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INVESTIGATING KNOWLEDGE MANAGEMENT WITHIN SOFTWARE INDUSTRY: A SYSTEMATIC LITERATURE REVIEW

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ABSTRACT

Knowledge is the ground of the software industry. In order to acquire, create, and incorporate knowledge, the organizations embrace the Knowledge Management (KM). Thus, the goal of this paper is to identify methodological instruments used by researchers to investigate the knowledge management within the software industry. We analyze the status of the research presenting an overview of the methods used by the authors, the objectives established by them, and some relevant aspects to drive future work in KM area. Based on the systematic literature review method this study analyses articles about what instruments are used by researchers within software industry to knowledge management investigate from June 2006 to July 2016 on five electronic databases according to a pre-defined protocol. Inthisliterature review, we identified eight articles about instruments to knowledge management investigate within the software industry. Those articles have been reviewed according to a set of research questions. We observed that this research subject has not been a common practice in the last ten years and the tools to investigate knowledge management used were structured based on consolidated research methodological instruments, having some necessary adaptations done. The results demonstrated that knowledge management is fundamental to software industry since these organizations are knowledge intensives. However, none studies analyzed specific proposalsof the instruments to investigate KM within the software industry.

INTRODUCTION

Knowledge is getting the key to innovation and competitivity of the organizations, contributing to problem-solving, decision-making, strategic planning development, dynamic learning, and improving resource usage (Meihami and Meihami, 2014). It creates new abilities and adding value to products and services (Chaudhuri, 2011).Considering the relevance of the knowledge for organizations, the need to manage such a resource becomes clear, being it that its systematization and usage as a differential is the greatest challenge of KM (Kebede, 2010).

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According to Gopalkrishna, Rodrigues, Poornima, and Manchanda (2012), KM is grounded by incorporating of individual knowledge to business processes, making it accessible to all those involved. Hence KM is animportantway to the organizationmanagingits assets and avoiding to lostit (Asrar-ul-Haq and Anwar, 2016).In the software industry it is not different because it ischaracterized by the intensive knowledge usage and by the complexity of their tasks, these organizations, regardless of their size, carry out several projects and activities at the same time (Nawinna, 2011), being it that knowledge is the main raw material (Aurum, Daneshgar, and Ward, 2008) to take placetheir activities and expandtheir business goals (Gopalkrisna*et al.*, 2012).In this sense, despite the organizations are aware of the knowledge importance into their processes sometimes due to lack of time, resources, and qualified personnel, they end up neglecting it and even losing it (Aurum et al., 2008).

Thus, learning about the knowledge source, where and how it is kept, shared, and used within the organizational environment is a relevant scenario for aninnovative and sustainable software industry. In addition, the software industry does not survive if it will not be able to innovate (Desouza and Awazu, 2005). However, the knowledge sources are not trivial to be found. It means knowing the organizational processestheir contributions to the generation of knowledge, evaluating what is or is not being done by the organization to highlight the way the organization works, how their operations are carried out and what is the path through which the information, and the knowledge run in the organizational environment (Costa, Vasconcelosand Cândido, 2009).Thus, the objective of the KM is promoting organizational knowledge to increase competitivity through better use and creation of individual and collective knowledge sources (CEN, 2004).

Methodological instruments for investigating KM such as OKA, APQC, APO, Bukowitz and Willians, among others, enable to identify organizational knowledge. However, besides the need to adapt by organizations of different types and sectors, some barriers arise from using those methodological instruments within software industry such as: i) presence of numerous questions requiring a long time to be answered; ii) repetitive questions generating the same previous response; and iii) the high complex degree to be understood by the people in a short time. For that, is necessary a specific instrument toward investigating KM in the software industry.Therefore, this paper aims to identify and analyze, through a systematic literature review (SLR), the methodological instrumentsproposed by researchers to investigate KM within thesoftware industry, offering a panorama of the scientific production about methodological instruments. The SLR is relevant because it shows how the KM being investigated within the softwareindustry and what is research tendencies. In addition, we present the authors who have contributed to the area, the publication's main aspects, among them, key words used, Brazilian quality research index (*Qualis*), study objectives, nature and type of research, dimensions evaluated, data collection place, characterization of the people surveyed as well as the countries involved and the research methodological instruments used.The remainder of this paper is structured as follows. Firstly, we present the role of KM within the software industry, as well as the relevance of its investigation for the research area. Secondly, we present the methodology of this work showing the procedure details to perform this study. Thirdly, we show the results achieved taking place this systematic literature review and the discussion of each article found out. Finally, we bring our conclusion our conclusion driving the future works to investigate knowledge management within the software industry.

