Knowledge management in construction industry projects. A review of the literature

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ABSTRACT
The purpose of this study was to determine the current status of knowledge management in the construction industry; the references analyzed formulate theoretical links between the variables listed above, therefore this article organizes the material. The methodology employed is founded on a systematic literature review, a bibliometric search of the variables, and an analytical-synthetic procedure based on the classification of articles. The outcome is the formulation of the current state of the art, which schematizes the variables individually and their interrelation. This work contributes to the literature of knowledge management and project management by presenting these findings. To improve the performance of knowledge transfer and, consequently, the performance of projects, this study is also of importance to corporations and public bodies that manage projects in the construction industry.

Keywords: construction industry, state of the art, review, knowledge management, project management.

1 INTRODUCTION

Knowledge is one of an organization's most valuable assets (Wong & Aspinwall, 2006). In an increasingly competitive climate, knowledge is viewed as a significant corporate asset (Anantatmula & Kanungo, 2010; Hussinki et al., 2017). People frequently interact and utilize many forms of common sense developed through extensive social and collaborative knowledge transfer. Knowledge management has been in some form in the organizational setting for quite some time; examples of organizational knowledge management include training manuals, procedure and policy documents, innovation forums, safety records, etc (Lin et al., 2006).

However, when organizations are evaluated from a knowledge-based perspective, one of the fundamental challenges is to achieve an adequate harmonization of the diverse knowledge of the company's members to convert it into products, services and processes that are beneficial to the organization as a whole. Effective knowledge management broadens the knowledge bases of businesses and enhances their problem-solving skills, hence boosting their global competitiveness.

In recent years, knowledge management's potential usefulness in attaining a competitive advantage has gained unprecedented attention (Nonaka & Takeuchi, 1995). However, it is only very recently that
the benefits and constraints of knowledge management in project environments have received significant attention. This is somewhat unexpected, given that project organization is not only an increasingly important organizational style, but has also been viewed for a long time as the environment for complicated new product development and innovation processes. Knowledge must flow across multiple stages of construction projects, such as capturing requirements to design, designing to estimate, and estimating to real construction, etc.

The importance of this research resides in its bibliometric analysis of the current level of knowledge management research in the construction industry. The article contains two major sections. The first section discusses the beginnings and development of literature. The second section examines the relationships between the aforementioned factors.

2 METHODOLOGY

To achieve the stated purpose, a systematic literature review was conducted, based on a summary of the evidence collected by an expert or group of experts for a particular topic (Whittemore et al., 2014), the Scopus and Science Direct databases were used with the keywords knowledge management and construction industry, research was selected, evaluated and synthesized to build the state of the art of the study and draw conclusions from the data collected (Moja et al., 2005). For this purpose, the documentary analysis technique was used, with an analytical-synthetic treatment in which the documents are described and represented, including their classification, extraction and translation.

3 STATE OF THE ART

3.1 KNOWLEDGE MANAGEMENT

A learning organization is not only capable of creating, capturing, and transferring knowledge, but also adapts its behavior to reflect new information and experiences. This applies to knowledge creation at all organizational levels and in all business areas, as well as the explicit policies that must be integrated into the organization's operations to transform information and experience into knowledge that will be shared and reused by all employees and their collaborators (Hsu & Shen, 2005). Castillo et al., (2018) view knowledge management as fundamental for quality and innovation management feedback processes in companies. These authors also suggest that, unlike quality and innovation, knowledge management is not yet amenable to standardization, which makes it difficult for organizations that manage and create through projects to increase their competitiveness.

In addition, knowledge management is essentially the duty of the organization's members (Love et al., 2005). However, a minimum degree of information and communication technology must be suited to the organization's demands for it to operate effectively (Lee & Wong, 2015). In addition, organizations
must be aware of the most effective learning methods and the benefits they provide, depending on the information they have created. Once the obstacles to the generation of information have been eliminated, its transport and storage must be secured (C J Anumba et al., 2004).

To make the greatest decisions, businesses must guarantee that the appropriate information is supplied to the right person at the right time. Companies that effectively manage knowledge are able to apply and utilize knowledge, study their resources, adapt and adjust their environment, and find and produce new knowledge from what they have learnt. In addition, in order to innovate, it is vital to acquire external knowledge and create new knowledge by resolving difficulties on-site with competitive firm solutions (Castro Benavides et al., 2012).

Szulanski, (1996) articulated knowledge transfer in terms of the knowledge transfer process and its outcomes, he believed that knowledge transfer is a process by which many types of knowledge can be transmitted from a knowledge provider to a knowledge recipient. In certain cases, it is also a planned and deliberate process of cross-organizational knowledge exchange. Knowledge transfer is the process of assimilation, adoption, modification, transformation, and diffusion, according to the majority of researchers (Kogut & Zander, 1992; Nonaka & Takeuchi, 1995).

