Review of empirical research on knowledge management practices and firm performance

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Abstract

Purpose – *Knowledge management (KM) has emerged as one of the most discussed new management methods. Among the most debated areas in KM has been the association between knowledge and firm performance, but a lack of understanding and consensus still remains as a major issue. This paper aims to address the research gap by reviewing the empirical literature and determining how KM-based managerial and organizational practices are related with firm performance.*

Design/methodology/approach – *This study followed a systematic review procedure.*

Findings – *The findings demonstrate that utilization of KM practices is significant driver for innovation. Also, specific leadership characteristics and organizational arrangements are likely to support firm performance through more efficient and effective management of knowledge resources.*

Research limitations/implications – *This study adds to the discussion on knowledge-based view of the firm by pointing out the key organizational and managerial practices that are associated with firm performance. The results of this study also add structure to the previously scattered discussion on KM practices by synthesizing the relevant literature*

Practical implications – *Measuring KM performance is characterized by organizational complexity; this study demonstrated that innovation is a likely outcome of utilization of KM practices, but there are numerous other factors that influence the financial performance figures. Also, this study points out that organizations should pay attention to specific KM leadership attributes and organizational arrangements in order to achieve firm performance through KM.*

Originality/value – *This is the first systematic literature review on KM practices and firm performance. The results increase understanding of efficient and effective management of knowledge resources for organizational benefit.*

Keywords *Performance, Review, Empirical, Knowledge management, Knowledge management practices*

Paper type *Literature review*

1. Introduction

Nowadays, the decisive drivers for firm performance are the differences in the firms' knowledge bases and capabilities of using and developing knowledge (Grant, 1996; Kogut and Zander, 1992; Spender and Grant, 1996). The pioneering academic discussion addressing this phenomenon revolved mainly around the concept of knowledge management (KM) (Davenport and Prusak, 1998; Nonaka and Takeuchi, 1995; Von Krogh, 1998). Generally speaking, KM represents the processes and practices conducted in a firm with the aim of unleashing its intellectual potential by improving the effectiveness and efficiency of the management of organizational knowledge resources (Gold *et al.*, 2001; Lee and Choi, 2003; Heisig, 2009; Andreeva and Kianto, 2012).

Empirical evidence on the association between KM and firm performance outcomes has developed into two avenues of research: First, the literature on *knowledge processes* and firm performance has dealt with how the activities, such as knowledge acquisition, sharing and utilization, which typically take place in firms even without systematic managerial intervention, are related with various firm performance outcomes (Chen

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et al., 2010; Lee *et al.*, 2013). Some researchers have offered different labels for these processes, such as KM capability (Ho, 2008; Hsiao *et al.*, 2011) and KM capacity (Lin and Kuo, 2007). The other stream of literature has discussed conscious organizational and managerial practices, with an intention to achieve organizational goals through efficient and effective management of the firm's knowledge resources (Andreeva and Kianto, 2012; Foss and Michailova, 2009; Kianto *et al.*, 2014). In this study, these practices are referred as *KM practices*, following the likes of Andreeva and Kianto (2012) and Kianto *et al.* (2014). This study is situated solely in the second avenue of research.

Previous studies have reviewed some areas of KM literature. Heisig's (2009) study of 160 different KM frameworks is one of the most comprehensive reviews done within this domain of literature. To mention some further reviews, Alavi and Leidner (2001) examined conceptual foundations and research issues in KM systems literature, Chauvel and Despres (2002) recapped the thematic aspect of KM survey research, Chen and Chen (2005) reviewed approaches related to KM performance evaluation, Choy *et al.* (2006) similarly summarized the criteria for KM performance measurement, Mehrizi and Bontis (2009) clustered the area of academic KM research based on the constructs of KM research models, Ragab and Arisha (2013) categorized different branches of KM research and Tzortzaki and Mihiotis (2014) studied how the theory revolving around KM has developed over the years. In addition, some review papers have concentrated on specific industries or firm categories, such as Durst and Edvardsson (2012), who examined KM within small- and medium-sized companies. Despite the wealth of KM reviews, none has yet reviewed the literature on knowledge-based organizational and managerial practices and firm performance. This review is highly sought after, as a recent study among more than 200 KM experts worldwide concluded that the lack of understanding about the association between KM and firm performance is still one of the major shortages within KM research (Perez-Arrau *et al.*, 2014; Heisig, 2014).

To address this gap within the literature, the current paper systematically reviews the empirical research on KM published in peer-reviewed academic journals. The special purpose of this study is to advance the current understanding on how knowledge-based organizational and managerial practices (i.e. KM practices) are associated with various firm performance outcomes. This review proceeds by gathering the relevant information together, re-arranging it to several focus categories and finally determining how the KM practices in different categories are associated with different firm performance outcomes. This paper is the first one to analyse the previous literature with this approach.

This review is important because it adds structure to the highly dispersed literature on knowledge-based organizational and managerial practices. This challenge is common for KM literature in general, as it is overlaps with many other domains, such as human resource management (HRM) and information technology (IT) (Ragab and Arisha, 2013). The lack of common vocabulary and definition persists as another great challenge for KM practice research. While some authors have chosen to discuss "KM practices" (Andreeva and Kianto, 2012), others have offered different terms. As a result, another goal of this review is to synthesize the literature on knowledge-based organizational and managerial practices.

This paper has the following structure: The next section discusses the concept of KM practices before moving on to specify the research approach and literature selection process. After a presentation of the results, the remaining sections include a discussion and concluding remarks.