THE ROLE OF KM WITHIN THE SOFTWARE INDUSTRY

The software industry stands out from the other branches of the market due to having a final product which is the result of the intensive use of their personnel's knowledge in the execution of the processes (Bjørnson and Dingsøyr, 2008). Wiig (1997) highlights that knowledge is something processed and stored in the human mind and which may come from facts, procedures, concepts, interpretation, ideas, observations, and judgement; being possible for individuals, according to Davenport and Prusak (1998), to add new experiences and

concepts to the existing knowledge. Hence, it is important to highlight how essential is creat, keep, and manage an organizationalknowledge. According to Bhatt (2001), individual knowledge is necessary for the creation of organizational knowledge, but organizational knowledge is not only the sum of individual knowledge, once it is composed of unique patterns involving the relationship among people, technology, and processes shaped by the organizational culture. In this sense, the KM works with the objective of ensuring an organizational knowledge basis along with the individual skills, thoughts, innovations, and ideas to capture, structure and spread the knowledge (Dalkir, 2011), involving planning, organization, motivation and control of the people, processes and systems aiming to ensure the improvement and application of knowledge (King, 2009).According to Quintas, Lefrere, and Jones (1997), KM is a process through which different kinds of knowledge are continuously manipulated meeting the existing and emerging needs, trying to explore the existing knowledge assetsto develop new opportunities. KM is present within organizations which uses knowledge to add value to its products and services.However, in the software industry, it becomes necessary because besides the activities being exclusively dependent on people's knowledge to be executed (Rus and Lindvall, 2002); these organizations are inserted in an environment subjected to continuous changes as a direct consequence of emergence of the new technologies (Nawina, 2011). These changes meet the needs of many different sectors adapting what already exists to new environments or to new computer technologies or implementing new business requirements and software expansion to function in other databases or systems (Pressman and Maxim, 2016). That is why there is great knowledge flow in the organizational environment; if there is no control, there are difficulties to identify, locate and use the knowledge (Rus and Lindvall, 2002).

Sveiby (1998) highlights that KM only makes sense whether people's knowledge can be shared. The author also emphasizes that a satisfying organizational performance is linked to people's efficiency to createnew knowledge, share, and use it for a continuous improvement of the organization and the individuals involved. Thus, the need to evaluate what is being done by the organization. Evaluating the KM means to understand and further the knowledge about organizational processes and which, effectively, are their contributions to knowledge creating and maintenance; includesestablishing the relationship between theory and practice to demonstrate how the organization works and what is the path taken by information and knowledge (Costa, Vasconcelos,and Cândido, 2009). KM investigation in the organizations aims to evaluate if the KM is being implemented in an effective way (APQC, 2002) showingwhich processes and/or activities are being developed by the organization to increase the intellectual assets (FONSECA, 2006).

METHODOLOGY

A SLRaims to present a general evaluation about a specific topic and define the limits of the research which one wants to carry out (Transfield, Denvever, and Smart, 2003).According to Jones and Evans (2000), a thorough planning is necessary to guarantee a clear direction to be followed, including the preparation of a detailed research protocol, the criteria to include articles in the review and a critic analyze of the publications.SLRis very common in KM and information

technology areas. Furthermore,it is used to enrich the research and offer new horizons to researchers,for instance, Bjørnson and Dingsøyr (2008), Zahedi, Shahin and Babar (2016), Mariano and Awazu (2016), and Charband and Navimipour (2016). We performed the SLR considering three stages: i) search, ii) selection, andiii) systematic analyses of the literature. In the first stage, welooked for publications related to the topic on online databases: Emerald Insight, IEEE Xplore, *Portal de Periódicos Capes*, Scielo and Science Direct. Hence, the following key wordswere used: "knowledge management"; "software industry"; "software companies"; "knowledge management investigations";"knowledge management diagnoses". Since there is not standardization in the search fields from the different databases, the definition of such words was necessary as well as the search filters, presented in Table 1.

