

ANÁLISE DAS PRÁTICAS DE INOVAÇÃO EM CONSTRUÇÃO CIVIL

ANALYSIS OF THE INNOVATIVE PRACTICES AT CONSTRUCTION INDUSTRY

ANÁLISIS DE LAS PRÁCTICAS INNOVADORAS EN INDUSTRIA DE LA CONSTRUCCIÓN

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RESUMO

A complexidade que tem caracterizado as relações de mercado, notadamente nas últimas duas décadas, com exigência de inovação de produtos e processos, repercutiu, inclusive, em atividades mais tradicionais, como no segmento de construção civil. Apesar de tradicional, o referido segmento passou por diversas modificações no modelo de negócios, em decorrência de importantes avanços tecnológicos, exigindo das empresas a sua adaptação às novas condições incorporando novas tecnologias, materiais e desenvolvendo novos processos, considerados inovadores. Com o propósito de estudar o referido processo foi conduzida a pesquisa com abordagem qualitativa, estudo de caso único, em uma indústria de construção civil, localizada na região metropolitana de Porto Alegre, por meio de entrevistas em profundidade, análise de narrativas e de documentos da empresa estudada. Os resultados permitiram identificar as especificidades que exigiram a concepção e adoção de diferentes formas de gestão e coordenação de recursos pelos gestores organizacionais, tornando-se referência no respectivo setor econômico.

Palavras-chave: Inovação. Construção civil. Tecnologia. Processos operacionais.

ABSTRACT

The complexity that has characterized the market relations, especially in the last two decades, with an ever increasing demand for innovative products and processes, has reflected even more in the traditional activities, such as the building sector. Although traditional, that segment has undergone many changes in the business model as a result of major technological advances, requiring companies to adapt to the new conditions, incorporating new technologies, materials and developing new processes, considered innovative. With the purpose of studying in depth this process a research with a qualitative single case study was conducted in an industrial building company, located in the metropolitan area of Porto Alegre, through in-depth interviews, analysis of the narratives and of documents. The results showed characteristics that required a specific design of the strategy, management practices and coordination of organizational resources, which allowed the company to become a reference in the sector.

Keywords: Innovation. Construction industry. Technology. Operational processes.

RESUMEN

La complejidad que ha caracterizado las relaciones de mercado, especialmente en las últimas dos décadas, con los requisitos y procesos de innovación de producto, que se refleja incluso en las actividades más tradicionales, como en el segmento de la construcción. Aunque tradicional, ese segmento ha sufrido varios cambios en el modelo de negocio como resultado de los avances tecnológicos importantes, que requieren las empresas para adaptarse a las nuevas condiciones mediante la incorporación de nuevas tecnologías, materiales y el desarrollo de nuevos procesos, considerado innovador. Con el fin de estudiar el procedimiento se llevó a cabo la investigación con enfoque cualitativo, estudio de caso único en una industria de la construcción se encuentra en la región metropolitana de Porto Alegre, a través de entrevistas en profundidad, análisis de relatos y documentos compañía estudió. Los resultados mostraron los detalles que requerían el diseño y adopción de diferentes formas de gestión y coordinación de los recursos por parte de los administradores de la organización, convirtiéndose en una referencia en el sector económico respectivo.

Palabras clave: Innovación. Construcción. Tecnología. Procesos operacionales.

1 INTRODUCTION

The construction industry has been portrayed by several authors as an economic segment that is conservative, traditional and little accustomed to bringing in innovation, whether in final products, operational processes, management or marketing activities (HALPIN; WOODHEAD, 2004; FARAH, 1996). This conservatism has often been attributed to the overall structure of the operational process and inputs used, which despite some modifications, follows a *modus operandi* designed thousands of years ago (HIRSCHFELD, 2000).

The reduced incentive to innovate or to introduce changes in the ways of designing and operating processes has also been credited to the end user of the products of the building sector, which perceive the traditional model as safer. This perception may have its origin in the

financial relevance of the final product, as well as its symbolic representation of this type of investment (homes). Even when not intended to home ownership, the product, whether as a house, building or industrial building, still represents for many people a kind of the safest investment (HALPIN; WOODHEAD, 2004; FARAH, 1996).

In this perspective, to innovate do not necessarily means added value. In this way, addition of value is, normally, subject and focus of the design, in order to optimize the use of the real estate or enhance certain aspects of its functionality. Therefore, it is possible to say that over the past decades and centuries the most relevant changes in the construction sector were restricted to this specific focus (THOMAZ, 2001; & HALPIN; WOODHEAD, 2004).

However, several authors have highlighted various initiatives aiming at

introducing new techniques and production methods, the use of new materials to reduce costs, either of the construction or of the maintenance of the real estate, or to meet the growing demand for environmental sustainability (HIRSCHFELD, 2000; THOMAZ, 2001; RIBEIRO; PINTO; STARLING, 2002; SALGADO, 2009). The authors also emphasize that initiatives to innovate are still timid in comparison to those undertaken in other segments and industries. So, execution of the study was motivated due the lack of research on the topic of innovation practices in companies in the construction industry.

In order to investigate alternatives to innovating in the building sector this research was initiated by the qualitative phase, consisting of in-depth interviews with two managers of a firm indicated by the representative institution of this segment (SINDUSCON/RS) as a reference in innovation in building activity. The research question that oriented development of the study was: What are the characteristics of the way of working of a company of the construction sector that provide the adoption of innovative practices? The evidences that emerged from the narratives allowed the highlighting of some of the characteristics and aspects to better understand the phenomenon in focus (RIESSMAN, 1993;

BOJE, 1995; CZARNIAWSKA, 2001; MOEN, 2006).

In order to allow a better comprehension of the study, first the historical context of the building sector in Brazil will be presented and then the theoretical bases of the innovative and organizational practices. Details of the methodological approach and results of the study are presented after this. Final remarks and references will be presented at the end of the paper.