2. Knowledge management practices

The academic discussion addressing the use and development of knowledge resources for organizational benefit has built around KM, but overlaps with other research domains, such as HRM and IT (Ragab and Arisha, 2013), and has been published in various non-KM

journals (Ma and Yu, 2010). Therefore, KM discussion is characterized by its dispersity. Literature on KM practices makes no exception, as it is a complex avenue of research without an established vocabulary regarding the practices that are conducted with the aim to unleash a firm's intellectual potential by improving the effectiveness and efficiency of the management of organizational knowledge resources. For instance, Andreeva and Kianto (2012) labelled the knowledge-based management activities "knowledge management practices" and conceptualized them as "management practices aimed to support efficient and effective management of knowledge for organizational benefit" (p. 620). Another terminological choice within reviewed literature has been KM "enablers", which are conceptualized as either resource-based or practice-based factors within an organization that are critical success factors for KM (Chauvel and Despres, 2002; Lee *et al.*, 2008; Migdadi, 2009; Yang *et al.*, 2009). Furthermore, researchers have discussed KM "enabler factors" (Theriou *et al.*, 2011), KM "capabilities" (Cohen and Olsen, 2015), "organizational facilitators" (Donate and Guadamillas, 2011), "organizational enablers" and "critical success factors" (Kamhawi, 2012), KM "resource inputs" (Kim and Hancer, 2010) and KM "infrastructure" (Lee *at al.*, 2012) within the previous studies with similar purposes. Moreover, several utilized financial and non-financial performance measures add to the complexity of the literature.

This study defines KM practices *as the conscious organizational and managerial practices intended to achieve organizational goals through efficient and effective management of the firm's knowledge resources*. This definition is strongly influenced by the works from Andreeva and Kianto (2012), Foss and Michailova (2009) and Kianto *et al.* (2014), as well as key inclusion criteria for the papers that will be included within this review.

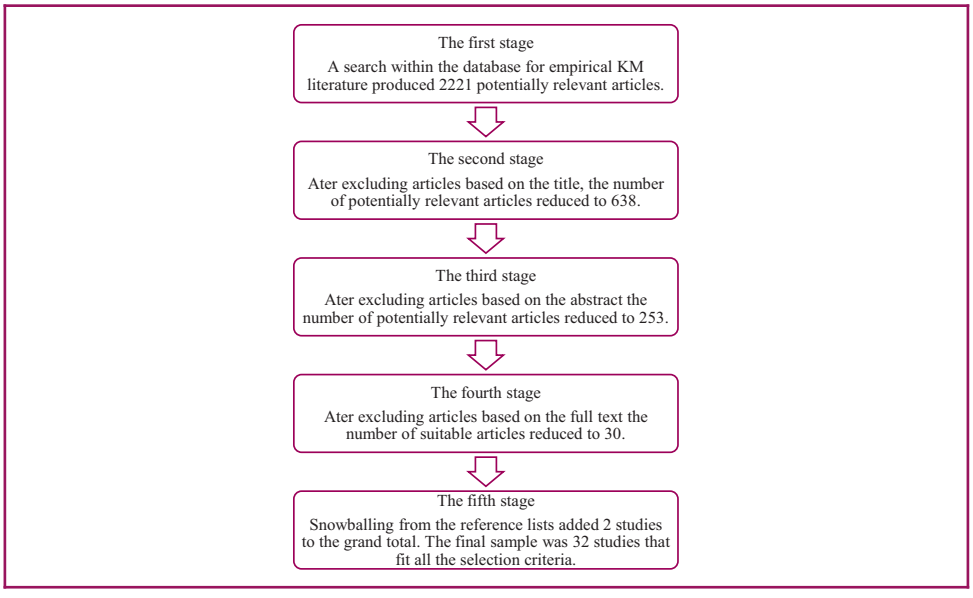
To add structure and synthesize the existing relevant research, this paper categorizes KM practices and determines how differently focused practice categories are associated with various firm performance outcomes. Heisig's (2009) categorization of the KM literature is used as the template. The categorization consists of four blocks; human-oriented factors (i.e. culture, people and leadership); organization-oriented factors (i.e. processes and structures); technology-oriented factors (i.e. infrastructure and applications); and management processes-oriented factors (i.e. strategy, goals and measurement). Heisig's categorization is based on a thorough review of 160 KM research models and represents the main themes of the critical success factors of KM. It can be expected that the KM practices fall into similar categories. However, if not, the categorization may require some revision.

Next, this study moves on to discuss the research approach and the literature selection process.

3. Research approach

This paper makes a systematic review of KM literature on the association between KM practices and firm performance. A systematic review, inspired by Bakker (2010), Crossan and Apaydin (2010) and Tranfield *et al.* (2003), was preferred as the approach to recap the literature, as it is replicable, transparent and provides a clear structure for the literature selection process. The scope of this review was delimited to empirical research papers that have used a managerial practice approach to KM and firm performance, as defined in the previous chapter. Also, only papers published in peer-reviewed empirical journals written in English were included, as they were presumed to provide the most suitable coverage on the issue studied. Appendices 2 and 3 present the inclusion and exclusion criteria. The literature selection process involved several stages, as depicted in Figure 1. Each stage had a purpose to either increase or decrease the number of relevant articles according to a pre-defined criteria. The first stage, a computerized search for the body of literature, was carried out in March 2015. The abstract and citation database Scopus (www.elsevier.com/online-tools/scopus) was the preferred tool to carry out the search because of its touted accuracy and excellent coverage of academic literature (Falagas *et al.*, 2008). During the

Figure 1 The literature selection process



subsequent stages, the articles were excluded based on titles (Stage 2), abstracts (Stage 3) and full texts (Stage 4). Eventually, in the fifth stage, reference lists of the remaining articles were searched to find key articles which were not recovered during the earlier stages in the literature selection process.

3.1 The first stage – the initial search

The initial search for literature took place in March 2015. To find empirical articles related to KM practices and firm performance outcomes, the following search terms were coupled in the literature search:

- "knowledge management" and "questionnaire";
- "knowledge management" and "survey";
- "knowledge management" and "performance"; and
- "knowledge management" and "case study".

The search strings were targeted to article titles, abstracts and keywords. The central objective of the literature search was to gather a wide variety of empirical KM literature instead of delimiting the search too much, as the terminology related to the targeted articles was considered not yet established. Moreover, only peer-reviewed journal articles written in English were included as candidates, as that strategy was assumed to guarantee a minimum quality and readability of the papers. The search within the database covered only the subject area "Business, Management and Accounting" because it was anticipated to have the highest managerial approach, and therefore provide the most suitable literature for the review.

