Engineering Management Journal

ISSN: (Print) (Online) Journal homepage: https://www.tandfonline.com/loi/uemj20

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To cite this article: Daniela Emiliano de Souza , Camila Favoretto & Marly M. Carvalho (2021): Knowledge Management, Absorptive and Dynamic Capacities and Project Success: A Review and Framework, Engineering Management Journal, DOI: 10.1080/10429247.2020.1840876

To link to this article: https://doi.org/10.1080/10429247.2020.1840876

Published online: 26 Jan 2021.

Knowledge Management, Absorptive and Dynamic Capacities and Project Success: A Review and Framework

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Abstract: This study investigates the relationship between knowledge management and project success. The applied research method was a systematic literature review, using bibliometric, network, and content analysis techniques. As a result, a framework is proposed, relating knowledge management and project success. The relationship between both tacit knowledge and explicit knowledge with success dimensions is explored in the literature. Explicit knowledge is more related to project management efficiency and impact on teams, while tacit knowledge has also been related to present impact on business in the surveyed literature. The main tools and techniques regarding knowledge management in project contexts were also identified.

Keywords: Knowledge Management, Project, Project Management, Absorptive Capacity, Dynamic Capability, Learning, Lessons Learned

EMJ Focus Areas: Knowledge Management, Program & Project Management

Organizations that leverage their knowledge, technological capabilities, and innovative experiences are more likely to succeed (Landaeta, 2008). However, due to the temporary nature of projects, knowledge is often tacitly kept by and shared only among project team members (Leybourne & Kennedy, 2015).

The learning process and the knowledge transfer interproject remain a complex subject (Aerts et al., 2017), requiring efforts for knowledge sharing (S. M. Duffield & Whitty, 2016a). Besides, actively interacting with external stakeholders allows acquiring and absorbing external knowledge, generating innovation (Scuotto et al., 2017).

Moreover, lessons learned can be identified, but their capture and categorization face problems concerning time and availability, while their application in future projects seems limited (McClory et al., 2017). Knowledge management (KM) requires strategic institutionalization to be effective, which is difficult in temporary work contracts or project-based organizations (Alkhuraiji et al., 2016; Ghosh et al., 2012). Efforts to establish effective knowledge management practices may lead to the need of a higher organization investment, but the return over this kind of investment is difficult to measure (Choi & Lee, 2003).

To improve project success rates, the discussion of knowledge management and organizational learning through projects is a relevant topic (McClory et al., 2017), but there is still a lack of research about it (Nadae & Carvalho, 2017).

In this context, this study aims to investigate the relationship between knowledge management in project contexts. Moreover, it aims at investigating the KM effect on project success. To achieve the proposed goal, the study is going to focus on the following research questions: (RQ1) How does the literature address knowledge management in project contexts? and (RQ2) How does the literature measure the impact of knowledge management on project success? The adopted research method was a systematic literature review (SLR), combining bibliometric, network analysis, and content analysis. This study contributes to a better understanding of knowledge management impacts on project management as well as of factors that affect knowledge management performance.

This paper is organized as follows: first the Literature review sectiondiscusses the main constructs of the research; second, the section Research methods defines the research methods, and is followed by an analysis of the results in Result analyses. Subsequently comes the discussion of results in the section called Discussion, implications, and future research agenda. The last section of the paper consists of conclusions and also points out the limitations of this article.

Literature Review

Knowledge management has been related to organization success since Nonaka and Takeuchi (1997) showed its importance to the success of Japanese organizations in terms of creation of organizational knowledge. Organizational knowledge is defined as the ability of a company to create new knowledge, bringing it to the organization as a whole and incorporating it into products, services, and systems.

Knowledge involves a person using their perceptions, skills, and experience to process information. Being conscious means having a greater sensitivity to build assumptions and knowledge in context. "When we are foolish, our behavior is a rule and routine governed, when we are aware, rules and routines can guide our behavior rather than predetermine it" (Andersen & Vidar Hanstad, 2013). Williams (2008) defines knowledge management as the capture, codification, use, and exploitation of the knowledge and experience of the employees.

The literature recognizes two types of knowledge, explicit and tacit (Leseure & Brookes, 2004; Nonaka & Takeuchi, 1997; Reich et al., 2012). According to Nonaka and Takeuchi (1997), explicit knowledge deals with knowledge that can be described in words, numbers, and codes, and thus, can be shared in organizations. However, tacit knowledge is personal and difficult to formalize and can be classified further as technical or cognitive. The assets of explicit and tacit knowledge can also be named know-what and know-how, respectively. In practice, all knowledge is a mixture of tacit and explicit elements and these designations are to be perceived as a range spectrum and not as definite positions (Nanthagopan et al., 2016).

Refereed Research Manuscript. Accepted by Associate Editor Landaeta.

A discussion is present in the literature regarding what type of knowledge the organization must maintain, and which knowledge is not healthy over time (Leseure & Brookes, 2004). Knowledge transfer is limited, as most of it is embedded in the specific social fabric of the organizations in which it is developed. Knowledge nature and organization can vary across three different dimensions: (1) the dominant form of tacit knowledge in use; (2) how knowledge and experience are distributed and used within the company; and (3) knowledge coordination and transmission methods (Collinson, 1999).

In the case of project-based organizations, the culture of knowledge is by far the most important success factor. However, not only "soft" factors such as top management culture and commitment are essential for a successful knowledge transfer, but they must be complemented by information and communication technology systems, which effectively support knowledge communication, storage, and retrieval in a temporary design environment. The third important factor for success lies in multi-project organizations and, especially, in the role and configuration of project management offices. In short, it is the interaction between several factors that leads to a successful transfer of knowledge within and among projects and from the temporary to the permanent organization (Lindner & Wald, 2011). Based on this discussion, we suggest the proposition (p. 1) that knowledge management, relating to both tacit and explicit knowledge, influence project success positively.

Research Methods

The methods selected to address the research questions were a systematic literature review (SLR) with content analysis, complemented by a bibliometric analysis.

A SLR uses organized, transparent and replicable procedures at all phases of the process, so that it can locate and synthesize studies that involve a specific issue (Littell et al., 2008). Kitchenham (2004) summarizes the research process of four SLR guidelines in three main phases that appear to be sequential, but involve iteraction: planning the review, conducting the review, and reporting the review. Bibliometric analysis is helpful to visualize the relevance and the impact of themes, articles, authors, and sources on the literature. Besides, network analysis facilitates mapping the relationship between keywords, authors and references, which helpsto obtain the relationship among the variables (Carvalho et al., 2013).

The scope of the theoretical framework was based on a content analysis that explored the manifest content of articles and at the same time searchedfor their latent content through interpretation (Seuring & Gold, 2012). Thus, it is important to acknowledge that content analysis should not be conceived only as systematic (Mayring, 2008); its strength lies in being both quantitative and qualitativein that it comprises a rich and meaningful analysis of the body of knowledge surveyed (Duriau et al., 2007).

Sampling Procedure and Data Collection

The research sample was selected through the following platforms: ISI Web of Science Core Collection (WoS) and Scopus. WoS was selected due to its high relevance to and impact on the academic field as well as differential data treatment options (Franco et al., 2018), and the SCOPUS database was chosen because of the large number of peer review journals available. The research was carried out until October 2017, and no timespan filter was applied. We filtered results by document types (articles and reviews) and research areas as follows: Web of Science Categories:Management Or Business Finance Or Business Or Operations Research Management Science; Scopus, the subject area regarding Business, Management and Accounting.

Various combinations of search strings and filters were tested during the sampling processes, and we had to deal with the challenge of increasing the sample size while dealing with remaining cognitively manageable results for data analysis. The search strings applied were the following: "knowledge management" AND "project*". It is noteworthy that the choice of search strings was related to the aim of the research, that is, bridging knowledge management and project management, mapping the body of the literature on these themes. Exhibit 1 summarizes the research flow and shows the results of the two search screening performed.