In the second stage, weselected the articles resulting from the first stage, according to the following criteria: "completearticles published in the respectfuljournal or in conference proceedings and whichsuggest/propose/present some instrument or methodology to investigate KM within the software industry". Also, we considered reading of: a) the title, abstract, and key words; b) methodology of each article selected in the previous stage; c) the selected articles completely.Finally, in the third stage we did a systematic analysis of the publications which met the selection criteria from the previous stage, having the following points analyzed: key words, year of publication, journal/event of the publication, *Qualis* (Brazilian quality research index), number of quotes, objectives, research nature, type of research, dimensions evaluated, KM investigation methodology, instrument used for data collection, interview/questionnaire application length, data collection place, tool used for data analysis and respondent characterization. The result of the search and the analysis of the selected articles are presented in the next section.

RESULTS AND DISCUSSION

Performing the first stage, which searched for publications about research tools to investigate KM within thesoftware industry, we found 449 articles. In which 65% were found through Brazilian *Portal de Periódicos da Capes* and 35% through the Scielo, as shown in Table 2 and 3, respectivelly.

Considering 294 articles which came up, the largest number found was on *Portal de Periódicos Capes* (97%) and the terms "knowledge management investigation and software industry" were the one which returned more results. Into the Scielo database, the terms"knowledge management diagnosis" and "software industry" did not result any entry. Considering 155 articles which came up from other databases, 42% was found on Emerald Insight, 48% on Science Direct and 10% on IEE Xplore. The terms "knowledge management process" and "software industry (ies)" were the ones which came up with more results, it means 52% of the total. The terms which showed fewer results were "knowledge management and diagnosy (ies) and software industry (ies)" (10%).

After that, we performed the second stage that started with the first analysis, which included the reading of the title, abstract and key words of the articles found. Thus, 413articles were dismissed due to not being related to the software industry. Considering 36 remaining articles, 28 also were dismissedbecause they did not present the methodological instrumentsor methodologies for KM investigation.Therefore, eight articles were read and have their texts fully analyzed, as presented in Table 4.Among the eight articles selected, three were published in international journals classified as *Qualis* A1, A2, and B4; two were published in Brazilian journals classified as *Qualis*A2, B3, and B4. Half of those articles were published between the years 2008 and 2009 and the remaining ones in 2011, 2012, 2015 and 2016.Analyzing the publications'*Qualis* considering the number of quotes (Figure 1), according to the data given by the Google Scholar tool, the most quoted publications were Singh's (2008) and Aurum et al. (2008), both classified asA1 *Qualis* (153) and A2 (138). Nawinna's work (2011), published inproceedings conference classified as A2 *Qualis*, had no quoting until this analysis date, October 2016; Spraggon and Bodolica's (2008) article was Nawinna (2011) and Gaspar *et al.* (2016) field research (Table 4). Regarding the eight articles selected, three were published in international journals classified as *Qualis* A1, A2, and B4; two were published in Brazilian journals classified as *Qualis* A2, B3 and B4. Half of the articles was published between the years 2008 and 2009 and the remaining ones in 2011, 2012, 2015 and 2016. Analyzing the publications' *Qualis*, with the number of quotes (Figure 1), according to the data given by the Google Scholar tool, the most quoted publications were Singh's (2008) and Aurum et al. (2008), both classified as A1 *Qualis* (153) and A2 (138).