Having discussed the delimitations, it is equally important to define what sort of firm performance metrics were considered as valid for the purposes of the current review. There is no established way of measuring organizational KM performance, and previous literature has used both financial and non-financial metrics. For instance, some of the previously used firm performance metrics have included different innovation performance measures, financial ratios, customer satisfaction and employee satisfaction. Therefore, this review includes papers with both financial and non-financial approaches to measure firm

performance. Taking into account all the predetermined criteria, the first search produced 2,221 potentially relevant articles.

3.2 The second stage – publications excluded based on the title

In the second stage of the literature selection process, the articles were screened by title. Those that did not fulfil the pre-defined inclusion criteria were eliminated from the further stages. After article title limitation, the number of potentially relevant articles was reduced to 638.

3.3 The third stage – publications excluded based on the abstract

The third stage put all the remaining articles under abstract examination. Based on key information of the papers, the shortlist of potentially relevant articles was reduced to 253.

3.4 The fourth stage – publications excluded based on the full text

The full texts of the qualified studies were carefully read to type in the summarized findings (Appendix 1) and finalize the shortlist of relevant articles. As it turned out to be, the majority of excluded articles in this stage focused on knowledge processes (e.g. knowledge acquisition, creation and sharing) instead of KM practices. After full text examination, the number of relevant articles reduced to 30.

3.5 The fifth stage – snowballing from the reference lists

Finally, the last stage was devoted to locating potentially suitable publications among the reference lists of the remaining articles. Snowballing increased the number of relevant articles to 32, which was the final number of the included studies.

4. Findings

4.1 Descriptive findings

Table I showcases the distribution of the reviewed papers after assigning them into Heisig's (2009) categorization of human-oriented, technology-oriented, organization-oriented and management process-oriented sub-categories. It is noteworthy for the reader that an article was placed into more than one sub-category if it addressed several KM practices. The assignment of the home categories was carried out without much hesitation, which validates also the applicability of Heisig's categorization over KM practices literature. Appendix 4 showcases the categories and the related attributes.

Although the classification was easy in most cases, there were also some tricky instances. For example, codification practices, discussed by Cohen and Olsen (2015), were difficult to assign to a single category; ultimately, it was placed into the technology-oriented category, as the authors conceptualized it as a predominantly technology-based practice. Lee *et al.* (2008) combined strategy and leadership orientations under the same practice category, and throughout the text gave equally attention to both aspects; therefore, their approach was assigned to both human- and management process-oriented sub-categories. Further, organizational infrastructure in Migdadi's (2009) article seems first to be a resource-oriented factor rather than one that could be described as a KM practice, but the author defined it as an activity of establishing "a set of roles and organizational groups". Clearly, it therefore falls into the organization-oriented sub-category. Also, knowledge protection was discussed in the papers by Hurmelinna-Laukkanen (2011) and Inkinen *et al.* (2015). Its assignment to the management process sub-category was justified, as the authors discussed the strategic use of knowledge protection for knowledge sharing and innovation. Finally, communities of practice (Borzillo and Kaminska-Labbé, 2011) and knowing communities (Harvey *et al.*, 2015) clearly looked to be organization-oriented tasks, but both studies discussed management's role in steering the communities; thus, they were considered as leadership-oriented practices under the human-oriented KM practice sub-category.

Table I Distribution of the reviewed papers into Heisig's categorization

Author and year	*Human-oriented*	*Technology-oriented*	*Organization-oriented*	*Management processes-oriented*
Sarin and McDermott (2003)	Team leader characteristics			
Soto-Acosta *et al.* (2014)	Commitment-based HR practices			
Lin and Kuo (2007)	HRM			
Khalifa *et al.* (2008)		KM systems		
Lee *et al.* (2008)			A special unit in charge of KM	Strategy and leadership
Migdadi (2009)	HRM, motivational aids, training and education, management leadership and support	Information technology	Organizational infrastructure	Strategy and purpose
Chen and Huang (2009)	Strategic HRM practices			
Theriou and Chatzoglou (2009)	Best HRM practices			
Yang *et al.* (2009)		IT support		
Kim and Hancer (2010)	Incentive, senior management commitment	Information technology	Delegated organization	
Steinfield et al., 2010		ICT use on human capital		
Camelo-Ordaz *et al.* (2011)	HRM			
Hurmelinna-Laukkanen (2011)				Knowledge protection
Kuo (2011)	HRM			
Liao (2011)	HRM control systems			
Theriou *et al.* (2011)	Leadership			KM strategy
Borzillo and Kaminska-Labbé (2011)	Management of communities of practice			
Donate and Guadamillas (2011)	Knowledge-centred HR practices, knowledge-oriented leadership			
Andreeva and Kianto (2012)	HRM practices	ICT practices		
Chien and Tsai (2012)	Learning mechanisms			
Donate and Canales (2012)				Knowledge strategy as a managerial instrument
García-Morales *et al.* (2012)	Transformational leadership			
Kamhawi (2012)	Rewards, training, management support	IT		KM strategy
Lee *et al.* (2012)	Top-management support, promotion	IT support	Decentralization of power	
Cao *et al.* (2013)		KM system		
Chuang *et al.* (2013)	Organizational incentive	IT support		
Abdullah *et al.* (2013)				KM strategy
Birasnav (2014)	Transformational and transactional leadership			
Cohen and Olsen (2015)		IT support for KM, codification practices		
Harvey *et al.* (2015)	Knowing community management			
Inkinen *et al.* (2015)	Knowledge-based HRM practices, Learning mechanisms, KM supportive supervisory work	KM supportive IT practices	KM supportive work organizing	Knowledge protection, strategic management of knowledge and competence
Vanhala and Ritala (in press)	HRM practices			

As these results suggest, the synthesis of the literature on knowledge-based organizational and managerial practices (i.e. KM practices) is plausible, as it settles well into the Heisig's general categorization of KM research focus areas.