For an engineering project management organization, knowledge comprises both general knowledge (such as management, technology, economics, law, computer science, psychology, sociology, and organizational behavior) and professional knowledge (construction methods, tools, processes, experiences, and required information) (Ni et al., 2018; Zhang & Ng, 2012). Given the highly fragmented nature of the construction sector, this is a crucial part of construction knowledge management. In the majority of projects, there are multiple groups with varying roles for completing the project's tasks. This makes the transfer of knowledge throughout the stages of the project a formidable problem. As a result, difficulties like contractual conflicts, considerable rework, and cost and time overruns arise. Although construction participants cooperate closely in a construction project cooperation network, which is similar to construction supply chains (Chimay J Anumba et al., 2008) and is composed of all construction participants (such as the owner, designer, owner's representative, contractor, subcontractor, material supplier, and other relevant parties), knowledge transfer is typically not very effective (Easterby-Smith et al., 2008). This inefficiency of information transmission necessitates that project managers place a greater emphasis on knowledge management (Carrillo & Chinowsky, 2006), especially in the construction industry, which is highly competitive and profit-driven.

Knowledge management can play a crucial role in promoting the effective transfer of knowledge throughout the many phases of a construction project, hence simplifying the flow between operations (Dave & Koskela, 2009). Due to the complexity of knowledge and organizational features, the
significance of knowledge management in the project-based construction and engineering business is significantly smaller than that of project execution and performance (Javernick-Will, 2011).

3.2 KNOWLEDGE MANAGEMENT INSIDE THE ORGANIZATION

According to a study on knowledge transfer among an organization's internal members. According to study on the knowledge transfer process, the majority of researchers concur that the knowledge supplier and receiver, the nature of the knowledge, and the transfer circumstances will influence the results of knowledge transfer (Szulanski, 1996, 1993).

This may be due to the temporary and singular nature of each undertaking. Due to the limited time available for each project, participants prioritize timely completion of the product or service rather than engaging in knowledge transfer activities. This lack of time is one of the most common obstacles to the transfer of knowledge (Gann & Salter, 2000). In addition, according to (Fong & Kwok, 2009), the absence of organizational resources devoted to knowledge transfer is one of the most significant obstacles to the implementation of knowledge.

Therefore, it may be claimed that knowledge obtained and lessons learned from many building projects are not systematically integrated into the company's memory, meaning that work that has already been completed must be duplicated, problem-solving techniques must be devised, and time is squandered (Maqsood, 2006).

Knowledge transfer success, according to Ambos & Ambos, (2009), is the amount to which the recipient absorbs potentially relevant knowledge and applies it to its own operations. Ren et al. (2018) and Sun et al. (2018) measured the success of knowledge transfer in the project environment based on the increase in knowledge stocks, the attainment of project objectives, and the improvement of technical and management levels. Effective knowledge transfer between members of an organization enables knowledge to be utilized, hence supporting its growth and prosperity (Argote et al., 2003). Effective information transmission between project members is crucial for preventing repetition of errors, enhancing job efficiency, and lowering failure risks (Ni et al., 2018). This inter-project information transfer has a favorable effect on project outcomes, such as accelerating project implementation and enhancing project efficiency and service quality (Landaeta, 2008). However, the transfer of knowledge between initiatives is not always effective. For instance, a source project team may have difficulty documenting and storing "lessons learned" in knowledge repositories (Newell & Edelman, 2008), whereas a receiving project team may discover that the majority of the project-related knowledge in the repositories is out-of-date or fragmented (Pemsel & Müller, 2012; Pemsel & Wiewiora, 2013).
Existing research has investigated the elements that influence the transmission of knowledge between initiatives. These criteria include the tacit nature of the knowledge conveyed, social interaction-based and information technology-enabled routes (Newell et al., 2006; Newell & Edelman, 2008), and the willingness of source project team members to transfer knowledge (Disterer, 2002), recipient project team members’ willingness and effort (Landaeta, 2008) to acquire and receive knowledge, trust between source and recipient project team members (Park & Lee, 2014), project organizational culture that refuses to make errors (Disterer, 2002), infrastructure, system, procedures, and rules of cross-project learning (Mainga, 2010).

The challenges connected with inter-project knowledge transfer have a detrimental effect on the growth of organizational and project management competencies, hence compromising the long-term organizational performance (Scarborough et al., 2004). The conclusion of Zhao et al., (2015) is that project-based organizations will be better able to manage the complexity of cross-project knowledge management if they consider the multiple dimensions at the same time, of the factors underlying the complex process of knowledge transfer; furthermore, organizations must be aware of the source and recipient of knowledge when planning projects.