At the top of Exhibit 1 is the searching process on the WoS and Scopus databases that led us to 107 articles from WoS and 277 from Scopus, in which 34 papers belong to both databases, so the total number of samples was 350 articles. We extracted the metadata of all these 350 articles and performed the first screening. This first screening was performed independently by each researcher, looking at the fit of the article to the research scope. For instance, articles which focused on information and communication technology (ICT) tools, software or platforms as Intranet were excluded. Just articles which all researchers agreed that did not fit the scope were discarded. After this process, 119 articles passed to the second screening for an in-depth analysis. The second screening of the full text was performed based on the quality criteria of the presence of references and of a research methods section explaining the protocol. In this second screening, the researchers agreed to discard 39 articles, so that the final sample comprised 80 articles.

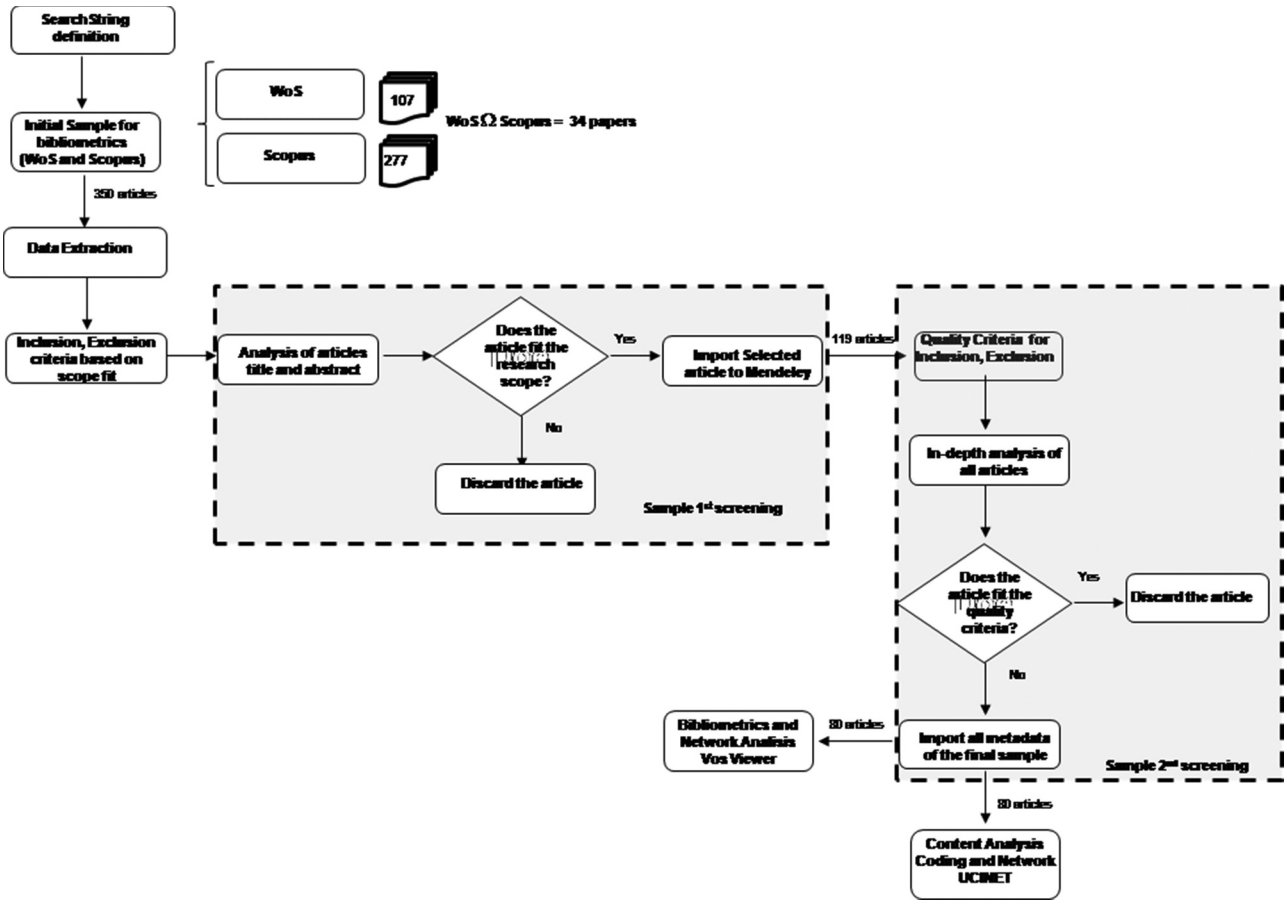
Data Analyses

The bibliometric analysis was carried out with the aid of VosViewer software, which allows the user to create networks, making it possible to identify more influential clusters on the subject. Besides that, the relationships and interrelations among the components of the network can be mapped (Van Eck & Waltman, 2009).

The first bibliometric indicator was an analysis of the most cited references of the sample, since these studies influence the research of the highest number of authors (Ramos-Rodríguez & Ruíz-Navarro, 2004). The second was the incidence of keywords, allowing for the identification of the most discussed subjects within a researched topic as well as for the establishment of interrelationships among these subjects and their relations with other themes.

For the content analysis, a coding scheme was used to classify the works according to the codes presented in Exhibit 2. Content analysis was performed manually in parallel with the codingthrough a careful reading of the 80 articles. The first code was related to the research methods (the type of study, approach, and unit of analysis), adapted from Franco et al. (2018). In order to operationalize the project success dimensions, a set of codes was adapted from Carvalho and Rabechini Junior (2015) and Shenhar and Dvir (2007). Knowledge was coded in two types: tacit and explicit knowledge as Nonaka and

Exhibit 1. Flow Chart of the Literature Review Carried Out in the Present Study



Takeuchi (1997) suggested. Besides, other related topics were investigated such as absorptive capacity and dynamic capability (Bernroider et al., 2014), and lessons learned (ISO 21500). The lessons learned coding was created in order to identify and discuss the learning processes and mechanisms of either an individual or an organization.

The in-depth content analysis through the coding schema is summarized in Appendix A.

The analysis of relationships among codes was developed through cross-tabulation, core-periphery analysis, and network analysis. First, the cross-tabulation of the codes was performed aiming at association of objects and attributes (Hair et al., 1998), applying the IBM SPSS software. The matrix that resulted from this analysis is shown in Appendix B, which is the input for the core-periphery analysis and network analysis, both performed in the UCINET6 software (Borgatti et al., 2002).

To identify the core codes to which the authors devote more attention, we performed the categorical core-periphery analysis that uses a genetic algorithm to fit a core/periphery model to the data network and identify which codes belong to the core and which belong to the periphery (Borgatti & Everett, 1999). Then, to help understand the relationships among codes and answer the RQ 2, we performed two network analyses based on the cross-tabulation data in Netdraw software (Borgatti et al., 2002).

Result Analyses

Bibliometric Analysis

The bibliometric analysis was carried out with the remaining articles after the content analysis was considered adequate according to the adopted quality criteria. The first analysis done was reference co-citation, i.e. the network of references that appear the most in the selected articles, as displayed in Exhibit 3.

The research that most stood out was the study by Brady and Davies (2004), with 16 citations. It is a theory building paper, presenting a Project Capability Building (PCB) model. The authors differentiate the two kinds of knowledge (explicit and tacit)and also present three models to manage knowledge creation: the top-down, which starts with the top management; the bottom-up, led by the entrepreneurial; and the middle-up-down, which starts with the managers as knowledge engineers. Because of this rich contribution, the majority of the other studies used this reference to start the discussion about project and organizational capabilities (e.g:.Aerts et al., 2017; Grabher & Thiel, 2015). Another important contribution of this study is the way the authors explore the emphasis and direction of learning in two co-evolving and interacting levels, 'project-led' (bottom-up) and 'business-led' (top-down). This approach has really influenced the literature on knowledge management in the PM field, particularly when it concerns the challenge of making project-level knowledge available to the organization

Exhibit 2. Code Scheme

Type of Study (TS)
TS1: Modelling
TS2: Theoretical – Conceptual
TS3: Interviews
TS4: Survey
TS5: Literature Review
TS6: Action Research
TS7: Case Study
TS8: Experimental

Approach (A)
A1: Qualitative
A2: Quantitative
A3: Multi-Method

Knowledge Management (KM)
TKM: Tacit Knowledge Management
EKM: Explicit Knowledge Management

Related Topic
LL: Lessons Learned
AC: Absorptive Capacity
DC: Dynamic Capability

Project Area (PA)
PA1: IT
PA2: Mechanics
PA3: Construction
PA4: Energy
PA5: Others
PA6: Not specified

Success Dimensions (SD)
SD1: Product/Service
SD2: Project Management Efficiency
SD3: Impact on Team
SD4: Present impact on business
SD5: Future impact on business
SD6: Impact on the customer
SD7: Social and Environmental Impact

(Bartsch et al., 2013) as well as the discussion of different kinds of learning between projects (e.g: Garcias et al., 2015; Mainga, 2017). Finally, it points out project-level knowledge as a key performance driver in project-based organizations and it helps other authors to explore its effect on the project and organizational success dimensions of a project-based organization (e.g: Chronéer & Backlund, 2015; Leufkens & Noorderhaven, 2011).