Table 1. Fields and Search Filters

Search fields	Search filters
- Emerald Insight: abstract, keywords	- knowledge management *and* software companies
- IEEE Xplore: document title, abstract	- knowledge management diagnosis *and* software industry
- *Portal de Periódicos Capes*: titles, subject	- knowledge management investigation *and* software industry
- Scielo: all indexes	- knowledge management and diagno* *and* software firm*
- Science Direct: abstract, title, keywords	- knowledge management and diagno* *and* software industr*
	- knowledge management process *and* software industr*

Table 2. Number of Articles Found in National Databases

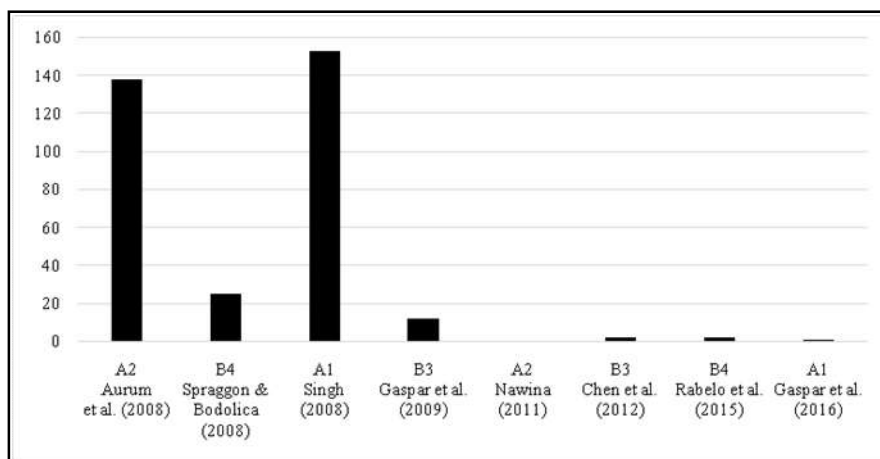| Terms searched	Scielo		*Portal de Periódicos Capes*		Total	
	n.	%	n.	%	n.	%
knowledge management *and* software companies	8	89	20	7	28	10
knowledge management diagnosis *and* software industry	0	0	85	30	85	28
knowledge management investigation *and* software industry	1	11	180	63	181	62
Total	9	100	285	100	294	100

**Figure 1. Relation Between the Number of Quotes and the *Qualis*
of the Journals where they were Published**

Table 3. Number of Articles Found on International Databases

Terms searched	Emerald Insight		Science Direct		IEE Xplore		Total	
	n.	%	n.	%	n.	%	n.	%
Knowledge management *and* diagno* *and* software firm*	2	3	53	72	4	25	59	38
Knowledge management *and* diagno* *and* software industr*	13	20	3	4	0	0	16	10
Knowledge management process *and* software industr*	50	77	18	24	12	75	80	52
Total	65	100	74	100	16	100	155	100

Table 4. Articles to be Discussed in the SLR

Authors	Title of the article	Publishing year	Journal or Event	*Qualis*
Aybüke Aurum, Farhad Daneshgar and James Ward	Investigating Knowledge Management practices in software development organizations - An Australian experience	2008	Information and Software Technology	A2
Martin Spraggon and Virginia Bodolica	Knowledge creation processes in small innovative hi-tech firms	2008	Management Research News	B4
Sanjav Kumar Singh	Role of leadership in knowledge management: a study	2008	Journal of Knowledge Management	A1
Marcos Antonio Gaspar, Denis Donaire, Maria Conceição Melo Silva, Carolina de Fátima Marques Maia, Eduardo Pinto Vilas Boas and Silvio Aparecido dos Santos	Gestão da criação de conhecimento na indústria criativa de software	2009	Revista de Negócios	B3
Dasuni P. Nawinna	A model of knowledge management: delivering competitive advantage to small & medium scale software industry in Sri Lanka	2011	6th International Conference on Industrial and Information Systems	A2
Hui Chen, Gillian Ragsdell, Ann O'Brien and Miguel Baptista Nunes	A proposed Model of Knowledge in the Software Industry Sector	2012	7th International Conference on Industrial and Information Systems	B3
Jacilane Rabelo. Edson Oliveira, Davi Viana, Luís Braga, Gleison Santos, Igor Steinmacher and Tatyana Conte	Knowledge management and organizational culture in a software organization - a case study	2015	8th International Workshop on Cooperative and Human Aspects of Software Engineering	B4
Marcos Antonio Gaspar, Silvio Aparecido dos Santos, Denis Donaire, Marcio Shoit Kuniyoshi and Leandro Campi Prearo	GC em empresas atuantes na indústria de software no Brasil: um estudo de práticas e ferramentas utilizadas	2016	Informação & Sociedade: Estudos	A1

