

Knowledge Management: A Case Study in a Construction Company

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Knowledge management and innovation are important for organizational environments, acting as a strategy to maintain and improve competitiveness. This article evaluates, in an exploratory study, knowledge management in a medium-sized company. To this end, a systematic literature review and a qualitative interview with fourteen employees of a medium-sized company in the construction industry were conducted. The questionnaires were applied remotely to employees with leadership positions and direct labor from the company. The results showed that, although it was evident that the company follows management principles that tangent dimensions of the SECI Model, there is an opportunity for improvement in the internalization and combination dimensions.

Keywords: Organizations. Medium-Sized Company. Explicit. Tacit.

Introduction

Nonaka and Takeuchi [1] described knowledge as a potential source of advantage and ongoing competitiveness in economies permeated by change and uncertainty. The authors also point out two types of knowledge: tacit and explicit. Tacit knowledge is personal, specific to the context, and difficult to be formulated and communicate. Explicit or codified knowledge, on the other hand, refers to knowledge that can be transmitted in formal and systematic languages. There are two dimensions of this knowledge: the technical and the cognitive. The latter relates to values, beliefs, and ability to perform, which the individual cannot demonstrate. Therefore, organizations must take advantage of this inherent knowledge and transform it into organizational knowledge, which is a knowledge that adds value.

The need for companies to remain competitive in the market has favored management practices that aim to create and share knowledge. Studies show that using knowledge management practices provides process optimization and error reduction,

which contributes to more assertive decision-making by managers [2].

According to Corrêa [3], several theoretical and practical approaches have been developed throughout the development of studies related to Knowledge Management (KM). There are types of theoretical knowledge that can be managed, such as declarative, procedural, cause, relational, basic, advanced, and innovative [4], tacit and explicit [1], and implicit [5, 6].

Personal knowledge emerges from information, interpretation, reflection, and experience in a particular situation. The personal knowledge (explicit and tacit) must be externalized to create organizational knowledge [7]. Knowledge creation is a synthesizing process by which individuals interact with each other in the organization (internal), external individuals, and the environment (external) to transcend emerging contradictions that the organization faces [8].

According to Nonaka and Takeuchi [1], there are four patterns of knowledge conversion: socialization, externalization, combination, and internalization. Knowledge expands in an increasing spiral as it moves from the levels of the individual to that of the organization. Therefore, the set of these forms is called the knowledge spiral.

Knowledge management is creating and disseminating knowledge in the organization and its incorporation into many services [1]. In addition, its main objective is to favor the best use

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of the information [9]. According to Nonaka and Takeuchi [1], the present work addresses the use of knowledge creation in a medium-sized company in the construction industry.

Materials and Methods

The guiding question of this study was: How is the knowledge accumulated over the years shared in a medium-sized construction company? Therefore, the present research was conducted to guide and determine the variables and define the sample to be researched.

The database used to search was Scielo. The descriptors used were: Knowledge Management and Companies.

We found 56 relevant studies about the subject, however, 10 studies were selected as relevant to compose this systematic review.

We used the classification of the Brazilian Service of Support to Micro and Small Enterprises to find the company [10]. This database includes industrial and construction companies that are classified according to the number of employees, namely microenterprise (up to 19 people employed), small enterprise (from 20 to 99 people employed), medium-sized enterprise (from 100 to 499 people employed), and comprehensive enterprise (500 people employed or more)

We also used the classification of the National Bank for Economic and Social Development [11], which applies to industry, commerce, and services and is defined according to the annual turnover of the company or the economic group to which the company belongs, specifically: micro-enterprise (up to R\$ 2.4 million), a small company (above R\$ 2.4 million up to R\$ 16 million), medium company (above R\$ 16 million up to R\$ 90 million), medium-large company (above R\$ 90 million up to R\$ 300 million) and large company (above R\$ 300 million).

The evaluated company, herein named "X", was classified using the abovementioned criteria: number of employees and annual turnover. The company offers services in the areas of specialized boiler making, industrial fabrication, welding, spot

services, refurbishments, and maintenance. The company name has been omitted for confidentiality reasons.