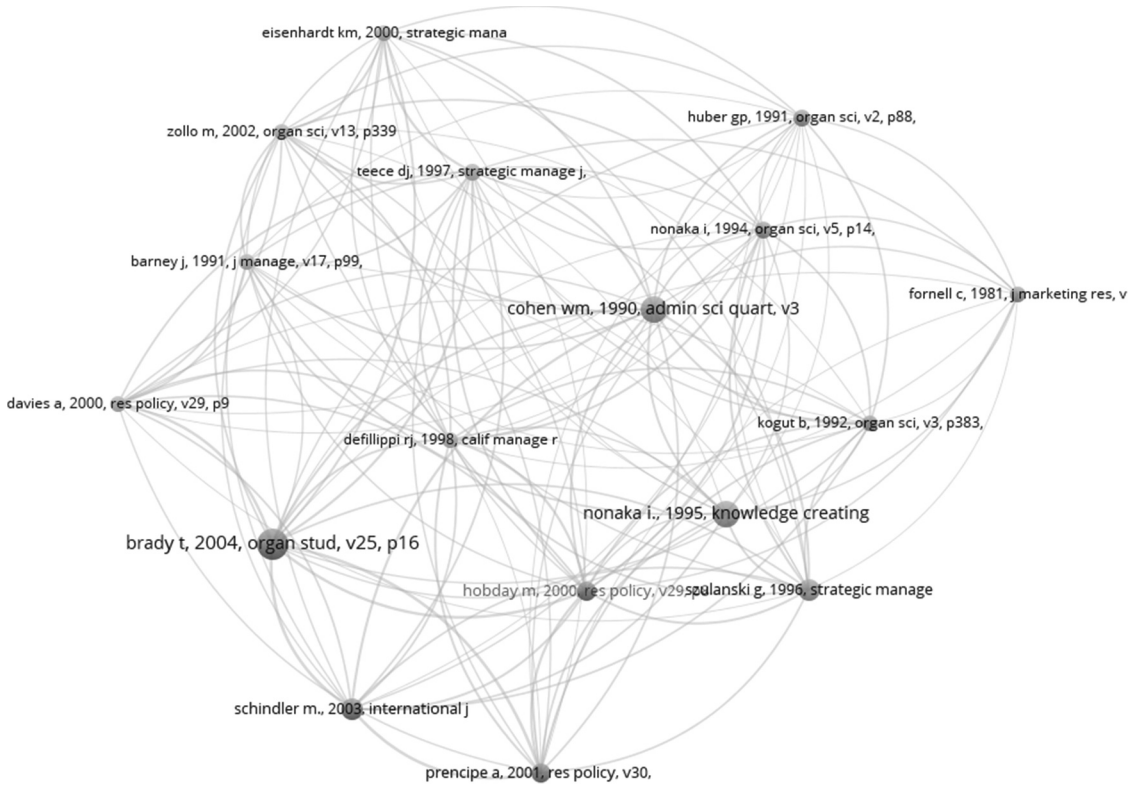
Nonaka and Takeuchi (1995) were the second most cited, with 14 citations. They differentiate the two kinds of knowledge (explicit and tacit)and they also present three models for managing knowledge creation: the top-down, which starts with the top management; the bottom-up led by the entrepreneurial; and the middle-up-down, which starts with the managers as knowledge engineers. The articles of the sample showed interest in this study as a foundation for defining and operationalizing the two kinds of knowledge and helping to show that the project management processes are based on know-what (explicit and codified), and know-how (tacit) (Nanthagopan et al., 2016). In addition, the articles rely on the explanation of Nonaka and Takeuchi (1995) about the creation of organizational knowledge and their emphasis that this creation occurs through a process that expands the knowledge created by individuals and crystallizes it as part of the knowledge network of an organization (e.g., Saenz et al., 2012; Teerajetgul et al., 2009).

The third most cited paper is Cohen and Levinthal (1990), which approaches absorptive capacity and proposes a firm investment model in R&D, so that it contributes to building the absorptive capacity of an organization. The articles in the sample used Cohen and Levinthal (1990) to support defining and operationalizing absorptive capacity as the ability to recognize the value of new information, assimilate it, and apply it for commercial ends (e.g., Bernroider et al., 2014; Leal-Rodríguez et al., 2014; Love et al., 2016). In the context of projects, this represents the organization's ability to recognize the value of new external information developed in the project, assimilate it, and apply it to gain competitive advantage (Bakker et al., 2011). The sample of articles also corroborate the results of Cohen and Levinthal (1990) when they affirm that the absorptive capacity can be understood as an organizational ability that allows knowledge to be converted into new products, services, or processes essential to the development of innovations (Killen et al., 2008; Leal-Rodríguez et al., 2014).

The second analysis deals with the co-occurrence network of the keywords, in which the main keywords with more than four incidents were present in the 80 selected articles.

According to Exhibit 4, the most representative keywords are knowledge management and project management, due to the research strings used. Despite these already expected keywords, other KM constructs that appear are also relevant, such as capabilities, dynamic capabilities, learning, and knowledge transfer. Innovation also appears greatly linked to knowledge management. The keywords network indicated that the focus of the literature is mostly on managerial aspects when compared to strategic or operational aspects. In general, it concerns medium-term changes and implementations and the action is mainly focused on the functional areas of the business. It was observed that there is the establishment of a structure in the organization to face the strategic challenges, which unfolds the institutional objectives in

Exhibit 3. Reference Co-citation Network



Note: Based on the bibliometric analysis data using the VosViewer software.

concrete actions and processes of action. That is, it is able to specify how the industry, process or project will support the achievement of the overall objectives of the organization.

Content Analysis

The coding was performed from a careful reading of the selected articles and stratification of the codes as proposed in Exhibit 2. The coding scheme used was first influenced by the previous network analysis that emphasizes the concepts of dynamic capabilities, absorptive capacity and learning and then the in-depth content analysis of the full papers suggested the other codes. The synthesis of the code analysis is presented in Exhibit 5. The detailed result of the content analysis of the 80 articles is exhibited in Appendix A.