It also noteworthy that the discourse on KM practices and firm performance has grown since the first publications in 2011. A number of empirical papers peaked in 2011-2012 and have tended to lower in frequency since then. However, as Figure 2 demonstrates, the dotted trend line is still positive. Geographically, the avenue of empirical research on KM practices and firm performance has been focused on Asia – especially Taiwan – and Europe, while few studies focused on North America or the Arabian Peninsula (Appendix 1). Surprisingly, this finding is quite controversial against the earlier KM reviews, as Chauvel and Despres (2002) found that survey research between 1997 and 2001 was especially concerned with Europe and North America, and Serenko and Bontis (2004) pointed out that North America and Europe were leading the research productivity ranking in KM and IC until 2004; therefore, it seems that Asian research has closed the previously existing gap and even overtaken the pole position in terms of the volume of empirical KM practice research.

Figure 3 shows that the human-oriented studies have been the focal point of KM practice research. In effect, 21 articles of 33 examined how culture, people and leadership inspired firm performance outcomes. The second most popular category was that of technology-oriented KM practices, as examined in 12 research papers. Organization-oriented and management process-oriented KM practices have attracted considerably fewer studies, with the tallies being seven and eight, respectively.

Figure 2 Number of empirical KM practice papers in 2003-2015

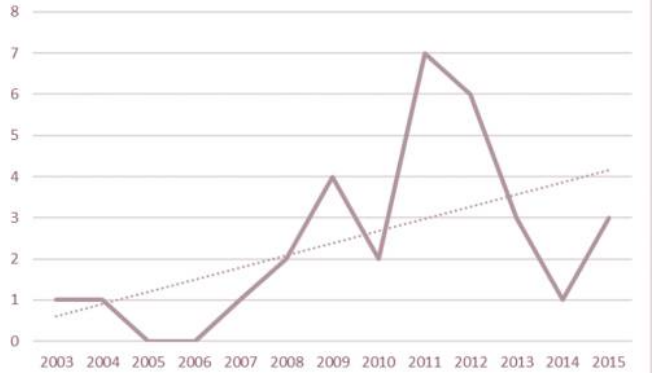
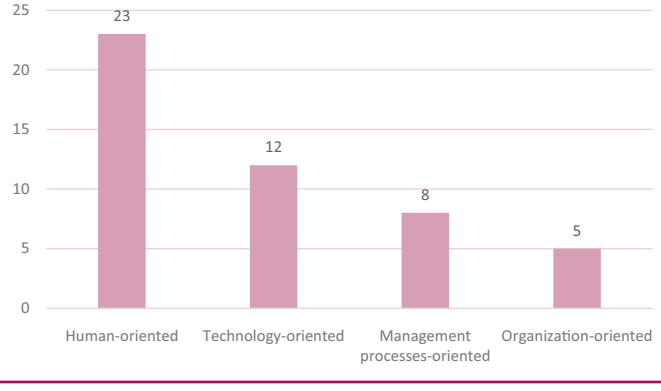


Figure 3 Share of papers focusing on each KM practice category



Next, this papers moves on to the findings related to KM practices and firm performance outcomes. Using the categorization, all four orientations are discussed separately.

4.2 Knowledge management practices and firm performance

To determine the current knowledge on the association between KM practices and firm performance, the relevant literature was systematically reviewed. Appendix 1 summarizes the findings of this systematic literature review. Following the categorization of the literature, this stage of the paper dives into each category separately in a quest to point out the firm performance-enhancing KM practices within them.

4.2.1 Human-oriented knowledge management practices. Within the human-oriented category, this study was able to identify two specific knowledge-based practices that researchers have argued are significant factors in terms of firm performance: knowledge-based HRM practices and KM leadership.

4.2.1.1 Knowledge-based human resource management practices. The association between HRM practices and firm performance was one of the most studied avenues within the selected literature. In summary, empirical research has provided evidence that HRM practices can be used to influence the company's bottom-line directly (Andreeva and Kianto, 2012; Inkinen *et al.*, 2015; Kim and Hancer, 2010; Liao, 2011) or indirectly by, for example, activating knowledge processes and creating capabilities within the organization (Soto-Acosta *et al.*, 2014; Theriou and Chatzoglou, 2009; Lin and Kuo, 2007; Kuo, 2011), by strengthening employees' affective commitment (Camelo-Ordaz *et al.*, 2011), by building impersonal trust to add value to relationships (Vanhala and Ritala, in press) and by increasing the utilization of IT support for KM (Chuang *et al.*, 2013).

More accurately, the literature strongly suggested that HRM practices were associated especially with innovations. Some studies pointed out that the utilization of HRM practices increased the knowledge processes, such as acquisition, sharing and creation, which had an impact on innovation capability (Kamhawi, 2012), administrative and technical innovations (Chen and Huang, 2009), product or service innovation (Kuo, 2011) and technological knowledge and product and process innovations (Soto-Acosta *et al.*, 2014). In addition, HRM practices were noticed to increase innovations and improve innovativeness by having a positive influence on the affective commitment of employees (Camelo-Ordaz *et al.*, 2011) and impersonal trust (Vanhala and Ritala, in press). Moreover, Chuang *et al.* (2013) wrote that incentives gave a push for more active utilization of IT for KM, which was associated with various performance outcomes including innovations. In a slightly different fashion, Inkinen *et al.* (2015) suggested that knowledge-based compensation practices were directly linked with Finnish firms' innovation performance in terms of products and services, production methods and process, management and marketing practices and business models. Finally, Liao (2011) specified that a top-down imposed HRM control system wherein employees were responsible for their actions regardless of the results, coupled with personalization KM strategy, was the most likely approach to build overall success including innovativeness.