2 THE CONTEXT OF THE CONSTRUCTION INDUSTRY

The building sector was developed in Brazil, according to Halpin and Woodhead (2004), Hirschfeld (2000), Maior (1967) and Farah (1996), through five distinct phases that characterize the differing moments that guided the focus and form formation, influenced by the embedded technology in the process. The first phase, or historical period, started at the arrival of the first Portuguese settlers in the territory in 1500 and ended in the year 1850. During this period, described by the authors as a transition to scientism, the construction process was conducted with few skilled professionals, based mainly on the use of the plenty of slave labor. Only in the nineteenth century, with the coming of Germans and Italians to Brazil that had know-how of the building process, was

possible to introduce more advanced techniques to the construction sites.

A second phase, between 1850 and 1930, was marked by the arrival of the Royal Family to Brazil, which offered conditions to initiate an industrialization process, as the opening of the ports, the organization of the educational system, with massive investments in infrastructure throughout the country, mainly for the purpose of transporting both freight and people, which reduced cost and time, thus consolidating the development model of the Republic (MAIOR, 1967). It was in this historical period that the construction industry began to organize through specialization and segmentation. In the building sector, for example, firms began to specialize to perform heavy construction, among others. Until then, the civil construction segment, carrying the legacy of lack of expertise, with few businesses and firms professionalized, with poor performance, has been executing a wide range of projects of a diverse nature (HALPIN; WOODHEAD, 2004; FARAH, 1996).

This historical moment has provided the emergence of entrepreneurs who started the new organization and structuring of the civil construction segment in Brazil. These construction companies were mainly of national capital and in a few decades they occupied a

prominent position not only in the domestic but also in the international markets. Those trade groups served for the recognition of a professional construction industry, based on the characteristics that differentiated them from other companies that remained performing building activities in the primitive way. One of the aspects that differentiated these firms from others was the investment to qualify the workforce through specific training at technical courses and civil engineering, with a focus on the production process (HALPIN; WOODHEAD, 2004; HIRSCHFELD, 2000; FARAH, 1996).

Paralleling this, the construction materials manufacturing sector also started to organize to cope with the increasing demand brought by the increase in investments in the construction sector in Brazil. The investments were more concentrated in the Southeast region and demanded the gradual structuring, through wholesale and retail trade and in the constitution of logistics systems, to support the growth in the construction in other Brazilian regions, thus increasing the value of indirect investments linked to the building sector (RIPPER, 2001; THOMAZ, 2001; RIBEIRO; PINTO; STARLING, 2002).

According to Farah (1996) and Mattos (2010) working conditions of construction workers were gradually

adapted to the different characteristics of each of the new segments of the construction industry that are of three basic types: heavy construction, building and construction materials. This adjustment was considered necessary because of the differences in the configuration of the operational activities of each sector, implying different sets of skills and knowledge (BEUREN; FLORIANI; HEIN, 2014). Moreover, in some of the activities was not possible to eliminate all risks to workers' health, implying the allocation of resources for investment in technology, mechanization and automation.

In certain activities, notoriously dangerous or unhealthy, governmental intervention was required to regulate relations between workers and employers. In several cases it was necessary to constitute specific rules and norms in order to force firms to improve labor conditions, what, for Halpin and Woodhead (2004), represented an important social advance, especially in that historical period.

However, Hirschfeld (2000) and Salgado (2009) argue that despite the investments made in technology and in regulating the activity of the working conditions in the heavy construction activities, the building industry continued to be extremely unfit for humans. Therefore, due to the extremely unhealthy and dangerous conditions, it was very

difficult to retain a regular stock of free workers in long-term constructions. And this fact was not restricted only to those works carried out in remote locations with little or no urban development. The extensive shift work, frequent accidents, besides the lack of facilities that could promote the welfare of the group at work, were some of the negative characteristics of this sector.

Between the years 1930 and 1950 happened the third phase of the development of the civil construction in Brazil, which, according to Farah (1996), raised several important structural changes that strengthened the heavy construction sector and stimulated the building of residential housing. This was possible because the emergence of the middle class and the growth in public spending by President Vargas. Thus, the government assumed the functions of major investor and major employer. The building sector also began to pay more attention to that sustainable expansion, going through detailed planning and precise execution (BERNARDES, 2011).

During this phase occurred a gradual process of skilling the workforce in order to support the changes in the construction industry, with increased mechanization and automation. This phenomenon is, usually, double-sided: on one side it creates opportunities for more

qualified people; on the other side, it releases more unqualified workers back for the market, causing the migration of workers and economic instability (SALGADO, 2009). The literature reports that in certain historical periods, economic instability and lack of planning for public spending in construction to provide a good infrastructure (energy, transport, communications) led to strong fluctuations in the volume of resources available for the construction industry, destabilizing the segment as a whole (TISAKA, 2011; BERNARDES, 2011).

Technological innovation occurred with greater intensity in the building sector with the specialization of the heavy construction, which has invested in research and development of embedded solutions with specific focus on the production process (FARAH, 1996, THOMAZ, 2001). However, the social migration that characterized this historic period resulted in a higher supply of unskilled labor for both segments, heavy and residential construction, contrary to the requirements of the sector. Obviously, that required additional spending by the firms to train such a workforce (AVELAR; MONTEIRO, 2013). This caused poor performance and delays that characterized the building industry in Brazil.

The fourth stage, which, according to the reviewed literature, occurred

between the years 1955 and 1970, was characterized by deliberate government action to promote the Buildings Sector, through the creation of the National Housing Bank in 1964, supported by a system of public savings that provided the necessary resources to meet the demand for residential housing. This initiative took place in parallel to the Goals Program, which was intended to promote the Heavy Construction industry, evidenced by constructions such as the Rio-Niteroi Bridge and the Trans-Amazon Highway. In this way it was possible to achieve other government's objectives such as offering working opportunities for the contingent of migrant and unqualified workers that moved from the countryside to the cities. In this moment emerged SENAI (public agency to provide skilling for workers in industry). Nevertheless, despite all the efforts, SENAI was unable to meet the need for training of such a large number of professionals in the required period (FARAH, 1996, THOMAZ, 2001; RIBEIRO; PINTO; STARLING, 2002).