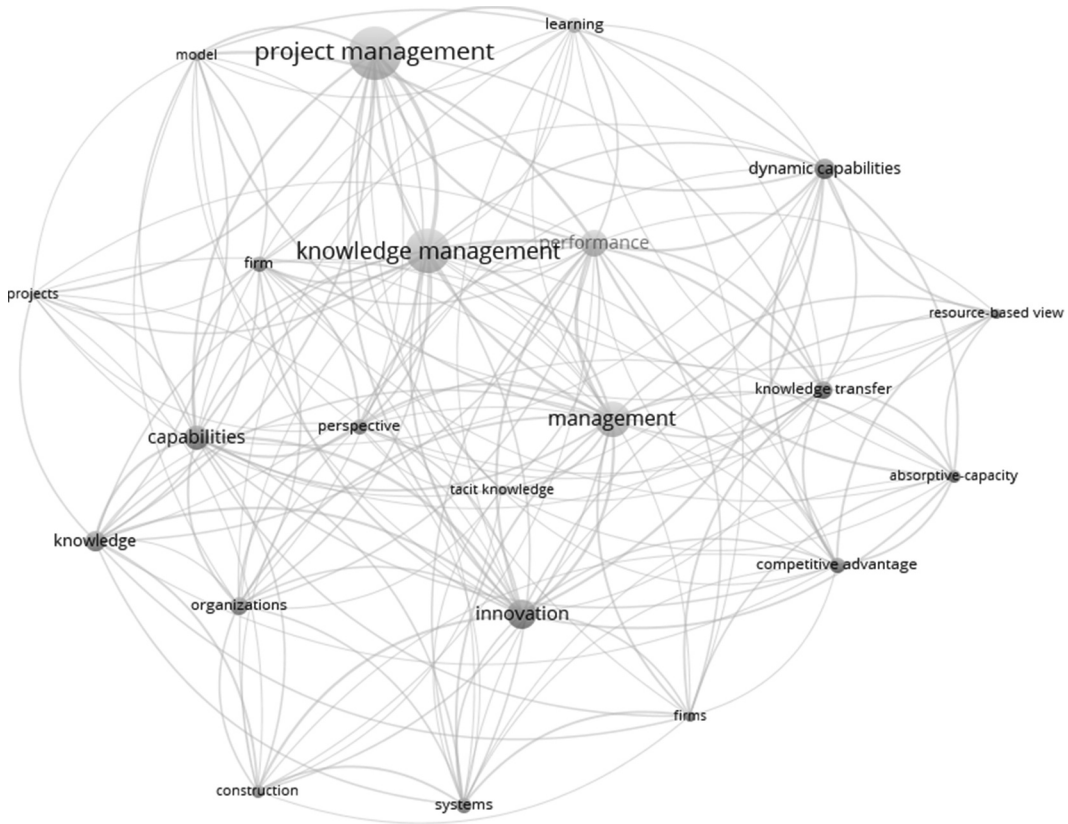
The code analysis indicated that more articles are linked to survey methodologies and case studies, demonstrating that empirical or field analysis is required for the subjects of this study, since from these subjects, it is possible to seek the practical verification of something and thus anchor and prove empirically what is conceptually presented. The most detected approaches were qualitative, showing that the discussed subjects still require of research a better understanding of the perceptions and a deeper comprehension of the general nature of a question, opening space for interpretation. The lack of confirmatory researches conflicts with the fact that knowledge management has been studied for several decades now (ex: (Dubinskas, 1993), and the results point that we are still in an exploratory phase.

The main focus of the articles is learning. According to Gieskes and Ten Broeke (2000), a strong debate in the literature still exists about whether and how a learning organization can be designed, how it can be characterized, and even what a learning organization is. However, a common understanding is that organizations should use tools, methods, and techniques that support, facilitate and promote different types of learning, and thereby support the transfer of individual to organizational learning.

It is also possible to see that most of the articles studied relations with companies. Of these articles, most either do not specify the study of the designed area or the analysis is done in several areas together, showing that the objective is about the project in general and not a specific sector in particular. In addition, it is important to point out that the success dimensions of the articles are mainly related to the efficiency of project management, impact on the team, and current impact on the company. The impact on the client, as well as the social and environmental impacts are still little explored by the studies.

Knowledge management. Contrary to a subjective view of knowledge as the understanding of one mind, new knowledge begins to be discussed in the literature in the 1990s as a social construction, built from interactions among people with different knowledge bases (Dubinskas, 1993). But it is from 2000 on that academia and knowledge-based organizations have invested substantial resources in knowledge management initiatives, which aim to facilitate

Exhibit 4. Co-Occurrence Keyword Network



Note: Based on the bibliometric analysis data using the VosViewer software.

such interactions, typically through the installation of information systems, such as document databases or promotion forums, encouraging interpersonal contact (Haas, 2006; Hong et al., 2008). Knowledge management now becomes an important competitive advantage (Chan et al., 2009), directly connected to organization strategies and organizational skills (Baskerville & Pries-Heje, 1999; Ravichandran & Rai, 2003).

As the discussion about knowledge management begins to mature, other authors begin the study this construct, particularly in project-based organizations. Lindner and Wald (2011) argue that KM is the most important critical success factor for this type of organization, where the level of knowledge transfer throughout project effort is associated to an increase in project capabilities and performance (Landaeta, 2008). According to Stephens and Carmeli (2016), teams can improve project performance results and adherence to project budgets by increasing their capabilities to access, exchange, and integrate knowledge. Knowledge management has a direct impact on organizational changes, such as the end of long-term supplier relationships, project closure, organizational turnover and growth (Leseure & Brookes, 2004). Consequently, Leseure et al. (Kitchenham, 2004) state that the degree of innovation affects both knowledge management and the type of knowledge the organization seeks to retain.

Specifically on knowledge transfer, Von Zedtwitz (2002) reports that the most efficient way to achieve it is through the storytelling of projects, directly linked to the capabilities of the account and the facilitating technology used to propagate the story (S. Duffield & Whitty, 2016b). Looking for a more in-depth analysis, Loufrani-Fedida and Saglietto (2016) highlight support and knowledge sharing tools in coding to make knowledge accessible along project lifecycles, such as project management formalization, post-project analysis, project documentation and its storage, using information and communication technologies.

Still on the relationship between KM and projected organizations, Reich et al. (2012) show that project managers play a doubly relevant role as they develop environments where knowledge can be created, shared, and used to produce project results while, on the other hand, they can suppress new knowledge resources, restricting communication or rejecting emerging ideas (Dubinskas, 1993).

As the theory was being developed, a group of authors sought to investigate their practices and challenges. For Knowledge Andersen and Vidar Hanstad (2013) and Reich et al. (2012), practices are affected by both social and technical issues. Thus, one of the largest barriers regarding knowledge transfer lies in the lack of project team motivation to pass it on (Bell et al., 2016). This motivation is affected by organizational synergy (Baskerville & Pries-Heje, 1999; Stephens & Carmeli, 2016; Zhang & Li, 2016), organizational skills (Baskerville & Pries-Heje, 1999) and the clarity and transparency of knowledge ownership (Andersen & Vidar Hanstad, 2013), and also organizational routines (Aerts et al., 2017; Andersen & Vidar Hanstad, 2013; Dubinskas, 1993; Medina & Medina, 2017).

Exhibit 5. Coding Scheme: Occurrence and Frequency

Code	Variables	#	%
Type of Study (TS)	TS4: Survey	31	39%
	TS6: Action Research	25	31%
	TS5: Literature Review	7	9%
	TS2: Theoretical – Conceptual	6	8%
	TS3: Interviews	6	8%
	TS7: Case Study	6	8%
	TS1: Modelling	5	6%
	TS8: Experimental	3	4%
Approach (A)	A1: Qualitative	43	54%
	A2: Quantitative	19	24%
	A3: Multi-Method	18	23%
Knowledge Management (KM)	TKM: Tacit Knowledge Management	26	33%
	EKM: Explicit Knowledge Management	20	25%
Related Topic (RT)	LL: Lessons Learned	38	48%
	AC: Absorptive Capacity	22	28%
	DC: Dynamic Capability	18	23%
Project Area (PA)	PA6: No specified	25	31%
	PA1: IT	22	28%
	PA5: Others	19	24%
	PA3: Construction	15	19%
	PA2: Mechanics	5	6%
	PA4: Energy	3	4%
Success Dimensions (SD)	SD2: Project Management Efficiency	34	43%
	SD3: Impact on the Team	23	29%
	SD4: Present impact on business	22	28%
	SD1: Product/Service	12	15%
	SD5: Future impact on business	11	14%
	SD6: Impact on the customer	6	8%
	SD7: Social and Environmental Impact	5	6%

On the other hand, even when knowledge is present in organizations, teams must transform it into resources for all. Only then will they be able to face the challenges to better identify and define problems, generate and implement solutions, and evaluate the results (Lin et al., 2015). In this way, greater efficiency and productivity arise from the combination of resources by team members with specialized and complementary knowledge.

