessarily limited to products and processes. The most radical innovations for an organization can be business and management processes [17].

Table 1. Kaizen's characterization and innovation

	Kaizen	Innovation
Effect	Lasting but not dramatic	Brief, yet dramatic
Speed	Small steps	Big steps
Time	Continual and incremental	Intermittent not incremental
Change	Gradual and constant	Abrupt and volatile
Implication	All employees	Selective to "champions"
Approximation	Collectivist, group effort	Individualist
Mode	Maintenance and improvement	Discard and rebuild
Detonator	State of the art knowledge	Technological advances, investment
Requirements	Low investment, great maintenance effort	High investment and low maintenance effort
Orientation	People	Technology
Assessment criteria	Processes and best results effort	Results to generate benefits
Advantage	In less dynamic economies	In dynamic economies

Innovations can be understood as technological innovations (strictly speaking) or as organizational innovations (broadly speaking) [18]. The latter refers to recognizing and profiting from market opportunities, integrating existing knowledge with subjective market interpretations, detecting and acting to seize the opportunity on resources, customers, markets (or combinatorics); and it occurs in imperfect market knowledge environments, as competition increases this knowledge.

Business practices have incorporated the concepts of innovation and technology in management to progressively integrate and guide them towards strategic direction, considering the main events that have marked milestones or limits in the continuum of technology innovation (see Figure 2.). Academic research has discussed this orientation of business practice from different theoretical perspectives.

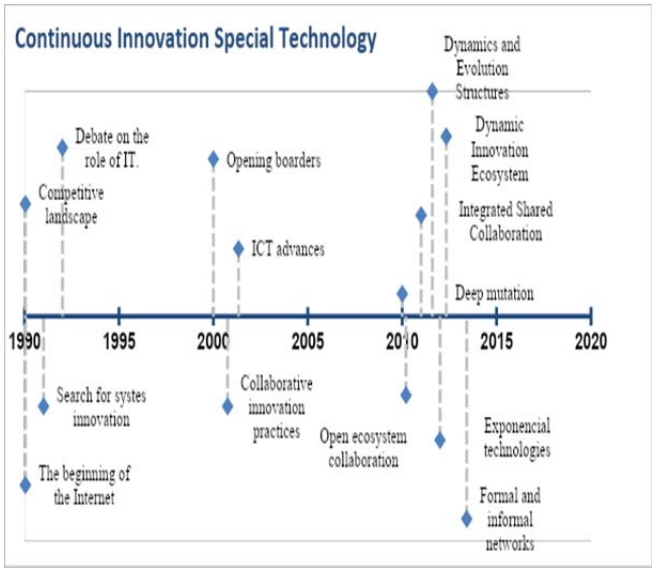

Figure 2. Continuance of special innovation technology

One of these perspectives - the resources and capabilities approach - explains the change in the concepts of quality and innovation, from product attributes to management models, considering that companies seek to generate organizational resources that become sources of competitive advantages [19].

Each company differs from the others by the set of resources and capabilities that they have accumulated throughout their trajectory [20]. The scarce and hardly imitable or substitutable resources maintain the differences between them in time. Resources definitely differ in value to compete with advantage in different markets; therefore, the company that has the most adequate resources to compete in a sector or activity will have a competitive advantage.

Innovative companies use technology as part of their strategies. What makes these different is not precisely that they are more efficient in applying the technology according to their objectives, but rather that their objectives themselves are shaped by technology [21].

The evolutionary theory of resources and capabilities explains the shift of management priorities towards innovation as a learning path and accumulation of strategic resources and capabilities, considering that the search for results in terms of innovation has a greater organizational complexity [22].

There is a consensus when considering innovation as the main source of sustainable competitive advantage [23], as well about the idea that innovation implies significantly transforming the performance measures of a product or service, a process, a team, or a company's way of operating, which, depending on the degree of change, will have an impact on the company's productivity using new methods, designing products, and optimizing the use of resources.

Prior to managing innovation, it is important to have a leader who will promote individual and team innovation in organizations, will identify factors that facilitate the managerial function and characteristics of the organizational culture, following a systemic approach based on organizational and individual characteristics, as well as on the creation of an entrepreneurial and innovation organizational context [24].

Innovation management is the responsibility of a company's administration. The best known model is specified by Myers and Marquis [25], and expanded by Roberts and Frohman [26], which shows innovation through the stages of opportunity recognition, idea formulation, problem resolution, experimentation and calculation, prototype solution, commercial development, and manufacturing, on two "axes" within which the stages of the technological innovation process are taking place. In this model, there is constant interaction with technology and the market at every technical stage.

3.3. Absorptive Capacity

The absorptive capacity (AC) is the ability of an organization to recognize the value of new and external information, assimilate it, complement with its internal knowledge and take advantage of knowledge integration, to reconfigure resources and strategies [27]. This skill is perceived as determinant in the innovative capacity of companies and, therefore, as a competitive advantage that will materialize in future organizational and economic benefits.