In the fifth and final phase, determined by the literature as beginning by 1970, it was evidenced that the building sector failed to reach technological maturity. This happened because this sector's workforce continued to have a low educational level, especially when compared to the manufacturing industry.

Experts have explained this fact based on the mode of operation and the organizational culture of the building sector, which eventually consolidated society's perception of the stereotypical construction worker: uneducated and endowed with physical strength (HALPIN; WOODHEAD, 2004; HIRSCHFELD, 2000).

The consolidation and specialization of a real estate market, that happened at the last decades of the century supported the reorganization of the building sector as, at the same time, the government created regulations to this market that allowed for the expansion of the rent properties market, such as of the land and housing, providing conditions for boosting the construction sector as a whole (HALPIN; WOODHEAD, 2004). Growing demand for urbanization, for credit expansion and investment attraction provided additional support for this market.

It is important to comment that the expansion of the construction market has also provided new possibilities for the remuneration offered for skilled labor, besides allowing the restructuring of the education system and training of both workers assigned in the operation. However, with the availability of resources and supply of skilled labor, the market has become attractive for the entry of new

players, demanding that the organizational managers of the construction industry create new strategies to cope with these challenges, especially for reviewing organizational practices and processes (BEUREN; FLORIANI; HEIN, 2014).

3 THE ORGANIZATIONAL PRACTICES AND PROCESSES

Organizational practices, from its conception to the operation, are based on theoretical and conceptual frameworks that guide the strategic reflection on the performance of the organization, shaping its internal structure, defining its processes, determining and conditioning choices, decisions and actions. The organizational structure of most companies, regardless of the sector, consists of organizational units that perform key and support functions (SLACK, CHAMBERS; JOHNSTON, 2002; DAVIS, AQUILANO; CHASE, 2003; MARTINS; LAUGENI, 2006). Despite the advances in the organizational design to coordinate resources in different ways, especially in the matter of implementation of operational and support activities, these definitions are still valid (FREJ; ALENCAR, 2010).

Over the past decades several approaches have been made with the purpose of identifying, analyzing and explaining organizational phenomena, with emphasis on strategy, which, in particular,

was influenced by specific areas of knowledge. One of these approaches is based on the classical theoretical reflection of the organizational strategy and has its roots in the military organization. Others are based mainly on the behavior theories or present a vision of the strategy as the processes that are restricted by economic rationality. The authors who contributed most to these strategic conceptions were Ansoff (1965), Porter (1989), Chandler (1992) and Mintzberg (1973), among others.

These analysis referring to the organizational practices and the theoretical perspectives that deal with strategic design, highlight the aspects that support the conceptual elements of the Resource Based View, representing organizational structure as procedural and systemic (PENROSE, 1959; WHITTINGTON, 2002; BARNEY, 1991; ROSENBERG, 1982). Considering the fact that many features and organizational actions stem from isomorphism, it is possible to say that the study of organizational structures and practices addressed within each organization provides elements for understanding the management models (MEYER; ROWAN, 1992).

This kind of economic approach to strategy was based on optimizing the use of organizational resources in order to maximize the economic outcome, which,

in the view of authors as Ansoff (1965), Porter (1989) and Mintzberg (1973), could only occur through the formation and consolidation of competitive advantages. In this case, organizational success or failure would be determined internally, thus emphasizing the importance of human rationality as a dominant and decisive factor in the decision processes (NEDEFF et al., 2014). It is assumed in this perspective that the manager assumes the role of organizational strategist, in an organizational environment predictable and controllable by rules, regulations and procedures (RONCON; OLIVEIRA; BELTRAME, 2015).

This understanding has been enhanced by the procedural approach, which was designed by Henri Fayol (1990), at the beginning of the last century, analyzing the organization in the perspective of processes within a more normative way. This approach was supported in the 70's decade based on the studies conducted under the auspices of Organizational Psychology in the humanistic perspective. These concepts were adopted by the Administration and widespread, both in academia as corporations. Whittington (2002) recognizes that the strategy does not always develop in a rational manner, citing two central principles of thought that underpins this approach: (i) the cognitive

limits of human action and (ii) the micro-political organizations.

The cognitive limits of human action prove that humans have restricted capacity to identify, collect, process and interpret data and information, implying that the decision-making process is flawed from the point of view of a full rationality (MILLER, 1956; SIMON, 1991). Organizational environments became more complex with the "discovery" of the political and social dimensions within the organizational universe, represented by the existence of groups with interests that can often diverge from the organization's objectives (SOUZA, 1978; STRATTI, 1998; WEICK, 1995, BERNSTEIN, 2005).

New organizational theories, such as contingency theory, systemic management, resource-based view and structuring programs as quality management, among others, introduced new components and elements to be considered in the organizations design of resources and processes. The individual and collective knowledge became relevant for the creation of competitive advantages, requiring from the manager a new type of attitude to coordinate work teams (ARGYRIS; SCHON, 1996; BROWN; DUGUID, 2001; CHAPMAN; HYLAND, 2004; VERGARA, 2006).

As a main result, it was "discovered" that workers, mainly those

allocated in the operational functions, became protagonists in the organizational universe. The machine has ceased to occupy the main role, giving way to the people and to the processes, in contradiction to some literary caricatures of the early century that depicted individuals serving the machines (FISCHER, 1996). With this new approach and aligned with the Resource Based View (RBV), accepted by most of the researchers in the area of management, technology came to be interpreted as a specific type of resource (HAYES; PISANO; UPTON; WHEELWRIGHT, 2005). Barney (1991) classified organizational resources into three categories: physical capital, human capital and organizational capital. The first category included physical machines, designs and technical drawings; the human category considers the skills and knowledge of employees, and the organizational category is represented by production systems and quality procedures (TSANG, 1997; GUEDES; MEIRELLES; COTI-ZELATI, 2015).