Learning. The discussion about learning among projects started in the 90's focusing on the project structure. Ayas (1996) argued that the essence of the project lies in the organization's ability to continuously improve its processes and systems with every project carried out. The network structure of the project, coupled with a learning strategy, can significantly increase this capability. Replacing the more traditional and hierarchically structured project teams with a network of self-managed teams leads to greater customer responsiveness, better quality, reduced deadlines and costs. Evolving to corporate learning Ayas (1997) defends that the organization must develop an integrative approach to the project that relates both short and long-term goals. Besides that, the organization must have in mind that the lessons should be studied in depth; after all, superficial learning would not add value to the development of the project.

In the 2000's, many authors began studying this subject area, and the theory started to be developed. One of the first topics of studies is about the effort of learning, which does not seem to be natural due to its temporal nature (Antoni et al., 2005; Williams, 2008). In that decade the practitioners and researchers started to focus on project management and its knowledge areas. Atkinson et al. (2006) asserts that learning and knowledge management are key contributors in various ways to uncertainty management (Atkinson et al., 2006), which is a common environment in project contexts.

On the other hand, lack of learning or incorrect project learning can lead to delays in project deliveries and budget noncompliance (Cavaleri & Reed, 2008). This learning is affected by organizational culture, time pressures, and the attitudes and behaviors of project teams (Atkinson et al., 2006).

Williams (2008) also focused on the kind of learning an organization should be interested in. In this case he argued that general learning is more valuable, because the organization can reapply it, whereas if it is a more specific learning the organization might not have any chance to apply the knowledge gathered.

As challenges to learn in the project context appear, another cluster of authors studied the mechanisms to actually learn. Gieskes and Ten Broeke (2000) argued that the

organization should use tools, methods, and techniques that support learning processes as well as display mechanisms to facilitate and promote different types of learning, supporting the transference of individual learning to organizational learning.

Von Zedtwitz (2002) presents post-project reviews (PPR) as one of the most structured and widely applicable approaches for undertaking group-level learning, which is a precondition for sustaining significant improvements over long periods of time. In an analysis focusing more on the processes than on mechanisms to assess learning, Daghfous (2004) divided the learning processes among experimentation, system focus, learning from past experiences, and competence acquisition. The results reported by this author are directly linked to the communication channels within the organization as well as the process structuring (Antoni et al., 2005). Mahanty et al. (2007) argue that the following processes are imperative for learning: reflection, integration, systems thinking, participation, and negotiation. The authors also state that social learning and its results depend directly on the participation of the main stakeholders of the project, with the leader playing a fundamental role in the learning process, being either a learning inhibitor or facilitator (Sastre-Merino et al., 2013).

Continuing this discussion, Berggren and Söderlund (2008) and Jugdev and Mathur (2013) report the following modes of learning practices used by organizations: reflection reports, learning contracts, exams, study cases, thesis work, and theaters of knowledge.

As the theory is developed by the researchers, the challenges became clearer, so the papers focusing on the barriers are more common. Bartsch et al. (2013) argued the learning barriers have an intra-organizational character, because of their temporary nature and lack of motivation, opportunities and ability on behalf of the organization (Bartsch et al., 2013). Thus, for an organization to be able to learn, it should already possess capabilities (Ayas, 1997; Medina & Medina, 2017).

Consequently, learning has a positive effect on capacity building and project performance. Also, learning is related to behavioral changes (Chuanmin et al., 2012).

Learning organizations should establish a system in which individual learning can be shared among members (Chronéer & Backlund, 2015).

In project-based organizations (PBOs), competencies are built through the execution of large projects. On the one hand, a PBO is recognized as a learning organization, since it requires comparisons and coordination among different competencies and allows the development of competencies in action. On the other hand, competence is seen as a key factor in the effectiveness of the project (Loufrani-Fedida & Saglietto, 2016).

Absorptive capacity and dynamic capability. The academic literature begins the discussion about organizational capacity in the late 1990s and early 2000s, making its connection with learning. According to Ayas (1997), a learning ability directly implies the ability to learn and manage this knowledge at individual, project, and organizational levels. In order to facilitate this process, certain tools have been developed, such as the CMM (capability maturity model) proposed by Baskerville and Pries-Heje (1999) and the capability maturity model in post-project reviews proposed by Von Zedtwitz (2002). Therefore, the company must display skills to detect knowledge outside the organization, to be able to appropriate and use it, uniting it with its previously available capabilities and abilities (Vicente-Oliva et al., 2015a).

As facilitating factors in the development of learning and organizational capacity, Deng et al. (2013) present a long-term strategic partner-provider partnership. These authors argue that client-specific capabilities and customer learning may be the basic conditions for relational performance generation, where trust between parties and project managers' capabilities are mediating factors. Leadership can be an inhibitor as well as a facilitator of capability building within the organization (Sastre-Merino et al., 2013). Evolving with the topic of capacity, other authors relate it to the context of projects. Chuanmin et al. (2012) assures that the creation of capability has a significant impact on project sustainability and project management capability, which tends to increase throughout the life of the project. This creation, when applied to complex projects, directly depends on the management of knowledge uncertainty intrinsic to the organization (Ahern et al., 2014). For Aerts et al. (2017), strategic organization issues, alongside organizational capabilities, have greater value and impact on project results than learning itself. Dynamic capabilities aid managers in designing project routines that add specific resource reconfigurations to the project context (Ramasubbu et al., 2008). Thus, organizational culture appears to have a great impact on competence management (Medina & Medina, 2017).

As already presented in this paper, organizational capacity was divided into two groups, absorptive and dynamic capacity (Bernroider et al., 2014). Absorptive capacity is defined as the ability of a company to recognize the value of new information, assimilate it, and apply it for commercial purposes (Bernroider et al., 2014). Authors such as Bell et al. (2016) and Medina and Medina (2017) view the absorptive capacity as a great facilitator of knowledge management. Therefore, the concept of absorptive capacity gains enough flexibility to be applied to a variety of fields of research, such as industrial organization, organizational learning, strategic management, innovative management, and project management (Killen et al., 2008).

For Love et al. (2016) the absorptive capacity is a function of organizational learning and requires learning capacities to assimilate knowledge to create problem-solving and knowledge creation skills. From a learning point of view, the organization's absorptive capacity depends on three kinds of learning: (1) exploration, (2) transformation, and (3) exploitation. Already for Kumar et al. (2008), technological absorptive capacity was the basis for technical learning within an organization, as well as for organizational and inter-organizational learning in general. The company's existing level of technological absorptive capacity determines to what extent the firm can actively increase its technological capacity or create a distinctive set of technological capabilities (Kumar et al., 2008).

As the studies progressed, relationships between the absorptive capacity and other constructs were being explored in the literature. An example of this is the research by Vicente-Oliva et al. (2015b), in which they ensure that the potential absorptive capacity is positively related to long-term project performance, whereas absorptive capacity is related to short-term performance. When these variables are studied alongside the dynamic capabilities of the organization, project performance is improved (Vicente-Oliva et al., 2015b). Another relational study by the same authors is Vicente-Oliva et al. (2015a),

in which they argue that the practices promote innovation in two ways: the practices are positively related to the absorptive knowledge capacity in the organization and, in turn, the absorptive knowledge capacity affects the success of R&D projects.

In the project scenario, some studies have emerged more recently, such as Medina and Medina (2017) that state that competitive organizations must work alongside learning and be able to absorb knowledge. However, according to Mainga (2017), the process of acquiring project skills is difficult and complex; it requires the active acquisition of new project knowledge during project planning and execution, as well as the development of absorptive capacities by the knowledge recipients. Therefore, higher levels of absorptive capacity of organizations are seen as facilitators of inter-organizational knowledge transfer (Bakker et al., 2011).

Something similar to what is found in the literature of absorptive capacity is seen for dynamic capability, which authors began to research in the 2000s. According to Atkinson et al. (2006), the dynamic capabilities are innovative; they enable technology users to replicate and alter the technical system, creating new products, processes, designs, and even new technologies. These capabilities involve processes or mechanisms that integrate, reconfigure, and also renew component resources and those used to expand, upgrade, and improve resources under changing market conditions (Zhang et al., 2012).