Table 5. Articles' keywords

Authors	Keywords
Aurum et al. (2008)	Knowledge management; Software engineering; Software process models; KM activities; KM process enablers.
Spraggon and Bodolica (2008)	Knowledge management; Knowledge creation; Small enterprises; Computer software; Canada.
Singh (2008)	Leadership; Knowledge management; India.
Gaspar *et al.* (2009)	*Gestão do conhecimento; Indústria criativa; Indústria de software.*
Nawinna (2011)	Knowledge management; Competitive advantage; Software process; Small & medium scale; software industry.
Chen *et al.* (2012)	Knowledge management; Knowledge sharing; Software development industry; Tacit knowledge Experience.
Rabelo *et al.* (2015)	Knowledge management; Organizational culture; Competing values framework.
Gaspar *et al.* (2016)	*Gestão do conhecimento; Práticas de gestão do conhecimento; Ferramentas de tecnologia da informação; Indústria de software.*

Table 6. Articles' objective

Authors	Objective
Aurum et al. (2008)	Investigate the KM practices in the Software Engineering processes, as well as describe the KM activities and processes used in practice.
Spraggon and Bodolica (2008)	Investigate the knowledge creation process in a highly technological company from the software industry.
Singh (2008)	Investigate the relationship, as well as the impact of the leadership style in KM practice in a software industry. To reach this goal, the author investigated this practice in these companies.
Gaspar *et al.* (2009)	Analyze the techniques and methodologies present in the knowledge creation and sharing process, as well as the information technology tools made for this.
Nawinna (2011)	Investigate the knowledge capture, sharing and acquisition process with the objective of proposing a KM model able to promote competitive advantage to SME from the software industry from Sri Lanka.
Chen *et al.* (2012)	Identify the different KM aspects in the software industry.
Rabelo *et al.* (2015)	Investigate the relationship between the SECI model and the organizational culture. To achieve that, the first step was to investigate the KM practices developed by the organizations.
Gaspar *et al.* (2016)	Verify and point out the KM practices and ICT tools associated to it which are the most used in companies from the software industry field in Brazil.

Table 7. Dimensions Evaluated in KM Investigation in the PapersFound in the Systematic Review

Authors	Dimension evaluated
Aurum et al. (2008)	KM facilitators (technology, culture, leadership, and measurement) KM Activities (identification, acquisition, creation, organization, transference, application, and application) KM Systems
Spraggon and Bodolica (2008)	Organizational knowledge creation
Singh (2008)	Knowledge identification Knowledge capture Knowledge storing Knowledge sharing and spreading Knowledge application
Gaspar *et al.* (2009)	Organizational knowledge creation
Nawinna (2011)	Capture Sharing Acquisition
Chen *et al.* (2012)	Leadership Technology Culture Measurement Processes
Rabelo *et al.* (2015)	KM practices
Gaspar *et al.* (2016)	Tools Technologies KM techniques

Table 8. Research Types and Investigation Methodology used to KM Investigate in Software Industry

Authors	Type of research	Investigation method used
Aurum et al. (2008)	Case study	SECI (Nonaka & Takeuchi, 1995) Experience Factory (Basili, Lindvall, & Costa, 2001) APQC (Andersen, 1997)
Spraggon and Bodolica (2008)	Multiple-case study	The authors created a questionnaire based on the SECI model
Singh (2008)	Field research	The author used the KM evaluation tool developed by Maier and Mosley (2003)
Gaspar *et al.* (2009)	Field research	The authors created an interview script
Nawinna (2011)	Field research	The authors elaborated a questionnaire but they did not explain how
Chen *et al.* (2012)	Case study	The authors created an interview script specific for this research without a theoretical bias
Rabelo *et al.* (2015)	Case study	The authors created an interview script
Gaspar *et al.* (2016)	Field research	The authors created a questionnaire