The ability to assume external knowledge is a key success factor (KSF) to efficiently manage an organization's resources and capabilities. It depends mostly on the company's previous knowledge, which is the result of R&D investments [27].

Zahra and George [28] propose a model (see Figure 3.) based on different forms of interactive learning that distinguishes the potential (assimilation) from performed (exploitation). The innovation process interacts systematically with the different forms of internal and external learning of the organization (learning spiral). Knowledge management is key, the codification of knowledge (tacit-explicit / individual-collective) and the interaction between innovation and learning methods, and finally the products as a result of problem solving and of the innovation process.

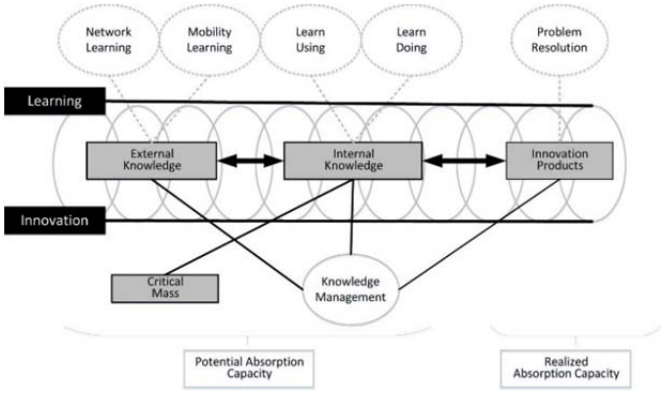

Figure 3. Capacity for absorption, learning and innovation

Although there is no consistency in the application of the construct, it is considered a good starting point to create a knowledge base [28]. Nonaka and Takeuchi [15] state that managers should attach greater importance to informal and systematic methods of knowledge generation and abandon the belief that knowledge can only be acquired through manuals, books or conferences.

3.4. Dynamic Absorptive Capacity

The construct of dynamic absorptive capacity has been evolving as an appropriate response to turbulent environments, which demand greater characteristics of that ability to successfully co-evolve [29]. This reconceptualization allows organizations to integrate and reconfigure their resources and competencies [30], in order to adapt to new environments and generate significant economic benefits as a result of the normalization of processes that require ownership of new external knowledge, which accelerates significant changes in operational routines [31].

According to Nelson and Winter [32], dynamic AC allows to obtain and generate new knowledge in the company, materializing it in the production of goods, services, and innovative processes.

3.5. The Role of ICTs and Social Networks

The use of technology implies a version of the technological device, repeatedly ordered and edited, personally experienced differently by individuals depending on time or circumstances [33].

In practice, ICTs and social networks constitute additional links between the organization, technology and dynamic AC, because they are internally created structures which do not materialize in technological

devices and arise through their practical construction, through the relationship between users and technology. This enriches their experiences and allows to obtain relevant information from the outside, which can be capitalized in favor of project development within the organization.

Likewise, social media are web-based applications: they allow multidirectional communication, based primarily on user-generated content, and require intervention to ensure its continued existence [34]. They are faster and are used more actively to connect a larger group of people, create and maintain interactive interest groups than face-to-face communication or email.

Companies' modernization is justified in these technologies so that the processes can be redesigned and integrated based on the information obtained from the environment. This allows timely advances in knowledge, technology, motivation and other factors that induces structural adjustments, contributing to process efficiency and obtaining privileged information with agility, optimizing resource use and promoting innovation.

3.6. Participative Design

Participative design is a way to capture creative thinking in order to solve problems. It is understood as the deviation between unwanted effect or a current situation on the desired effect or expected situation, which would be the solution as a result of innovation. Thus, the participatory redesign of BA in organizations must be carried out by a heterogeneous, interdisciplinary group, coordinated by a specialist with collaborators representative of each of the processes to define how to integrate the organization and information technologies [35]. This implies distributing tasks, seeking to obtain individual visions on how to quickly obtain a new ICT design.

From the beginning of the project, interdisciplinary actors must be involved in design development, engaging in each of the stages until the end of the project. This diversity promotes conflicts of objectives, form, integrity, functionality, competencies, controls, values and the evaluation of the results obtained that should be kept in mind.

4. Conclusions

BA and IT constitute an integrating element of technologies and information systems with strategic unit structures, useful for the appropriation of knowledge from external sources and to generate value in organizations.

Organizations require appropriate conditions that allow greater business agility and efficiency through the integration and alignment of operational and IT processes to boost AC, to manage resources with cost-benefit criteria and to build sustainable competitive advantages in order to profit from opportunities in the market.

Social media, unlike traditional media, facilitates access and interaction of more people with relevant information, which is a source of knowledge absorbed by the organization.

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