In the field of projects, the dynamic capabilities are a useful concept to understand how organizations develop the strategic organizational processes required to manage the different degrees of uncertainty found in many large and complex projects (Davies et al., 2016). These capabilities are important for the successful delivery of a project, but their fragility is revealed in the extensive efforts needed for their mobilization (Davies et al., 2016).

Research framework. In this section, we analyze the influence of Knowledge Management, Absorptive Capacity and Dynamic Capability in Project Success by means of a research framework.

The analysis presented in this study allowed for the investigation of RQ1, how does the literature address knowledge management and capacities in a project context?

The cross-analysis of the 80-article coding (see Appendices A and B) allowed for the identification of the core themes in the literature and for the discussion of their relationship with the codes. Exhibit 6 shows the core-periphery analysis that identifies which codes belong to the core membership class and which belong to the periphery as well as the fit correlation among them. The core class membership codes are Lessons Learned (LL), Tacit Knowledge Management (TKM), Project Management Efficiency (SD2), and Impact on team (SD3), with a core/periphery fit of 0.8359. The fact that LL stood out in the project literature may be related to the fact that lessons learned is a PM closure process suggested by ISO21500. In the present study, it appears as 48% of the evaluated sample.

There is still a lack of research on Absorptive Capacity (AC) (28%) and Dynamic Capability (DC) (23%), both weakly related to KM codes in the evaluated sample.

Exhibit 6. Analysis of the Core Themes of the Research

	SD2	SD3	KM1	KM2	KM3	SD1	C1	C2	SD4	SD5	SD6	SD7
SD2	33	9	20	10	11	2	9	7	4	2	1	2
SD3	9	23	14	10	7	1	5	4	6	3	2	2
KM1	20	14	38	6		3	12	7	12	5	2	2
KM2	10	10	6	26	9	3	4	3	8	5	2	1
KM3	11	7	6	9	20	2	3	4	2	3	1	
SD1	2	1	3	3	2	12	3	2		1		
C1	9	5	12	4	3	3	22	5	6	1		2
C2	7	4	7	3	4	2	5	18	4	4	2	1
SD4	4	6	12	8	2		6	4	22			2
SD5	2	3	5	5	3	1	1	4		11	3	
SD6	1	2	2	2	1			2		3	6	
SD7	2	2	2	1			2	1	2			5

Core: KM1 KM2 SD2 SD3
Periphery: C1 C2 KM3 SD1 SD4 SD5 SD6 SD7
Core/Periphery fit (correlation) = 0,8359

Note: Based on content analysis data using the UCINET software.

As shown in Exhibit 6 the core connection among codes is between lessons learned and tacit knowledge management and their impact on project success.

The cross-analysis of the 80-article coding also allowed for the exploration of RQ2. How does the literature address the impact of knowledge management on project success?

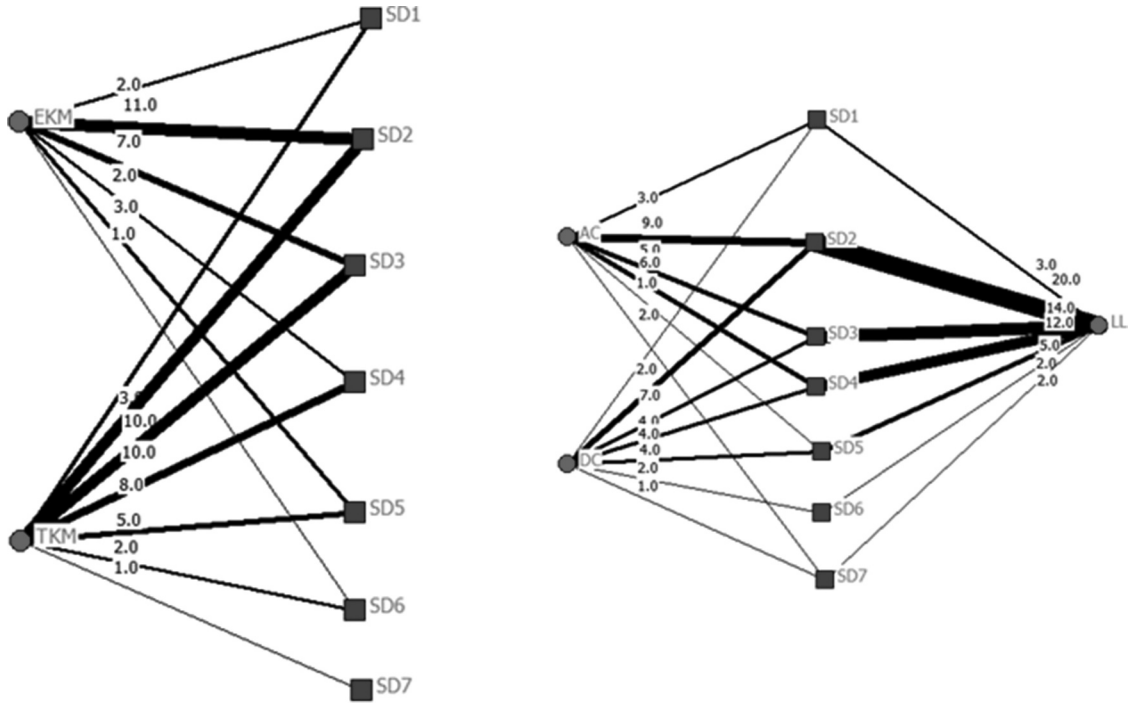
The frequency analysis identified Project Management Efficiency (SD2) as the most prominent success dimension in the studied sample, at 43%, followed by Team Impact (SD3) (29%) and Present Impact on Business (SD4) (28%). These three success dimensions are often linked with all knowledge management codes, as displayed in Exhibit 7.

Exhibit 7 shows that the relation between KM, both tacit (TKM) and explicit (EKM), with SD codes is strong. More interesting, EKM is more related to SD2 (11 references pointed out this relation) and SD3 (11 references), while TKM, besides having a relation with SD2 (10 references) and SD3 (10 references), also pointed out a relation with SD4 (8 references). Considering AC and DC with SD, only the relation with SD2 is more stressed in the literature. Finally, the relationship between Lessons Learned and SD is strong, particularly with SD2, SD3, and SD4.

Discussion, Implications and Future Research Agenda

Exhibit 7a points out some interesting insights for future research because it shows that different types of knowledge influence different success dimensions. Explicit Knowledge (EKM) is more related to Project Management Efficiency (SD2) and Impact on Team (SD3), while Tacit Knowledge (TKM) influence various success dimensions. Therefore, this discussion suggests that the following proposition should be considered in a future research agenda:

Exhibit 7. Relationships Between Knowledge Management, Related Topic and Project Success. (A) Types of Knowledge and Success Dimensions. (B) Related Topics and Success Dimensions



Note: Based on content analysis data using the UCINET and IBM SPSS software.

P1: Knowledge Management (KM) influences Project Success (PS) positively. However, TKM and EKM may affect different Success Dimensions (SDs).

Considering Exhibit 7b, the relationship between Lessons Learned (LL) and Project Success (PS) stood out, particularly in the three following dimensions: Project Management Efficiency (SD2), Impact on Team (SD3), and Present Impact on Business (SD4). Consequently, the following propositions are stated.

P2a: Lessons Learned (LL) affect Project Success (PS) positively. However, the effect on each Success Dimensions (SDs) can be different.

A similar reasoning can be applied to the relationship of both Absorptive Capacity (AC) and Dynamic Capability (DC) into Project Success (PS). While AC is more often bridged with PM Efficiency (SD2), Impact on Team (SD3), and Present impact on business (SD4), DC is linked with these SDs (SD2, SD3 and SD4), but also with the Future Impact on Business (SD5). Thus, Exhibit 7b shows that AC and DC are linked with various SDs, but with different magnitude, which leads to the following propositions:

P2b: Absorptive Capacity (AC) affects Project Success (PS) positively. However, the effect on each Success Dimensions (SDs) can be different.

P2c: Dynamic Capability (DC) affects Project Success (PS) positively. However, the effect on each Success Dimensions (SDs) can be different.