It is worth noting that within the anthropological approach the technology is considered a part of the cultural knowledge in the same way as it occurs with production processes, especially in the matter of handling and operation of machinery and equipment. This finding

contradicts, in part, common sense, according to which technology is represented by the development of innovative machinery and equipment, as it identifies the source of knowledge that supports the development and improvement of the products. In reality it is the intrinsic cultural knowledge and it depends on a particular context and specific environment, where machines and equipment constitute cultural artifacts (SPRADLEY, 1975; GEERTZ, 1989).

The operational area got, along the time, characteristics that present this area in the stereotypical way to the organizational universe based on its technical and technological dimensions, precise definitions of times, processes and methods, with combination of tasks, among others (HABERMAS, 1993; BANDEIRA, MELLO; MAÇADA, 2008). One of the main reasons that support the construction of that stereotype of the operational area might be the organization's goal to optimize the use of its resources. This kind of priority justified the adoption of the principles of Scientific Management which guided the decisions on the methods to design, research, development and techniques (COURPASSON, 2000).

Thus; the organizational manager could initially organize the work under the functional point of view, define the set of

operational tasks, both in terms of physical and mental ability of the workers (PEAUCELLE, 2000). This approach was characterized by analysis, description and division of manufacturing steps, in activities and tasks defined both in scope and in complexity (FELLS, 2000). According to Fells (2000) and Neves and Guerrini (2010), the division of labor, discipline and order are justified by the need of subordinating individual interests to the organization interests.

Regarding the functional division, Courpasson (2000) sees that all organizations are "locus" of power, spreading through established relations over people and processes, changing only according to their type, sophistication and technology. At the beginning of the last century evidences of these power relations were more direct and visible, but organizations innovated over time and nowadays they are using less direct methods, not so perceptible or invasive. Barker (1993) and Foucault (2002) studied the disciplinary power based on the system of self-control individuals, defined them as certain invisible surveillance omnipresent and omniscient. According to Silva (2002) and Ball (2005), organizations make use of regulatory mechanisms, emphasizing that culture and sharing a dominant ideology enable them to expand their power.

It is also important to say that instrumental action is guided by technical rules that rely on empirical knowledge. These rules can, in each case, take the predictions about observable events, physical or social, that may be true or false. The behavior of rational choice is guided by strategies that are based on an analytical knowledge. Deductions imply preference rules (value systems) and general maxims; these propositions are deduced from a correct or false supposition. Experts and technicians inhabit the universe of the structures investigated and are extremely subtle - "the world of regularities quantified" (HABERMAS, 1993).

In this way, the technical evolution fits the interpretive model, according to which the human race designed, based on the technological progresses, the basic components of the functional and teleological circle of a rational action (HABERMAS, 1993), thus providing legitimacy to the political power that is present in all spheres of organizational culture. In this sense, to Grant (1991), the role of management is to establish the necessary coordination for the integration of knowledge. As described by Loasby (1998), companies are innovative systems and innovations are based on the division of labor and knowledge networks.

4 THE INNOVATION, THEIR TYPOLOGY AND THEIR SPECIFICS

One of the first researchers that investigated innovation in the way of the actions of the firm in the market and its influence on organizational outcomes was Schumpeter (1982) who developed the theory of innovation as "creative destruction." While most theorists and researchers analyzed the capitalist system as a problem of administering the existing structure, he presented the perception of capitalism as a process of creation and destruction of their structures. Schumpeter (1982) argued that the perception of competition in the capitalist system must be based on the development of new products, new techniques, new sources of supply and new forms of business organization. This type of competition is, in his opinion, a lot more effective than the one that bases its action on the criteria of price, quality or production scale. Thus, the capitalist entrepreneur who seeks differentiation through performance of the investment strategy in new products, new production techniques, new suppliers, etc., deserves extraordinary profits resulting from this corporate positioning.

It can be argued that Schumpeter influenced other researchers that became interested in the subject and developed new studies. Many of these researchers and

authors expanded the concept of innovation, applying it, too, to management, because the managing processes influence the organization's ability to innovate products and operational processes. In this way it was possible to think about new ways to organize resources and make decisions considering all complexities, both in the external environment as well as in the organizational universe. It is important to say that to organize the resources in innovative ways and make decisions with the objective to optimizing internal resources and exploit opportunities in prospected markets, is the basis for building the competitive advantage of organizations (NELSON; WINTER, 1982; WERNERFELT, 1984; GRANT, 1991; BARNEY, 1991; PETERAF, 1993; MADHOK, 1996; LOASBY, 1998; FOSS; FOSS, 2004; VOLPE; BIFERALI, 2008; SAKO, 2012; WILLIAMSON, 2010).

For Rodney (2000) there are three broad categories of innovation, that are (i) innovative strategic management to cope with the environmental changes, (ii) management of initiatives to promote changes with innovative character and (iii) innovation through the creation and application of knowledge. The literature about innovation proposes definitions for innovation as being incremental or disruptive, but the author suggests one

more: innovation-related knowledge. To Rodney (2000), knowledge construction implies the creation and recognition of knowledge and this process is socially constructed. Thus, organizations are innovative when they allow new knowledge to be recognized and applied in both processes and products (TEECE, 2010; SAKO, 2012).

However, it is not always necessary the occurrence of a radical innovation (new to the world) of products, services or production systems or customer services to provide favorable conditions for the construction of this differential. It is obvious that the design of any product with characteristics radically different from all competitors in the market may enable the creation of a relevant differential, but this condition is not possible for all economic segments at an acceptable cost. Therefore, small technological advances may be considered relevant and representative (CHRISTENSEN; RAYNOR, 2003; TIDD, BESSANT; PAVITT, 2005; MARKIDES, 2013).