Table 9. Data Collection Instrument, Duration of Interviews and Data Analysis

Authors	Data collection tool	Length	Data analysis
Aurum et al. (2008)	Semi-structured interview Questionnaire	Interview: 40-60 minutes Questionnaire: 60-90 minutes	The data was qualitatively and quantitatively analyzed.
Spraggon and Bodolica (2008)	Depth interview Public documentation Archive documents Depth interview	90-120 minutes	The interviews were transcribed and encoded by the Nvivo 07 qualitative software. Some questions from the interview were created in a scale format and those were analyzed and interpreted statistically.
Singh (2008)	Questionnaire	Not applicable	Arithmetic mean T test Correlation Multiple regression Cronbach's Alpha coefficient
Gaspar *et al.* (2009)	Directed interview	Not applicable	Interview analysis and interpretation
Nawinna (2011)	Survey	Not applicable	Collected data interpretation
Chen *et al.* (2012)	Semi-structured interview	60 minutes, average	Thematic data analysis (interview transcription, topic and subtopic identification and interpretation, concept map production).
Rabelo *et al.* (2015)	Semi-structured interview Observation of meeting on learned lessons	Not applicable	KM practice identification and distribution per the SECI Model.
Gaspar *et al.* (2016)	Structured questionnaire.	Not applicable	The data wasanalyzed with the aid of the Statistical Package for Social Sciences - SPSS

Table 10. Place of Data Collection, Number and Characterization of the Respondents

Authors	Data collection place	Number and characterization of the respondents
Aurum et al. (2008)	Two Australian companies from the software industry, named "company A" and "company B" in the text. The data were collected during the execution of two projects from "company A" (A1 and A2) and two projects from "company B" (B1 and B2).	Twelve respondents in each company, of those: one project leader, six software developers, two programmers, one system analyst and two consultants.
Spraggon and Bodolica (2008)	Five software development companies located in Canada.	Fifty interviews were carried out.
Singh (2008)	One Indian software industry.	331 questionnaires were answered by employees who had at least one year experience.
Gaspar et al. (2009)	Three interactive software development companies focused on leisure activities, located in the metropolitan areas of São Paulo, Campinas, and Recife.	Eight interviews were held involving consultants, system analysts, directors, team leaders, programmers, and testers.
Nawinna (2011)	58 small and medium companies from Sri Lanka.	Not clear.
Chen et al. (2012)	One software development company located in Taiwan.	21 employees involved, being: one consultant, five project managers, one knowledge manager, one network analyst and thirteen programmers.
Rabelo et al. (2015)	One software development company.	Seventeen employees, including developers, quality analysts, test analyst, project coordinators and team leaders.
Gaspar et al. (2016)	Fifteen software companies, medium and large-sized working in Brazil.	319 employees, being 67 at the position of management and 252 from the technical area.