In addition to the propositions asserted it was possible, through the analysis of content, to identify the main findings and issues not yet solved, presented in Exhibit 8.

Analyzing Exhibit 8, we noticed that the literature still lacks answers when it comes to project context related to knowledge management. Studies on barriers and facilitators exist, but it is necessary to achieve clear and precise results in project environments and their specificities as well as to study them in different businesses. One possible way to do this is to build models to investigate these contexts. Something similar was identified in the work on absorptive capacity, the focus so far has been to clarify this construct, to identify the factors that facilitate its generation, and to create some models to test hypotheses raised in the literature. However, there are still gaps when this theme is addressed in different environments, such as public and private companies, and/or when it is necessary to identify individual participation in improving team's performance. The studies on dynamic capability show a certain evolution since they identified a new capacity required from project managers and the main activities between the three phases of their application, as well as created a structure for team, organizational, and collaborative capacity. Thus, as an unresolved issue, it is pointed out the need to connect this topic with the success dimensions and improvement of project performance. We identified that the research on the relationship between project success and knowledge management is still in an embryonic phase, and there is the need for more studies addressing how it affects the success dimensions. We identified some studies pointing out in this direction, but there is a need to move further beyond

exploratory research toward the confirmatory investigation of the propositions raised in our study.

Based on our knowledge management context research results,it is clear that the authors focus on two major situations. First, studying the processes of knowledge management, there are a few frameworks designed to set up relationships among some constructs of knowledge management, for example, Bell et al. (2016), who proposed the relationship among organizational knowledge, mechanisms, and the learning process. Second, facilitators and barriers are starting to be studied, which is

Exhibit 8. Findings, Gaps and Unsolved Questions

Topic area	Key findings	Unsolved questions	Reference
Knowledge Management	Identified barriers and facilitators for knowledge management divided into six groups: Learning, Culture, Social, Technology, Process and Infrastructure; Identified the Systemic lessons learned knowledge model impact on the capability of storytelling Detailed the systemic lessons learned knowledge model process of implementation	How does the organization context influence the barriers and facilitators to knowledge management? How to develop a Systemic lesson learned knowledge model to support the daily routine of an organization? How is the impact of barriers and facilitators for knowledge management in a large enterprise changed to an SME? How do barriers change in different businesses?	(Duffield and Whitty, 2016b) (Duffield and Whitty, 2016a)
	Identified the knowledge required for the participants in each lifecycle stage of a general project; Proposed a framework which relates the knowledge transfer mechanisms, the learning process, and the organizational knowledge; For knowledge to be reused, it needs to be transferred to a centralized position as a knowledge manager, instead of being transferred directly to a database	How can an organization transfer the organizational knowledge to the project team?	(Bell et al., 2016)
	In the universe studied, it is clear the difficulty for organizations to understand which knowledge they should keep, and how to treat undesired knowledge	What kinds of knowledge should an organization maintain to increase the PPP projects efficiency?	(Aerts et al., 2017)
	Identified 14 micro-practices that form the basis of the competences needed by the project management, connecting them to individual, group, and organizational levels. Identified the factors which influence and inhibit knowledge transfer in a project-based organization;	How can the micro-practices underlying project manager competences be assesed when building the competences needed in public-based organizations?	(Loufrani-Fedida and Saglietto, 2016)

Exhibit 8. (*Continued*)

Dynamic Capability	Identified a new capacity needed in project managers - called collaborative social project management capacity Structures the elements of team, organizational and collaborative capacities Identified the key activities among the 3 phases of the dynamic capability	How do different capacities influence the success dimensions in project management? How do firms learn how to improve dynamic capabilities to increase performance in different project contexts?	(Loufrani-Fedida and Saglietto, 2016) (Nanthagopan et al., 2016) (Davies et al., 2016)
Absorptive Capability	Organizational capabilities seem to be more important for acquiring new important knowledge than previous individual capability; Identified the factors which facilitate de generation of new knowledges; Organization culture appears as an important factor in competence management; The capacity of expressing negative emotions influences positively knowledge creation capabilities, which in turn have a positive impact on project success	How can an organization develop the factors needed to be capable of hiring the capability of generating knowledge? How are these results altered from a public organization to a private one? How can the individual effectively manage the expression of negative emotions in order to improve the team's performance?	(Medina and Medina, 2017) (Stephens and Carmeli, 2016)
Lessons Learned	Indentified mechanisms which assess learning among projects The learning factor is intensified in challenging environments where issues such as timeframes for solving difficulties are short	What are the challenges and facilities to implement and use learning mechanisms among projects? How can an organization simulate a critical environment in order to increase levels of learning.	(Loufrani-Fedida and Saglietto, 2016) (Davies et al., 2016)

in agreement with the first situation highlighted. To improve the knowledge management process, it is rather important to understand which the major barriers and facilitators are.

Regarding capabilities, the authors are researching the kind of capabilities that need to be kept and maintained in an organization, and what the impacts of applying these capabilities in projects and organization contexts are.

Additionally, during our research we identified and suggested some questions yet to be solved. First, we emphasized the gap of the impacts of the absorptive capability and dynamic capacity on the success dimension of the project context. Second, we suggested questions about the context of managing knowledge, so that after these questions are solved, the academics may assess how the practioners either implement an efficient and successful knowledge management processor improve the ones that already exist.

Conclusions and Limitations

This article contributed to the literature with an in-depth analysis of 80 articles dealing with knowledge management in the context of projects. The two research questions (RQs) proposed here were answered based on this analysis. The first research question explored the core topics in the literature of KM in a project context and showed that the literature stresses Tacit Knowledge Management (TKM) and Lessons Learned, while exploring the relationship between two success dimensions (Project Management Efficiency and Impact on Team). This analysis also showed a lack of research on Absorptive Capacity and Dynamic

Capability, despite the fact that these themes are well explored in KM literature as a whole. The second research question, the relation between both tacit knowledge and explicit knowledge with success dimensions is explored in the literature, particularly with Project Management Efficiency and Impact on Team. More interestingly, explicit knowledge is more connected to Project Management Efficiency and Impact on Team, whereas tacit knowledge has also been related to present impact on business in the surveyed literature.

This leads to certain practical implications, specially to exploring how knowledge management happens in order to influence project success. Moreover, our research pointed out various tools and methods with usability and applicability in real organizational conditions. In addition, this paper demonstrates a lack of studies with operational focus, such as a focus on the challenges perceived during the implementation of knowledge management in an organization as well as a lack of a framework that could aid organizations to effectively implement knowledge management. Thus, these issues remain as potential topics for future research agendas.

This paper presents certain inherent limitations to the adopted research methods. First, the selection of databases and research strings provide constraints on the sample and, therefore, relevant studies may not have been considered in the search. The inherent subjectivity of the analysis process by researchers concerning article inclusion and exclusion may also present limitations, although the selection criteria and the redundancy in the analysis minimize this problem.

For future research, an in-depth study of the factors that affect knowledge management is suggested. In this regard, the next step of the study would be to understand how these factors are related to the dimension of success as well as the magnitude of their effect. The literature is scarce concerning research that aids the implementation of knowledge management practices, so it is important to analyze how this implementation occurs in organizations to allow and facilitate the presentation of proposals in this regard.

Acknowledgements

The authors gratefully acknowledge the financial support of the Brazilian research funding agencies CNPq (National Council for Scientific and Technological Development), and CAPES (Federal Agency for the Support and Improvement of Higher Education).

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Appendix A – Summary of Content Analysis on Coding Schema – Cont.