4.2.1.2 Knowledge management leadership. KM leadership was another human-oriented KM practice that stood out from the literature. One of the reviewed papers even highlighted leadership as the sole KM factor that had a significant effect on the firm's KM effectiveness, the number of the firm's markets and the firm's total profitability (Theriou *et al.*, 2011). Further evidence suggested that a transformational mode of leadership including idealized influence, intellectual stimulation, inspirational motivation and individualized consideration, increased the firm's relative performance compared to its competitors through improved knowledge acquisition (Birasnav, 2014) and financial performance through learning and innovation (García-Morales *et al.*, 2012). Also, a participating leadership mode and initiation of goal structure were noted to be favourable features for supervisory work, as they increased knowledge application and learning, as well as speed to market and innovation (Sarin and McDermott, 2003). Further, the management's involvement in communities of

practice was noticed to increase knowledge expansion and incremental innovations (Borzillo and Kaminska-Labbé, 2011), and steered the firm towards its innovation goals by ensuring that a right mix of expertise was involved in knowledge creation, by connecting correct audiences to new knowledge, and by ensuring that community members got extra-organizational exposure and knowledge updates on a regular basis (Harvey *et al.*, 2015).

Top-management support was associated also with an increase in knowledge processes, which resulted in higher organizational learning and the capability to develop new products or services, predict business or risks and cope with new information regarding markets (Lee *et al.*, 2012). In addition, knowledge-oriented leadership, in terms of empowering features and promoting trust and learning, increased the effect that knowledge exploration and exploitation practices had on product, method and procedure innovations (Donate and Guadamillas, 2011).

On a slightly different note, some papers showcased that successful KM leadership required structural arrangements and other organizational practices as supporting factors. Lee *et al.* (2008) argued that a well-drafted KM strategy and a special KM unit were highly important supporting factors, while Kamhawi (2012) pointed out the roles of well-functioning technological support, a relevant reward system, training regime and KM strategy.

Controversially, Kim and Hancer (2010) did not find senior management commitment to be a significant predictor of organizational effectiveness, unlike incentives, delegated organization and IT.

4.2.2 Technology-oriented knowledge management practices. Regarding technology-oriented KM practices, this review included only those KM studies which focused on technology utilization for the efficient management of knowledge. Another avenue within KM research has viewed IT as a resource (Heisig, 2009), i.e. something that a firm owns or possesses.

The reviewed papers did not typically directly associate technology-oriented practices with financial performance figures, but rather suggested alternative ways of performance measurement. Similar to knowledge-based HRM practices, researchers have found technology-oriented KM practices to support innovations. For instance, the supply chain-related KM system utilization increased agile and innovative firm performance (Khalifa *et al.*, 2008), while IT support for collaboration, communication, information search, real-time learning, simulation and prediction was associated with a firm's innovativeness (Yang *et al.*, 2009). Researchers also noted that IT support was a main facilitator of knowledge acquisition, creation and sharing, which pushed firms to improved performance through innovations and organizational agility (Kamhawi, 2012), and that KM supportive IT practices were significantly and directly related with the innovation performance of the firm (Inkinen *et al.*, 2015). In addition, the increased utilization of IT support for KM steered firms to general success, increase in market share, improved growth rate and better profitability and innovativeness (Chuang *et al.*, 2013).

Moreover, there were various combinations of practices and resources which had explanatory power over the association between technology-oriented KM practices and firm performance. For instance, Andreeva and Kianto (2012) pointed out that information and communication technology (ICT) support to organizational practices did not automatically lead to improved financial results, but the positive link was established when ICT support was coupled with a motivational aid through HRM practices. Further, IT support was noted to be one of the main facilitators of knowledge acquisition, creation and sharing, which pushed firms to improved performance through innovations and organizational agility (Kamhawi, 2012). In similar fashion, Lee *et al.* (2012) argued that creative organizational learning was a product of IT support and top management's support of knowledge processes (i.e. acquisition, application, conversion and protection). Also, it was

found that KM systems needed a strategic fit with the firm's business processes to help to accomplish a portfolio of tasks (Cao *et al.*, 2013).

Another line of evidence referred to a direct relationship between technology-oriented KM practices and firm performance. In effect, Kim and Hancer (2010) noted that IT support constituted the most important KM resource (the others were senior management commitment, incentives and delegated organization) input in relation to a company's effectiveness. Steinfield *et al.* (2010) found that ICT use to enhance human capital in the means of online recruiting, information supply and support for group project teams influenced positively both firm's exposure and performance in the market. Also, IT support for KM and codification practices (converting tacit knowledge into explicit) that built on human capital KM capabilities were directly linked with financial and market performance potential (Cohen and Olsen, 2015).

4.2.3 Organization-oriented knowledge management practices. Because of the low number of studies, the organization-oriented category was clearly less informative than the other three categories. However, two themes were yet pointed out. First, two papers discussed the advantages that could accrue from purposefully establishing organizational roles and groups. Lee *et al.* (2008) wrote that a firm should establish a special unit in charge of KM, as it was significantly associated with firm performance in a learning and growth perspective, an internal process perspective and a customer perspective. Migdadi (2009) continued on the same track by stating that a systemic creation of organizational roles and groups was especially relevant for customer satisfaction, but slightly less significant for performance in terms of employee development.

Second, with respect to the delegation of authority, two studies argued that it was not significantly associated with firm performance outcomes. Specifically, Kim and Hancer (2010) stated that delegation of authority could not predict organizational effectiveness, while Lee *et al.* (2012) found that decentralization of power was an insignificant factor over organizational performance in terms of the capability to develop new products or services, predict business or risks or cope with new information of markets.

4.2.4 Management process-oriented knowledge management practices. The articles under the management process-oriented category dealt mostly with KM-related strategic issues. Generally speaking, the firms were found to perform better if all the necessary strategic KM elements existed, e.g. the concept of KM for top management, a breadth of knowledge strategy objectives and KM tools and implementation support elements, such as cultural principles, leadership and HR practices (Donate and Canales, 2012).