We did 12 questions: 4 related to general data and 8 related to the SECI dimensions based on the study by Arantes and colleagues and Gonzalez and colleagues [7,12]. In addition, the questions were reworded to make them easier to understand for all company's employees, who had different levels of education.

Socialization Dimension

Does the company offer courses/lectures to employees to improve their competencies? Do the employees recognize the importance of their work in the company's strategy?

Externalization Dimension

Does the company have practices encouraging experienced employees to transfer their knowledge to new or less experienced professionals? After the training sessions, do employees interact with the acquired knowledge?

Combination Dimension

Is there in the company the sharing of knowledge from a database with regular updates, best work practices, lessons learned, and guidance from experts (for consultation)? Is there access to a computer network where specific knowledge related to the work is stored?

Internalization Dimension

Does the company offer training outside the workplace (e.g., knowledge fairs, workshops, along with others) to its professionals? Does it disseminate the organizational culture?

The questionnaires were applied remotely, using the Google Forms platform, to fourteen company employees with leadership positions (coordinator and foreman) and direct labor (painter, mason,

boilermaker, welder, and construction helper, along with others).

Results and Discussion

Table 1 summarizes how knowledge sharing accumulated over the years occurs in medium-sized companies, according to the studies evaluated).

Regarding the general data from the questionnaire, the results showed that 93% of the interviewees have more than five years of experience in the construction industry, and 71.4% have worked less than five years in the same company. As for the respondents' level of education, 71.4% have completed high school. Regarding the four ways of creating knowledge (Socialization, Externalization, Combination, and Internalization), according to Nonaka and Takeuchi (1997) [1], the results of the questionnaires showed the following:

1. **Socialization Dimension:** All interviewees informed that they participated in courses and lectures offered by their company in the last 12 months, as well as recognizing their importance for achieving the corporate goals of their company.
2. **Externalization Dimension:** All respondents answered that they received and/or shared knowledge with other employees (new and experienced) of the company in the last 12 months and interacted on the topics discussed with other employees.
3. **Combination Dimension:** One employee reported that he or she does not have access to the organization's operational procedures with the best practices to perform daily tasks, and five reported that they do not have access to training and corporate procedures via computer tablet, cell phone on topics related to their work.
4. **Internalization Dimension:** Internalization Dimension: ten employees answered that they did not participate in training outside the work

environment. They also did not participate in any event related to disseminating the company's organizational culture (Figure 1).

The result of the questionnaire was discussed with the manager of the company studied. This collaborator informed that the contracting company (which has as its main activity the storage of flammable products) requires that all workers who performed activities in the company must previously undergo training as established in the Regulatory Norm (NR-20). This norm establishes minimum requirements for managing safety and health at work against risk factors of accidents arising from extraction, production, storage, transfer, handling, and manipulation of flammables and combustible liquids. In addition, the company's manager also informed us that recycling training is carried out for employees every 12 months.

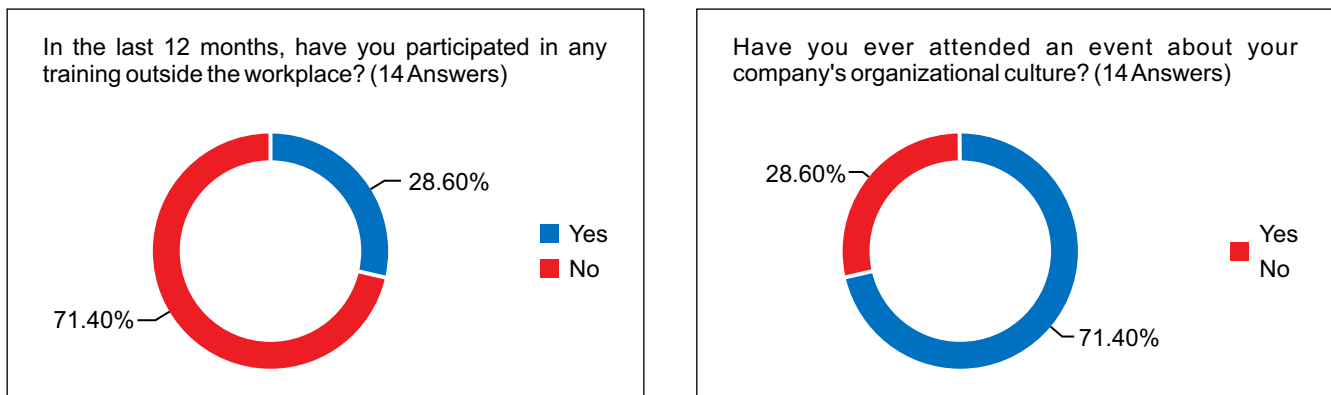
The manager understands that the internalization of explicit knowledge into tacit knowledge is an opportunity for improvement within the organization after being explained that training outside the workplace will allow his employees to interact with people from other corporate environments and that developing the absorption capacity of workers in such training and internalization in the company's environment can culminate in improvements in the firm's organizational performance and become a competitive differential [3,12] since innovative companies develop a training policy that encompasses technical, managerial and creative skills, where multidisciplinary teams play an essential role in innovation [19] and that knowledge assets (in this case people) have a positive influence on organizational performance [17].