The importance of focusing on innovation to achieve higher levels of economic and financial return was represented by Kim and Mauborgne (2005) in his metaphor of the blue ocean. In this interpretation, the market is segmented into two types: blue or red. The blue ocean means the market segment where

organizations are focused on innovation, developing "new" products for the market, unlike the red ocean, where many companies compete through selling traditional products. While in the Blue Ocean organizations thrive, without worrying about competition, companies operating in the Red Ocean compete through cutting prices, reducing costs, besides other techniques and management methods, transforming the market into a real battlefield with few survivors.

In this sense, Chaharbaghi and Newman (1996) note that the term innovation is also used to describe the process of change, evaluating the impact of adoption of the new products and processes by consumers and workers. Thus, innovation becomes part of the cognitive and behavioral repertoire. It is worth saying that innovation may also mean an idea, practice or material artifact that was invented or interpreted as new, with various possibilities in the using of it. Authors classify innovation in four distinct types: a) product or service, b) production process, c) organizational structure, and d) people.

At this point it is essential to mention the contributions of Freeman (1989) who identifies six distinct types of organizations which base their strategies on technological innovation. They are: offensive (search leadership based on

product excellence and is aggressive in the market); defensive (prefers to be the second, seeking to imitate products with adaptations); imitative (copies, sometimes entirely); dependent (exclusive suppliers or customers); opportunistic (performance-based niche markets); and traditional (active in economic sectors that leave out technology innovation - ex. ax, shovel, etc.).

Complementarily Tidd, Bessant and Pavitt (2005) presented concepts that add to the two basic types of innovation (product and process). On the one hand, innovation consists of changes in the market context that influences the design of products and services; on the other, innovation paradigm that includes changes in the underlying mental models that define organizational actions. However, the authors do not dismiss the importance of the degree of change that results in the configuration of the final product, represented by the binomial innovation that characterizes incremental, radical and disruptive innovation.

For Christensen (2002), innovation management includes elements such as marketing and production. Organizations that seek success in implementing innovative processes should succeed in integrating and aligning its activities to the organizational strategy. Thus, innovation management refers to the strategic and

organizational context of the innovated processes in order to produce successful products for the market and to achieve the rationalization of time and resources.

The contributions of Miller and Morris (1998), Teece (2010) and Sako (2012) deepen the reflection on the business model based on innovation and identified three theoretical dimensions in which they are structured: economy, learning and management. The economic dimension is characterized by the shift from an industrial economy to a knowledge economy. Learning, in turn, is the central process for creating knowledge and stimulating innovations. Finally, management defines the organizational structures and the means by which innovation and other activities of an organization are realized.

At this point it is worth returning to Schumpeter's theories that provided background for the first conceptions of innovation, because it was him who developed the first classification with five types of innovation: new products or major changes to existing products; new processes or production methods; new markets; new sources; and new organizations (SCHUMPETER, 1982). So, the concept goes beyond technological issues, including several other organizational dimensions.

Technological innovation hardly materializes without organizational innovation, which is considered essential to the constitution of the underlying and enabling environment for the organization of processes, tasks and activities that may create favorable conditions for innovating (WILLIAMSON, 2010; TEECE, 2010). According to the Oslo Manual (OCDE-FINEP, 2006), technological innovation, which is present in organizations, is represented by the change in products and processes. Several innovative products require process changes to be produced and so be brought to the market.

A product to be considered technologically new requires innovations that may involve both conceptual changes radically new, based on a combination of existing technologies or derived from the use of new knowledge. But innovation may be also defined as the design, synthesis or combination knowledge that results in a new products, processes or services. Innovations in processes and services can revolutionize an industry, lowering costs, reducing production stages and adding new forms of services (CHRISTENSEN, 2002; GAMBARDELLA; MCGAHAN, 2010).

5 METHODOLOGY

To do the research the case study method was chosen, since it has been considered to be better in relation to the research's design and objectives. For Tull and Hawkins (1976, p. 323) "a case study is more adherent to an intensive analysis of a particular situation." According to Yin (2005), the preference for the case study should be made when researching contemporary events, in situations where the behaviors are relevant and can not be manipulated, but is possible to make direct observations and systematic interviews. The study was conducted without any involvement of the researchers, with no possibility of manipulating the information and facts raised during the study. Following Yin (2005) instructions this study sought to describe the context of real life and contemporary events.

According to Bonoma (1985, p. 207), the case study is useful, "[...] when a phenomenon is broad and complex, where the body of existing knowledge is insufficient to allow the proposition of causal issues and when a phenomenon can not be studied outside the context in which it occurs naturally." The objective of the Case Study Method is not the quantification or enumeration, "[...] but instead: (1) description, (2) classification

(typology development), (3) theoretical development, and (4) the limited test of the theory. Thus the objective is to understand the phenomenon (p. 206)". In the empirical part of the research situations that occurred in the organization surveyed have been described, confronting them with the theory.

The description is based on the analysis of narratives constructed from the interviews in depth conducted in the researched organization, with two managers of a construction company, which is considered a reference for innovation practices in this specific sector. In order to achieve better comprehension of the way of working of the company, that turned it a reference in innovation, researchers decided to use interviews in depth technique. This technique of interview is characterized by few questions to stimulate the interviewed to describe in details determined situation or phenomena.

The questions used by researchers in the interview were: (i) What was the history of the company? (ii) How you describe the way of working of the company? (iii) How the company seeks to differentiate itself from the competition? The questions were formulated in order to allow identification of the elements to perform analysis of the theoretical model of innovation suggested by Oslo Manual,

innovation in product, process, marketing and organization of the resources.

After the transcription of the interviews, as the results usually come up in a nonlinear text and sometimes are even confusing, the results have been rewritten as a cohesive text, fluid, first-person narrative format. Furthermore, they were submitted to the people interviewed for checking and contributions. Although this method is not recent it is considered innovative.