Strategic KM practices were especially associated with innovations. In effect, Inkinen *et al.* (2015) wrote that strategic management of knowledge and competence was among the most important predictor of Finnish firms' innovation performance. They found that strategic planning, implementation and updating activities, which considered knowledge as the main component, were efficient for addressing the strategic knowledge gaps and generating innovations. Further, human-oriented KM strategy was linked with highly rated hotels with traits such as the perceived importance of tacit knowledge and efficient sharing of it, encouragement for individual-level creativity and innovativeness, development of human capital and knowledge acquisition through human channels (Abdullah *et al.*, 2013). Also, strategic use of knowledge protection was positively related with more open knowledge sharing, which increased the likelihood of better innovation performance (Hurmelinna-Laukkanen, 2011). In addition, KM strategy, combined with a learning- and knowledge-friendly culture that promoted innovation, as well as business process reengineering capabilities, had a positive influence over organizational agility, which led to the firm's better general success, market share, growth rate, profitability and size (Kamhawi, 2012).

The literature also found that strategic KM was associated with non-financial performance outcomes of the firm. For instance, strategy and leadership, as a combined factor, was

associated with the non-financial performance of an organization in a learning and growth perspective, an internal business process perspective and a customer perspective (Lee *et al.*, 2008). Also, KM strategy and purpose were capable of predicting the level of the firm's good external relationships and were only statistically marginally associated with general organizational success (Migdadi, 2009). Theriou *et al.* (2011) even pointed out that there was not any significant association between KM strategy and the firm's KM effectiveness, market performance or total profitability.

5. Discussion

The aim of this paper was to recap the empirical KM literature, to analyse the association between KM practices and firm performance outcomes. This paper took off by briefly introducing the background and objective of the current study and by explaining the concept of KM practices. Then, the paper thoroughly presented the design of the study and the literature selection process, followed by the results based on the reviewed articles.

The empirical literature was first arranged into four categories of human-oriented, technology-oriented, management process-oriented and organization-oriented studies. The categorization was adopted from Heisig (2009), who successfully arranged 160 KM research models based on it. The KM practice literature settled smoothly into the four categories, which further confirmed the relevance of the categorization. Then, each of the categories was analysed separately to find the typical associations between each category and different firm performance outcomes. Overall, the results suggested that knowledge-based organizational and managerial practices are highly influential factors for firm performance outcomes; therefore, this study also supports the dual message of the knowledge-based theory of the firm, which argues that the success of firms is up to both their current knowledge *and also how they use and develop it* (Grant, 1996; Kogut and Zander, 1992; Spender and Grant, 1996).

This review by and large confirmed the general understanding that highly knowledge-intensive HRM practices are an important vehicle to manage organizational knowledge resources; thus, these findings add to the discussion about the role of HRM practices in KM (Hislop, 2003; Scarbrough, 2003; Wong, 2005). Especially, this review suggested that innovation performance can be significantly boosted through investment in HRM practices. Also, as HRM typically deals with management of the organization's employees (Foot and Hook, 2008), the results of this study can be linked to the arguments of intellectual capital research about the importance of human capital for firm performance (Bontis *et al.*, 2007; Cabello-Medina *et al.*, 2011; Hormiga *et al.*, 2011).

Leadership has been theorized as a key catalyst for organizational culture, in terms of leading by example, creating a trustful and respectful atmosphere, and installing a creative culture (Holsapple and Singh, 2001). It has been also argued that successful KM requires approval and penetration throughout the organization, with the leadership taking the main responsibility (DeTienne *et al.*, 2004); therefore, KM leadership is seen as an important driver for successful KM (Holsapple and Joshi, 2000). This review pointed out the importance of KM leadership for firm performance and found that influential KM leaders were especially those who were participative, inspirational, supportive and capable of delegating tasks to others (Sarin and McDermott, 2003; Singh, 2008; García-Morales *et al.*, 2012; Birasnav, 2014). In addition, knowledge-oriented leadership, in terms of empowering features and promotion of trust and learning, increased the effect that knowledge exploration and exploitation practices had on product, method and procedure innovations (Donate and Guadamillas, 2011). Managerial intervention was seen also important in terms of knowledge production and innovation output of professional communities, i.e. communities of practices, as they set relevant goals and were able to piece together the experts and new knowledge (Borzillo and Kaminska-Labbé, 2011; Harvey *et al.*, 2015). Furthermore, this review pointed out that supporting factors of a KM strategy, a specialized

KM unit, technological support, a reward system and a training regime were very helpful to increase the influence of KM leadership over firm performance outcomes.

Taking in the relevant empirical evidence, KM leadership is indeed a crucial task in deriving organizational benefits out of its knowledge base. However, the individuals in the leading roles must have the necessary attributes to fill in the position. For instance, the ability to delegate tasks to, for example, a specialized KM unit and other organizational members makes people more involved and builds competence around KM. In turn, participation among other organizational members generates trust between organizational agents and increases the leader's understanding of how KM is conducted throughout the organization. Finally, strategic steering of professional communities keeps the focus on business relevant issues and inspires useful knowledge and new ideas, while a motivational push to learn and try new things empowers employees to be involved.

Technology has been discussed as a key organizational KM enabler (Alavi and Leidner, 2001; Davenport and Prusak, 1998). For instance, it has been demonstrated that technology has enabled knowledge codification (turning tacit knowledge into explicit) (Nonaka and Takeuchi, 1995) and accelerated new knowledge application through workflow automation (Alavi and Leidner, 2001). This review is in line with Kianto *et al.* (2014), who wrote about the synergy between KM practices and intellectual capital, and strongly suggested that firms should invest in competences and practices that are needed for technology-oriented utilization and development of knowledge. In particular, technology-oriented KM practices have been linked with innovations (Chuang *et al.*, 2013; Inkinen *et al.*, 2015; Kamhawi, 2012; Khalifa *et al.*, 2008; Yang *et al.*, 2009). Technology support of KM has opened an era of much improved data analysis, enabled a combination of knowledge from various sources to allow the formation of new knowledge, offered quick and location-independent access to knowledge and provided a new reality in terms of communication and interaction (Kankanhalli *et al.*, 2003). These traits seem to be very likely contributors for innovations.