3.3 KNOWLEDGE MANAGEMENT INTER-ORGANIZATIONAL

There are a variety of elements that can influence the effectiveness and consequences of knowledge transfer between businesses (Szulanski, 1996). Transferring knowledge between firms is more difficult than transferring information between units within the same organization (Inkpen & Tsang, 2005) because it is influenced by boundaries, such as culture, setting, and the practice involved. Numerous studies examine the variables of knowledge transmission between various (Lane & Lubatkin, 1998; Szulanski, 1996, 2000), some from the standpoint of the knowledge transfer process and others from the perspective of connections, particularly employing social network theory. Intra- and inter-organizational research on knowledge transfer has been prompted by the growing significance of information transfer in building competitive advantage. However, knowledge transfer is a complicated phenomenon and activity, and it is frequently difficult to achieve (Easterby-Smith et al., 2008). Because units within businesses are prone to share the knowledge with which they are most familiar, intra-organizational knowledge transfer is prevalent (Van Wijk et al., 2008).

The construction industry has not been able to successfully transfer knowledge between projects, nor has it built a learning management system that considers both technology and people. In practice, knowledge transfer in the construction business has proven to be challenging (Argote et al., 2003). Recent studies of knowledge management and organizational learning in project contexts have highlighted the difficulty of learning from projects not only within individual projects, but also across and across projects.
(Gann & Salter, 2000). Fundamentally, the difficulties of cross-project learning have broader implications for organizational learning processes; thus, it is not unexpected that businesses view the ability to manage cross-project knowledge as a source of competitive advantage.

It is not difficult to identify the causes of cross-project learning's limits. To capture the knowledge and recycle the project-based learning that results from the largely independent, idiosyncratic, and finite nature of project work, project-based organizations must overcome formidable challenges. From one project to the next, there are inevitable breaks in the flow of resources, notably employees and data, across time and geography. Capturing and disseminating information and lessons learned between projects (or even between project phases) becomes a major priority, as does resisting the need to "reinvent the wheel" when confronted with a challenge. Due to the complex organizational division of labor between professionals and other organizations participating in the construction management process, the construction industry faces additional difficulties.

By focusing on knowledge management in project-based environments, one becomes aware of the unique complexity connected with this type of organization. In an environment where learning is predominantly project-based, knowledge management faces numerous obstacles. It becomes challenging to build steady-state procedures that maximize knowledge flow and learning capture from one project to the next when there are major differences between projects and significant discontinuities in the flows of employees, resources, and information (Defillippi & Arthur, 1998). In particular project contexts, such as the construction industry, which is the subject of this study, these discontinuities contribute to the fragmentation of the building project team into several professional specializations. Because each subject has its own knowledge base and language, codification and knowledge transfer may be hampered.

Companies in the construction industry have a tendency to do the same errors over and over again because they do not successfully transfer the knowledge they have gathered from earlier projects (Landaeta, 2008). Transferring information from one project to another helps workers to use existing, tested knowledge to address challenges, rather than producing new knowledge, which typically takes more time. This collaboration enhances overall performance and decreases project expenses (Love et al., 2005).

Knowledge transfer between projects is the process of transmitting knowledge from a source project to a recipient project in order for the recipient project to absorb and utilize the knowledge (Zhao et al., 2015).
4 CONCLUSIONS

A bibliographic examination of the variables yielded a variety of papers that addressed and detailed their relationship, with the most pertinent articles being filtered and selected in order to get specialist literature on the research variables. Observed is the evolution of these factors across time, as well as the paucity of literature pertaining to the variables under examination. Knowledge generation begins when one employee gets an idea and communicates it to other organization members through a cycle that allows for learning. It emphasizes that this exchange of knowledge is the initial step towards knowledge management. Organizations must prioritize knowledge production to prevent the rapid obsolescence of their existing knowledge. Sharing experiences and reusing knowledge provides further advantages, such as minimizing the need to consult prior initiatives, enhancing the quality of solutions, and saving time and money because it is no longer essential to find the same answers repeatedly.

It is stated that companies in the construction industry tend to repeat the same mistakes because they do not successfully transfer the knowledge gained from previous projects. This is why knowledge transfer between projects is so important, as it enables workers to use existing and proven information to solve problems, rather than having to produce new knowledge. This improves the overall performance and reduces project costs. In conclusion, knowledge obtained and lessons learnt from many building projects are not systematically incorporated into the company's memory. As a result, previously completed work must be duplicated and problem-solving methodologies must be developed, resulting in time loss.
REFERENCES