The narrative can be interpreted as an organized speech about a particular event, situation, topic or theme. Thus, narratives represent the way in which people tell their experiences, what they emphasize or omit, positioning themselves as heroes or as victims. It is important to say that the relationship between the researcher and the narrator is no longer only the act of saying something, but becomes an act of building a personal identity.

In a way, it can be said that research through written narratives consists of stories. The stories are ubiquitous, found in clippings, historical fiction novels, short stories, autobiographies, and other literary genres. The stories stem from testimony of people on their own stories and about others, becoming part of everyday conversations. Added to these voluntary statements it is necessary that researchers

of oral narratives promote stories on specific topics so that they can be transcribed and analyzed. The study of narratives is considered as one of the approaches in social research (POLKINGHORNE, 2007).

The narrative is part of the cultural process where symbolic systems create and are created through discourse and is used in different contexts to communicate different points of view. Fragments of larger narratives and different versions of stories are part of the everyday speech of the people, who are, after all, beings made in language-based meanings constructed to make sense of the world in which they live. These are meanings that are part of the network of conversations, constituting sets of values, symbols, representations, finally, the culture (BOJE, 1995; MOEN, 2006).

The texts were interpreted in relation to each word and phrase. Therefore, the contextualization of the narrative became mandatory, as the discourse is constructed from objective and subjective elements that are present in the environment within which they live and allows interpreting them based on the assumptions of the researcher, formed from its own personal and professional experience. These assumptions form filters, patterns of behavior, attitudes and truths or lies, which are used to

characterize certain situations, serving as a parameter for classifying the nature of the occurrence (RIESSMAN, 1993).

According to Czarniawska (2001) analyzing narratives is considered appropriate to uncover the processes adopted by the narrator to interpret things, and is particularly suitable for assessing the individual's interpretation of subjective issues, such as organizational culture. The researcher will interpret interpretations of the narrator. However, it is important to remember that the researcher does not have direct access to the experience of others and for this reason the researcher will always deal with different shapes and ambiguous representation of the experience that the other will report through speech, text, interaction and, of course, the interpretation. For this reason it becomes impossible to consider that the researcher is neutral or objective in his representation of reality.

6 RESULTS OF THE STUDY

BETA was founded in February 1977 and until today has built more than one million square feet of construction, at home and abroad. With a primary focus on corporate clients, to meet the demands of industrial and commercial buildings, the company has developed its expertise by meeting the contract specifications for this kind of construction, with such

requirements as environmental management, technological innovation, besides others, in order to deliver their products with maximum quality.

BETA is a family business, with the founder occupying the presidency and his son, also a civil engineer, with a master degree from the UFRGS (Federal University of Rio Grande do Sul), occupying the position of technical director. The founder and president of the company came from the Brazilian countryside and said that he has German origins, derived from the German immigration that occurred at the start of the last century. With extensive experience in construction, that he acquired at other companies where he worked before opening BETA. This origin reveals the basis for the values that support his perception of the world and give meaning to his personal and professional life. Among these values deserve to be highlighted the central role of working as the building and structuring element of his character, the need to do always all that he can to perform any task and work, the relevance to think about how to improve his performance and the importance of teamwork.

The in-depth interview was held at the company headquarters in the neighborhood of one of the cities in the metropolitan region of Porto Alegre,

located in southern Brazil. The company president's office supported his narrative by symbolic meanings of the details in his office, such as pictures posted on two walls of the room, depicting buildings and pavilions built by the company in Brazil and abroad. The other pictures that completed the mix showed moments of the academic graduation, his and of his son, plus trophies, certificates, diplomas and honors boards, which marked the course of the company in its 35 years of existence.

As the interview had been scheduled in advance of nearly a month, the entrepreneur had separated various documents and internal reports about the company and its achievements. Some of them, such as newspaper and magazine articles, referred to the company as an innovator, arousing the interest of the researcher to find evidence to justify this reputation.

The set of the questions for the interview, as part of the approach planned by the researcher to identify and characterize the ways of doing of the firm, sought to evaluate from the strategic direction of the organization until the operational processes. Following the method recommended for this kind of research, all questions were formulated in order to encourage the entrepreneur to describe and analyze the company's operations, providing evidence for the

researcher to identify if the innovation is part of the organizational performance and how it is applied to the routine work.

The businessman said that he never formalized organizational strategies, but considering the company's history, with evidence based on his narrated experience and from internal documents, it became clear that the market's focus of BETA is on the construction of industrial and commercial buildings. It is worth to say that BETA's experience in building residential units was defined by the president as not being a very good business. He highlighted that this experience only contributed to support the decision to remain focused on the corporate construction, but considered it important to acquire knowledge to achieve a better comprehension of the processes of incorporation in this construction segment.

In the perception of the respondent, the decision to try to diversify the operation by investing in another market, acquiring new experiences and new knowledge, constitutes, per se, innovation. *A priori*, from the perspective of those who are unaware of the construction market, and could not believe that this kind of experience should not be considered as an innovation, it is worth saying, on the basis of the documents submitted, narrative of the president and literature reviewed, that this initiative may be considered as

incremental innovation (OCDE-FINEP, 2006). This observation stems from the fact that the company had to adapt their methods of construction and management processes to the new context. The adaptation was so successful that many competitors (statement of respondent) who worked in residential construction for decades, sought to adapt their own methods to that deployed by BETA, which, from its experience in the industrial segment, managed to reduce the environmental impact and rate of wasted material. Furthermore, BETA management has developed controls that provided a much better distribution of workman hours applied to the construction activities.

The need to adapt processes and activities for the implementation of residential construction is important because executing industrial projects requires from the operational staff and manager specific kind of the competence, supporting thus the Resource-Based View theory. Even though some of the equipment and many of the experts can meet residential demand analyzing documents presented by BETA showed that mere allocation of the work team to the residential project, without adjustment, would generate waste of time and, consequently, higher costs (WHITTINGTON, 2002; BARNEY, 1991; ROSENBERG, 1982).