Nawinna's article (2011), published in proceedings conference classified as A2 *Qualis*, had no quoting until this analysis date, October 2016; Spraggon and Bodolica's (2008) article was published on a B4 Journal (25), Gaspar et al.'s (2009) on a B3 (12), Rabelo et al.'s (2015) on the proceedings of B4 Conference (5), Chen, Ragsdell, O'Brien, & Nunes (2012) on the proceedings of B3 Conference (2) and Gaspar, Santos, Donaire, Kuniyoshi, & Prearo 's (2016) on an A1 *Qualis* journal. Table 5 presents the key words from the articles analyzed. The terms "knowledge management" and, in Portuguese, "*gestão do conhecimento*" were present in all articles. Relating the key words to the other search terms used, the only word which appeared was in Portuguese "*indústria de software*". Other key words used by the authors were: "KM activities", "Knowledge creation", "KM enablers", "Knowledge sharing", "small enterprises", "software process", "Software developing industry" and "*práticas de gestão do conhecimento*". Regarding the goal of the publications (Table 6), Aurum et al. (2008), Chen et al. (2012), Singh (2008), Rabelo *et al.* (2015) and Nawinna (2011) investigated KM practices and processes in the software industry. Spraggon and Bodolica (2008) investigated only the knowledge creation process, Gaspar *et al.* (2009) checked only the knowledge creation and sharing process. Gaspar*et al.*'s (2016) publication had as scope investigation KM practices, as well as their relation to the information and communication technologies (ICT). Considering the KM dimensions evaluated in Table 7, the research topics were distinct. Aurum et al. (2008) evaluated KM facilitators, activities, and systems. Spraggon and Bodolica (2008) and Gaspar et al. (2009) had as focus the knowledge creation process, while Singh (2008) investigated the identification, capture, storing, sharing, spreading and application knowledge process. Nawinna (2011) verified the capture, sharing and acquisition dimensions, Chen et al. (2012) verified leadership, technology, culture, measurement, and process; Rabelo et al. (2015) verified the KM practices and Gaspar et al. (2016) verified KM tools, technologies, and techniques. Regarding the nature of the research analyzed, 50% were qualitative research, 25% quantitative research and 25% were mixed (quali-quantitative research) techniques. Concerning the research types, Aurum*et al.* (2008), Chen *et al.* (2012) and Rabelo *et al.* (2015) carried out a case study, Spraggonand Bodolica (2008) a multiple case study and Singh (2008), Gaspar *et al.* (2009),

Table 8 brings information regarding investigation methods. It can be observed that Singh (2008) was the only one to use a questionnaire already consolidated in the literature, Maier and Mosley's (2003), to carry out the research. Aurum et al. (2008) made a synthesis of the three models - SECI, Experience Factory and APQC. Spraggon and Bodolica (2008) used the capture, sharing and acquisition dimensions, Chen *et al.* (2012) verified leadership, technology, culture, measurement, and process; Rabelo *et al.* (2015) verified the KM practices and Gaspar *et al.* (2016) verified KM tools, technologies, and techniques. Regarding the nature of the research analyzed, 50% were qualitative research, 25% quantitative research and 25% were mixed (quali-quantitative research) techniques. Concerning the research types, Aurum *et al.* (2008), Chen *et al.* (2012) and Rabelo *et al.* (2015) carried out a case study, Spraggon and Bodolica (2008) a multiple case study and Singh (2008), Gaspar *et al.* (2009), Nawinna (2011) and Gaspar *et al.* (2016) field research (Table 8). Table 8 brings information regarding investigation methods.

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However, there were no significant variations regarding the target public, being it made up of consultants, programmers, team leaders, system analysts, and directors.

CONCLUSION

This paper presented a SLR aimed to identify and analyse the methodological instruments to investigate KM within the software industry. The findings revealed both a lack of a specific instrument toward to that and the importance of the KM to create and keep the knowledge in its organizational environment intending to improvement its products and services. Furthermore, we observed that the main objective of the analyzed articles was neither the application nor the presentation of a specific instrument to investigate the KM in the software industry. The articles analyzed demonstrated that just one of them was used an instrument already consolidated in the literature, but created to be applied in companies from different area. The remaining studies used as research instruments interviews and questionnaires elaborated without a theoretical basis and addressed to investigate KM within organizations. We also observed that analyzed articles do not make clear if the researchers took place a pre-test or conceptual test of the research instrument used and the time spent to answer it. Considering the dimensions investigated, the researchers' focused, basically, to KM process, tools, technology, and practices. In most of the analyzed articles, the methodology does not clarify the time spent to answer questions. Thus, it difficult to determine if the methodological instrument application is fast or not. The authors also do not report if the respondents have had a hard time to understand the instrument's questions. Therefore, the articles analyzed do not propose a specific methodological instrument to investigate the KM within the software industry. Assuming this scenario, a methodological instrument proposal specific to aid the software development industry to investigate the KM and overcoming barriers as the need to be adapted, numerous and repetitive questions, long time to be understood and answered is very welcome.

Acknowledgement

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