As for disseminating the organizational culture, the manager informed that when they join the company, the employees go through a stage called integration. At this stage, the company is presented, the projects already carried out, and the benefits, among other relevant aspects of the company. However, since 2015, due to several crises that the country has been going through, there has been a significant oscillation in the company's staff,

Table 1. Guiding questionnaire of the study.

References	Guiding Question: How is the Knowledge Accumulated Over the Years Shared in Medium-Sized Companies?
[3]	Holistic knowledge management is a proposal that aims to approach the parts by the whole, considering that these parts should not be analyzed in isolation because there is an interconnection between them and, therefore, results in contextualizing these parts in a mold that contemplates the whole.
[7]	As for the degree of maturity of knowledge management, the results showed that companies spend more effort on the variables connected to the socialization and externalization dimensions and less on internalization and combination.
[12]	Five organizational constructs related to knowledge management: human resources, teamwork, organizational culture and structure, and knowledge development and absorption.
[13]	Management can contribute as a company differential concerning its competitors, providing a competitive advantage. These two aspects are essential elements for the performance of organizations.
[14]	Significant relationships between the dimensions of absorptive capacity and organizational performance are translated by adaptive capacity. Firms must be able to use their knowledge capacity fully and to transfer and disseminate such information to other relevant people.
[15]	Through the application of benchmarking of tacit knowledge that is in the minds of employees and can be transmitted through informal conversations, as well as the search for information that allows bringing and storing mostly tacit knowledge not only from competitors but also from suppliers and the customers themselves.
[16]	All the knowledge acquired by the companies was documented, and all the files about the simulation project were stored on the company's computers and had free access to manage them: conceptual model in image format, Excel spreadsheets, versions of the computer model in simulator-specific format, project reports in document format, and videos.
[17]	Identified the relationship that positively influences organizational performance: knowledge assets, organizational learning, knowledge process capability, business process capability, and organizational performance.
[18]	In reality, as experienced by SMEs, knowledge management still presents itself as a goal to be reached that might be achieved through a better understanding and conception of the practice of information management and the use of IT is still essentially operative and aimed at organizing, systematizing, and making efficient the daily activities, being far from knowledge management.
[19]	Group of facilitators of innovation in construction companies: external collaboration, innovation culture, top management support, and knowledge management, with leadership being an essential aspect of promoting systematic innovation.

Figure 1. Result of the internalization dimension in the evaluated company.



which can be reflected in the years of service per employee ratio. It is observed that strengthening the organizational culture with employees is an opportunity for company X to build employee loyalty, as well as achieve better financial results, especially in challenging scenarios [14,15].

Conclusion

The knowledge creation process in the company studied relates to tacit and explicit knowledge. Regarding the unfolding of the four ways of creating knowledge (Socialization, Externalization, Combination, and Internalization), we could observe that knowledge is acquired through employee training with the participation of employees in courses and lectures (conversion of explicit knowledge into Tacit knowledge) besides the interaction between people in the workplace, so that there is the conversion of tacit knowledge into other tacit knowledge, in the process of socialization.

We observed through the SECI spiral of continuous knowledge creation and used that tacit and explicit knowledge expands, in an unstructured way, from the individual to the group and then to the organizational level in the company studied. There are opportunities for improvement in knowledge management at company X, especially in the internalization and combination dimensions.

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