The main characteristics of the operational processes innovation, transferred and adapted from industrial to residential construction, refer to the precise control of activities, from the simplest to the most complex, and to its prior planning in terms of time and form of execution, similar to the production of footwear, one of the working experiences of the BETA's founder. This was one of the reasons for BETA to invest in its own training center, where tasks are simulated to exhaustion in order to achieve a better execution time and less material waste.

This kind of worrying to achieve the best performance in managing operational processes is highlighted by authors such as Slack, Chambers and Johnston (2002), Davis, Aquilano and Chase (2003); Martins and Laugeni (2006). It can be argued that this aspect assumes even greater importance in activities that are manual labor intensive, as is the case in the construction sector (SILVA; WARSCHAUER; ROTONDARO; TORRES, 1998; HALPIN; WOODHEAD, 2004). Thus, the introduction of new techniques and methods of implementation can be considered as being an incremental innovation, as it is explained in the Oslo Manual (OCDE-FINEP, 2006; CHRISTENSEN, 2002).

BETA customers are always invited to visit the construction site in order to

monitor the execution of the contracts. In this way the president of the company understands that it is possible to achieve transparency in the relationship client/BETA. In addition, the interaction between company and customer is encouraged in order to provide, especially for the operational staff, elements to be thought about and support the reflection about possibilities to improve construction processes. This is, in the opinion of the president of BETA what the customers interpret as a value added process in project construction and implementation.

It can be argued that promoting customer visits to the construction site, similar to what already occurs in the segment of food establishments, such as restaurants and bakeries, it is in fact an organizational practice little explored by the construction sector (HALPIN; WOODHEAD, 2004; SILVA; WARSCHAUER; ROTONDARO; TORRES, 1998). However, providing personal protective equipment for customers, among others safety arrangements, this initiative may be considered an important marketing innovation (OCDE- FINEP, 2006), and also highlights the innovative entrepreneurial spirit of the BETA founder (CHRISTENSEN; RAYNOR, 2003; TIDD, BESSANT; PAVITT, 2005; CHAM, 2005).

Throughout the first three decades, passing through various phases, the company has invested in the internalization of running processes, training employees, teams and in the improvement of managerial methods (SLACK; CHAMBERS; JOHNSTON, 2002; DAVIS, AQUILANO; CHASE, 2003; MARTINS; LAUGENI, 2006). However, it was never possible to break the paradigm of the need for external control of the work team, namely, by a supervisory level, which means additional costs to the building Industry (COURPASSON, 2000; BARKER, 1993; FOUCAULT, 2002). Breaking the paradigm was only possible in the 90's of the last century, when a new economic scenario, instable because the linearity in the revenues has been compromised by the changes in the economic model as well as in the stimuli given to the country's construction sector.

One of the reasons was the globalization of the markets and the Brazilian government had to adopt a neoliberal stance, establishing public policies that have led to the construction sector instability and insecurity, thus requiring that economic agents be inserted in this context to design and adopt new models of organization and coordination of the building sector. Among these changes, the outsourcing of activities, which had as the common characteristic the specificity,

the expertise needed and high costs of execution, has been paramount (HALPIN; WOODHEAD, 2004).

This new economic scenario has also hit BETA despite an initial reluctance to abandon the successful management model developed along the last decades. Thus, BETA has had no alternative but to adhere to outsourcing as the others competitors have done. However, to reduce the risk of losing control over the quality of the projects execution, the most experienced technical workers of the company were selected to assume a new form of relationship with the company (outsourcing). In this manner, BETA would continue to have the same work team, with the advantage of cutting variable costs and with reduced operational risks which could compromise the operation as a whole (THOMAZ, 2001; FARAH, 1996; BERNARDES, 2011).

However, the company noted in the following years that this kind of the "solution", found to circumvent the risk of outsourcing, has not generated the expected results because not all employees that assumed the role of the entrepreneur had managerial competence to do so. According to the company's CEO, five years were needed to adjust this new arrangement with a mixed team of employees and outsourced partners. The central criterion that guided the selection

and interaction with partners was reliability in quality of execution services allocated in the contract terms, items considered relevant also by authors as Limmer (1997) and Mattos (2010).

BETA also established a new pattern of relationships with its partners based on merit, offering in return the stability of the relationship and preference in hiring. Furthermore, in the specific cases of more complex services that required high levels of training and/or upgrade in terms of technical capability and/or use of new technologies, BETA offers partial or total funding and helps in the acquisition of machinery and equipment. On several occasions BETA acquired certain equipments with their own resources and lent or financed their purchase to the partner.

BETA keeps following the technological evolution of the construction industry. Its two directors, the founder and his son, participate in the majority of trade shows in the construction industry, whether in Brazil or abroad. What is unusual, however, is the fact that BETA offers to suppliers and partners a chance to participate without cost, paying all their bills, thus aiming at enhancing the relationship with them as well as encourage them to innovate their practices and catch up with the novelties in the construction sector, both in terms of

technical execution as well as embedded technology.

Based on the literature on the construction industry and its practices, it is possible to see that this initiative is unprecedented in the industry. So, it can be considered an organizational innovation, focused on structuring and consolidating strategic alliances and partnerships (GRANT, 1991; LOASBY, 1998). It is possible to analyze BETA's initiatives based on the contributions from Whittington (2002) who studied the relevance of the establishment of the political and social dimension within the organizational universe represented by the existence of political and social groups and individual interests (SOUZA, 1978; STRATTI, 1998; WEICK, 1995, BERNSTEIN, 2005).

However, if any of the suppliers and partners do not answer accordingly to the BETA's, expectations demonstrating no interest to upgrade their technical competences or unwillingness to invest, improve their performance, keeping pace with BETA, it will become a serious candidate to being expelled from the company's network. This rule also applies to BETA's permanent work team, which is basically composed of professionals who perform supervisory activities over the projects, being responsible for training and

mentoring workers who are hired for each project (COURPASSON, 2000).