References	TS	A	KM	RT	PA	SD
(Ayas, 1997)	TS2	A1		AC, LL	PA6	SD2
(Baskerville & Pries-Heje, 1999)	TS6	A1	EKM	DC	PA1	D2, SD4
(Von Zedtwitz, 2002)	TS1, TS3, TS4	A1	EKM	AC, DC, LL	PA5	SD5
(Ravichandran & Rai, 2003)	TS1, TS4	A2	EKM		PA1	SD1, SD5
(Leseure & Brookes, 2004)	TS3	A1	TKM		PA6	SD3, SD5, SD6
(Daghfous, 2004)	TS8	A1		LL	PA1	SD1, SD2, SD3
(Antoni et al., 2005)	TS1, TS6	A3		LL	PA2	SD1, SD2
(Mahanty et al., 2007)	TS1	A1		LL	PA5	SD2, SD7
(Williams, 2008)	TS2, TS4	A1	TKM, EKM	LL	PA4	SD2
(Killen et al., 2008)	TS6	A2		AC, DC	PA6	SD2
(Berggren and Söderlund, 2008)	TS6	A1	TKM, EKM	AC, DC	PA1	SD3
(Ramasubbu et al., 2008)	TS1	A2		AC, DC, LL	PA1	SD2, SD3
(Teerajetgul et al., 2009)	TS4	A2		LL	PA3	SD5
(Swan et al., 2010)	TS6	A1		LL	PA6	SD4
(Chuanmin et al., 2012)	TS4	A2		DC	PA1	SD2, SD7
(Reich et al., 2012)	TS4	A1	TKM, EKM	DC, LL	PA6	SD3, SD5
(Deng et al., 2013)	TS2	A1	TKM	DC	PA6	SD5, SD6
(S. Duffield & Whitty, 2016b)	TS8	A1	TKM, EKM		PA5	SD3
(Zhang & Li, 2016)	TS4	A2	TKM, EKM		PA3	SD2, SD3
(Ahern et al., 2014)	TS6	A1		AC, LL	PA6	SD2
(Bell et al., 2016)	TS8	A1		LL	PA6	SD2, SD3, SD5
(Aerts et al., 2017)	TS6	A1		DC, LL	PA3	SD2
(Medina & Medina, 2017)	TS4	A2		AC	PA6	SD3
(Garcias et al., 2015)	TS4	A2	EKM	AC, LL	PA6	SD3
(Grabher & Thiel, 2015)	TS4	A2		LL	PA1	SD2, SD5, SD6
(Vicente-Oliva et al., 2015b)	TS6	A3	EKM	LL	PA3	SD2
(Andersen & Vidar Hanstad, 2013)	TS3	A1		LL	PA1	SD3
(Aramburu et al., 2013)	TS4	A2		DC	PA3	SD1
(Bakker et al., 2011)	TS6	A3		AC	PA3, PA6	SD4
(Bartsch et al., 2013)	TS4	A2		LL	PA2	SD4
(Berggren & Söderlund, 2008)	TS4	A3	EKM		PA4, PA5	SD2
(Bresnen et al., 2003)	TS6	A3	TKM		PA3, PA6	SD1
(Damm and Schindler, 2002)	TS8	A3	TKM		PA1	SD5
(Bernroider et al., 2014)	TS4	A2		DC	PA1	SD6
(Ethiraj et al., 2005)	TS4	A2		AC	PA1	SD1
(Haas, 2006)	TS4	A3	EKM		PA6	SD6
(Hong et al., 2008)	TS4	A3	TKM		PA1	SD1
(Jugdev & Mathur, 2013)	TS5	A3		LL	PA4, PA6	SD3
(Kumar et al., 2008)	TS4	A3		AC	PA2, PA5	SD1
(Lindkvist, 2008)	TS6	A3		DC	PA3	SD1
(Love et al., 2016)	TS6	A1		LL	PA1	SD4

(continued)

References	TS	A	KM	RT	PA	SD
(Lytras and Pouloudi, 2003)	TS4	A1	TKM		PA1	SD4
(Mainga, 2017)	TS4	A3		AC	PA1	SD2

Appendix A – Summary of Content Analysis on Coding Schema – end.

References	TS	A	KM	RT	PA	SD
(Russell-Hodge, 1995)	TS8	A3	EKM		PA1	SD1
(Sáenz et al., 2012)	TS3	A3		DC	PA6	SD5
(Tacla and Figueiredo, 2006)	TS6	A1		LL	PA2, PA5	SD3, SD6
(Zhang et al., 2013)	TS6	A3	TKM		PA3	SD2
(Leufkens & Noorderhaven, 2011)	TS8	A3	EKM		PA3, PA5	SD2
(Chronéer & Backlund, 2015)	TS6	A1		LL	PA1	SD4
(Collinson, 1999)	TS6	A3	TKM		PA3, PA5	SD4
(Nanthagopan et al., 2016)	TS6	A1		LL	PA3, PA5	SD1
(Sastre-Merino et al., 2013)	TS6	A1			PA5	SD3, SD7
(S. M. Duffield & Whitty, 2016a)	TS7	A1	TKM, EKM	LL	PA5	SD2, SD3
(Loufrani-Fedida & Saglietto, 2016)	TS6	A1	TKM	LL	PA5	SD2, SD3, SD4
(Stephens & Carmeli, 2016)	TS4	A2	TKM	AC	PA5	SD2
(Rungi, 2015)	TS4	A3		DC	PA6	SD4
(Yang et al., 2015)	TS4	A2	TKM	AC	PA5	SD4, SD7
(Vicente-Oliva et al., 2015a)	TS4	A2		AC, LL	PA6	SD2
(Lin et al., 2015)	TS5	A1	EKM		PA1	SD2, SD3
(Ritala et al., 2013)	TS3, TS4	A1	TKM	AC	PA1	SD1
(Killen and Hunt, 2013)	TS6	A1		AC, LL	PA1	SD2, SD4
(De Souza Carvalho et al., 2013)	TS4	A1		AC, LL	PA5	SD3, SD4, SD7
(Davies et al., 2016)	TS6	A1		DC, LL	PA3	SD2
(Ruuska and Brady, 2011)	TS6	A1		AC, LL	PA5	SD4
(Leal-Rodríguez et al., 2014)	TS4	A2		AC, LL	PA2	SD2
(Killen et al., 2008)	TS5	A1		AC, LL	PA6	SD4
(Styhre, 2009)	TS3, TS6	A1	TKM		PA3	SD3, SD4
(Chan et al., 2009)	TS4	A1	TKM, EKM		PA1	SD4
(Landaeta, 2008)	TS4	A2	TKM, EKM		PA6	SD2
(Lindner & Wald, 2011)	TS4	A2	TKM, EKM		PA5	SD2
(Cavaleri & Reed, 2008)	TS2, TS6, TS7	A1	TKM	LL	PA5	SD2, SD3, SD4
(Edmondson & Nembhard, 2009)	TS5	A1		LL	PA6	SD3, SD4
(Bredin, 2008)	TS2	A1		DC	PA6	SD3, SD4
(Atkinson et al., 2006)	TS5	A1		AC, LL	PA6	SD2
(Walker and Christenson, 2005)	TS5	A1	TKM	LL	PA6	SD2, SD3
(Adams, 2006)	TS5	A1	TKM		PA6	SD4
(Gieskes & Ten Broeke, 2000)	TS4	A1		LL	PA3	SD4
(Nissen, 1998)	TS2	A1	TKM		PA1	SD5
(Ayas, 1996b)	TS7	A1		DC, LL	PA5	SD2
(Dubinskas, 1993)	TS6	A1	EKM		PA1	SD2

Appendix B – Cross-Tabulation Analysis

	AC	DC	LL	TKM	EKM	SD1	SD2	SD3	SD4	SD5	SD6	SD7
AC	22	5	12	4	3	3	9	5	6	1	0	2
DC	5	18	7	3	4	2	7	4	4	4	2	1
LL	12	7	38	6		3	20	14	12	5	2	2
TKM	4	3	6	26	9	3	10	10	8	5	2	1
EKM	3	4	6	9	20	2	11	7	2	3	1	0
SD1	3	2	3	3	2	12	2	1	0	1	0	0
SD2	9	7	20	10	11	2	33	9	4	2	1	2
SD3	5	4	14	10	7	1	9	23	6	3	2	2
SD4	6	4	12	8	2	0	4	6	22	0	0	2
SD5	1	4	5	5	3	1	2	3	0	11	3	0
SD6	0	2	2	2	1	0	1	2	0	3	6	0
SD7	2	1	2	1	0	0	2	2	2	0	0	5