Strategic KM practices typically deal with constructing a KM strategy for the firm, monitoring and measuring the firm's knowledge resources, and benchmarking the business environment for their developmental needs (Dalkir, 2005; Skyrme and Amidon, 1997). Within the management-oriented category of KM practices, strategic KM practices were among the factors most strongly associated with innovations. In detail, researchers have pointed out the following as key strategic activities for KM success:

- strategic planning, implementation and updating activities that consider knowledge as the main component (Inkinen *et al.*, 2015);
- the strategic use of knowledge protection (Hurmelinna-Laukkanen, 2011); and
- an understanding of the crucial role of tacit knowledge, the efficient sharing of it, encouragement for individual-level creativity and innovativeness, development of human capital and knowledge acquisition through human channels (Abdullah *et al.*, 2013).

Also, some non-financial performance outcomes were argued to be likely outcomes of strategic KM practices. These included the non-financial performance of an organization in a learning and growth perspective, in an internal business process perspective and customer perspective (Lee *et al.*, 2008) and in external relationships (Migdadi, 2009).

The prominent KM literature has argued that strategic KM practices are crucial for firm performance, as they help to turn the attention to the most valuable intangible assets and leverage on them to build competitive advantage over their rivals (Barney, 1991; Conner and Prahalad, 1996; Grant, 1996; Zack, 1999). In addition, the edge that strategic KM practices can provide for the focal firm lies within the improved decision-making regarding the utilization and development of its knowledge base aligned with the firm's strategic aims (Zack, 1999; Grant, 1996; Kogut and Zander, 1992; Spender and Grant, 1996; Von Krogh

et al., 2001). The reviewed empirical literature confirmed the strong association and specified that strategic KM practices are especially useful in terms of recognition, utilization and development of knowledge for innovation.

The basic approach of organization-oriented KM issues is to improve the firm performance typically by facilitating the division of labour and responsibilities and also coordinating the work (Mintzberg, 1992). For example, the delegation of authority and decision-making has been demonstrated as a catalyst for flexibility and innovativeness in firms (Davenport and Prusak, 1998), and the use of cross-functional teams has been argued to accelerate knowledge creation (Nonaka and Takeuchi, 1995). The empirical literature has partially confirmed and questioned those theories: establishing organizational roles and groups, e.g. a special unit for KM, was indeed seen to influence firm performance in a learning and growth perspective, in an internal process perspective (Lee *et al.*, 2008) and in a customer perspective (Lee *et al.*, 2008; Migdadi, 2009). However, the delegation of authority was deemed irrelevant in regard to organizational effectiveness (Kim and Hancer, 2010) and the capability to develop new products or services, predict business opportunities and risks or cope with new information or markets (Lee *et al.*, 2012). Therefore, the results have suggested that firms do not achieve significant gains by decentralizing the authority and decision-making, but instead may be better off by establishing expert units that have well-defined goals and responsibilities.

6. Conclusions

All in all, this study gathered the relevant empirical literature on KM practices, which has thus far examined how the utilization of these organizational and managerial practices was associated with different firm performance outcomes. First and foremost, this review pointed out that human-oriented, technology-oriented and management process-oriented KM practices were associated with innovation. Especially, knowledge-based HRM practices, technology-oriented practices for KM and strategic management of knowledge were touted as significant drivers for innovation performance of the focal firm. While the KM practices to innovation link-up was persuasively demonstrated, this review found less proof of the bearing on the financial performance of the firm; thus, this study points out that, while KM practices are indeed integral drivers for new knowledge and innovation within a modern firm, much deeper understanding of the organizational complexity and utilization of more sophisticated research models are needed to manifest the association between KM practices and financial performance outcomes.

Moreover, this study pointed out that leadership in KM requires a modern approach that appreciates people for their knowledge and intellectual qualities. A modern leader spends less time in the ivory tower and gets more involved to create a knowledge-friendly and trustful organizational culture, and gently reshapes the knowledge base to match the firm's general strategic goals. Such a leader also is open to share the KM leadership with a devoted specialist unit.

Finally, the organization-oriented studies indicated that the creation of specific roles and units was a more efficient firm performance driver than generic power decentralization.

6.1 Limitations of the research and findings

The first limitation of this paper regards the methodological choice. This systematic review may have missed some literature due to the rigorous literature selection process. The search for the literature was conducted only through the abstract and citation database Scopus, while the inclusion of other databases may have produced slight differences in the shortlist of articles. Also, the selected keywords might have caused some potentially relevant articles to be missed. Another limiting factor was that the literature selection process left room for personal preferences; exclusion based on titles, abstracts and full texts followed carefully pre-set criteria, but the reviewer's personal judgments can also make a difference.

The results of this study could have been analysed with a different approach. For instance, a comparison of different industries could have yielded interesting outcomes. Also, Heisig's (2009) categorization of KM literature influenced the results of this study. Another type of categorization might have altered the results slightly, even though the achieved results showcased strong consistency.

6.2 Implications for researchers and practitioners

Considering everything discussed in this study, it can be argued that *conscious and intentional organizational and managerial practices* (i.e. KM practices) enable firms to achieve organizational goals through efficient and effective management of the firm's knowledge resources. This remark adds weight to the fundamental arguments of the knowledge-based view of the firm (Grant, 1996; Kogut and Zander, 1992; Spender and Grant, 1996). Especially, the results of this study extend the discussion on utilization of HRM to KM (Hislop, 2003; Scarbrough, 2003; Wong, 2005), KM leadership (DeTienne *et al.*, 2004; Holsapple and Joshi, 2000; Holsapple and Singh, 2001), technological support to KM (Alavi and Leidner, 2001; Davenport and Prusak, 1998; Kankanhalli *et al.*, 2003) and KM strategy (Barney, 1991; Conner and Prahalad, 1996; Dalkir, 2005; Grant, 1996; Kogut and Zander, 1992; Skyrme and Amidon, 1997; Spender and Grant, 1996; Von Krogh *et al.*, 2001; Zack, 1999).