BETA offers various opportunities for the workers to seek new knowledge and upgrade their competences, mainly through agreements with educational institutions, paying, in many cases, 100% of the cost, turning such courses costless for the worker. This practice can also be considered innovative because this kind of aid may be considered very rare for many organizations that operate in the construction sector (HALPIN; WOODHEAD, 2004). It is worth noting that the agreements with educational institutions also include consulting services conducted by professors from universities and technical schools, as well as the use of laboratory services to test various materials used in construction, in addition to measuring machines and equipment.

With the objective of monitoring the performance and quality of the construction services of either partners, equipment suppliers or employees, BETA bought and installed a system to evaluate performance through a series of indicators. The indicators are calculated based on internal records, periodicity and timeline that vary according to each type of activity evaluated. Despite the importance of indicators for the monitoring of work, it is possible to say, based on the literature reviewed (HALPIN; WOODHEAD, 2004;

SILVA; WARSCHAUER; ROTONDARO; TORRES, 1998; SILVA; SOUZA, 2003) that this initiative may be considered as innovation.

It is worth mentioning the importance attributed to the quality of the materials used by BETA in its construction activities. In this sense, BETA's CEO is always available to experiment new materials and innovative processes, what may be considered innovating because this happens even if the performance indicators point to the suitability of the materials, processes, marketing and management format. His behavior contradicts several theories that describe the building sector as refractory to implementing innovations (RIBEIRO; PINTO; STARLING, 2002; LIMMER, 1997; THOMAZ, 2001).

Innovation in the processes is reflected too in the workers' compensation policy, through which, by mutual agreement and with the consent of the union workers, payment is not made per hour, as it is common in most companies, but based on performance indicators (HALPIN; WOODHEAD, 2004). It is noteworthy that as the productivity indicator is calculated for each activity, each member of the work team is exercising a mutual control of the production. Thus, monitoring and tracking productivity is no longer a function of the management that is free to perform the

strategic thinking, without damage to its effectiveness.

The implementation of this model to manage and coordinate the resources allocated to the construction projects offers a number of advantages, being worth mentioning the flexibility to coordinate more projects simultaneously with a lean management structure. Suppliers and partners assume, within this new perspective, the responsibility for executing and monitoring the quality of the activities and processes attributed to them, leaving BETA to perform activities as articulating more projects, acting more strategically, what proved to be a very effective and stimulating organizational innovation (CHRISTENSEN, 2002). In this manner, those specialized professionals at BETA are available to devote more time to customers services, R & D, prospecting new partners and evaluating alternative uses of new materials, subject to the operational flow. The result of this managerial behavior, as commented by BETA's director, is that: "[...] Today, we execute in volume the same work that was done in the past, with less people and cost".

Their form of budgeting and financing projects can also be considered innovative for the building sector. Instead of raising funds from financial agents, considered to be a predominant practice in

the building sector (LIMMER, 1997), BETA chooses to work with its own resources or with the funds paid in advance by clients, following the budget negotiated previously, with terms, deadlines and timelines, physical and financial.

BETA's president stated that this management model offers the possibility to seek opportunities to search for new materials; equipments and machinery, in order to differentiate BETA from the competitors and, so, to expand their market-share. Various equipments with a high level of innovative attributes and functionalities, which provided increased productivity, allowed BETA to become a reference point for the construction segment in Brazil and abroad. The equipments which contributed to improve BETA's productivity were imported from Greece and Germany and facilitated the implementation of the operational processes. As an example, the entrepreneur cited the mini-excavators and loaders.

Finally, it is worth to detach as innovative the multifunctionality of BETA's permanent work team which allows them to supervise a broad range of projects and works in progress. Aiming at facilitating the implementation of the new management model of outsourcing various stages of contracted projects, these permanent technicians must have capacity and competence to coordinate the activities

of the work teams outsourced, to work in research and development, perform analysis and participate in negotiations. Moreover, the technical team is also responsible for the maintenance of the standardized operational processes.

7 FINAL REMARKS

The construction industry has received in recent years various government incentives due to its capacity to offer jobs for workers with low qualification, thus contributing significantly to the generation of employment and income, especially for economic classes D and E (SINDUSCON-RS, 2012). Moreover, this political decision allowed access to the first house for millions of Brazilians, enabling the reduction of the historic country's housing deficit.

The process of construction, both in terms of technique, method and materials used, has changed little throughout history, unlike what happened in other economic sectors, such as, for example, in the mechanical, electrical, electronic and information technology. Innovation, whether of the products or processes, considered central to most industrial organizations, especially in the last three decades, has changed very little the existing landscape in the building sector.

Considering this situation a research was proposed in order to identify the opportunities and alternatives for innovation in this economic sector. At the first stage, this study used a qualitative approach to allow in depth understanding of the context of the construction industry. Indicated by the Union that congregates the construction sector, a construction firm located in the Porto Alegre Metropolitan Area was analyzed: BETA. To collect evidences for the research the president of the company was interviewed and documents relating to the execution of the projects and works, indicators of the performance, among others, were analyzed.

Considering this specific segment, the analysis of the narrative and internal documents revealed aspects of the company's operation, which, when compared with the literature review about construction, innovation and organizational processes revealed the characteristics of BETA's innovation processes. As the most important aspects of the innovation process, it must be highlighted the coordination of the organizational activities, the adoption of outsourcing strategies, and the innovation regarding the use of semi-autonomous supervision of the work teams. Constant investment in training, purchase of machinery and equipment, process simulation and

monitoring implementations are other innovative features. Finally, it also deserves to be highlighted the marketing innovation in terms that BETA organizes oriented customer visits to the construction sites.

It is worth noting that the results of this first stage of the research, qualitative in nature, is going to support the achievement of a quantitative stage which the authors wish to complete during 2014. Despite this limitation, the authors understand that the analysis of this single case study may provide evidence for a better understanding of innovation in the construction industry.

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