This study was successful in adding structure to the KM literature, which typically overlaps with many other domains (Ragab and Arisha, 2013). Particularly, the study contributed to the discussion on KM practices by clarifying the vocabulary and definitions, as well as drawing together a representative sample of literature from various academic journals.

This study provided several managerial implications. KM performance is difficult to measure with financial indicators because the firm's financial performance is reliant on multiple factors and is characterized by organizational complexity. However, this study suggested that innovation performance was strongly associated with the utilization of KM practices. In particular, it is a performance measure that should be used to follow and determine the performance of knowledge-based HRM practices, technology-oriented practices for KM and strategic management of knowledge.

Filling in managerial positions (for KM) is a crucial task for knowledge-intensive firms. Managers should seek to employ leaders who have suitable personalities and skill sets for a participative style of leadership that inspires, supports and generates a culture of trust and learning.

Further, managers can influence firm performance by establishing roles and units within the organization, to support knowledge creation, problem solving and innovation output. Such roles and units could be centres of excellence, communities of practice and cross-functional teams.

6.3 Possible areas for future research

Future review papers could take a different approach than the current review. One potential option would be to have a more open-minded approach and analyse the literature without theoretical groundings. That could inspire unexpected and valuable findings. Also, the authors can significantly influence the review within the literature selection stage by using different inclusion and exclusion criteria, as well as various abstract and citation databases. Future studies could also analyse relevant articles based on industry-level differences in utilization of KM practices for firm performance, as that sort of information is typically available.

Association between KM practices and firm performance has been studied mainly with a survey strategy; thus, the results typically do not discuss extremes. To enrich the avenue of research, future research should focus more on case studies because that approach would provide important information about the firms that have done really well or poorly with

KM. Also, case studies could yield information about, for example, the best HRM practices for cultivating organizational KM, the most important KM leadership qualities for various positions within the organization and the strategic KM practices that help firms to stay focused on the most valuable strategic activities. Another future study direction could be to use recursive research models and judge whether firm performance was associated with higher utilization of KM practices, which again support firm performance outcomes.

As demonstrated, human-oriented studies have dominated the KM practice research avenue. Future research should provide more evidence on other avenues to add balance to the literature.

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Note: *Indicates a source that was included in the systematic review.

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Further reading

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Table AI The summarized results of the systematic literature review

Author(s), year of publication	*Target country of the study*	*Industry*	*Included KM practices*	*Research objective(s)*	*Sample size*	*Methodology*	*Summarized findings*	*Citation count*
Sarin and McDermott (2003)	USA	High-technology	*Team leader characteristics*	To study how leadership characteristics in new product development teams affect learning, knowledge application, team performance, degree of innovation and speed to market	229	Regression analysis	Participating leadership mode and initiation of goal structure were noted to be important team leader characteristics, as they increased knowledge application, learning, speed to market and innovation	369
Lin and Kuo (2007)	Taiwan	Financial	*HRM:* appraisals, staffing, training and development, workflow and rewards and compensation	To investigate the relationships between HRM, organizational learning, KM capability and market share and profit ratio	553	Structural equation modeling	HRM supported profit margin, sales, customer satisfaction and human resource performance, through organizational learning and KM capability (learning and improving, knowledge sharing, creation and capturing)	88
Khalifa *et al.* (2008)	China	Multi-industry	*KM systems:* enterprise portals, competitive intelligence systems, supply chain management systems and customer relationship management systems	To explain both direct and indirect effects of KM systems utilization on innovativeness, organizational agility and organizational performance (not specified)	114	Structural equation modelling	KM system utilization, especially supply chain related, increased likeliness to agile and innovative firm performance, which was reflected also to firm's profitability and market share	46
Lee *et al.* (2008)	Taiwan	Multi-industry	*Strategy and leadership* *Special unit in charge of KM*	To examine the association between KM enablers and the firm's non-financial performance outcomes (output of the learning and growth perspective, the internal business process perspective and performance of the customer perspective)	151	Regression analysis	Strategy and leadership and establishing a special unit in charge of KM were significantly associated with firm performance in learning and growth perspective, internal process perspective and customer perspective	5
Chen and Huang (2009)	Taiwan	Multi-industry	*Strategic HRM practices:* training, staffing and participation	To examine the role of KM capacity in the relationship between strategic HRM practices and administrative and technical innovation performance	146	Regression analysis	Training, staffing, and participation practices supported administrative and technical innovations through improved knowledge acquisition, while compensation practices gave a push for knowledge sharing and innovation performance	491

(*continued*)

Table AI

Author(s), year of publication	*Target country of the study*	*Industry*	*Included KM practices*	*Research objective(s)*	*Sample size*	*Methodology*	*Summarized findings*	*Citation count*
Migdadi (2009)	Saudi Arabia	Multi-industry	*Management leadership and support* *Information technology* *Strategy and purpose* *Organizational infrastructure* *Motivational aids* *Training and education* *HRM*	To assess the relationships between critical success factors for KM and performance outcomes (systematic knowledge activities, employee development, customer satisfaction, good external relationship and organizational success)	418	Regression analysis	Among the various examined relationships, the critical success factors for KM were positively associated with both customer satisfaction and organizational success. Motivational aids and training and education were the practices which provided the strongest support for firm's success	66
Theriou and Chatzoglou (2009)	Greece	Tertiary sector	*HRM practices:* employment security, selective hiring, use of teams and decentralization, compensation and incentives, extensive training, employee involvement and internal communication arrangements, internal career opportunities, job descriptions, harmonization and employee health and safety	To empirically examine the links between HRM practices, KM, organizational learning and capabilities and firm performance (financial: corporate profitability and market performance, non-financial: organizational commitment)	242	Structural equation modeling	HRM and corporate profitability, market performance and organizational commitment were linked through higher levels of learning, accumulation of knowledge and organizational capabilities	27
Yang *et al.* (2009)	Taiwan	Liner shipping	*IT support*	To identify the crucial KM enablers and examine their impact on firm performance (innovativeness, financial performance and customer service performance)	83	Regression analysis	IT support for collaboration, communication, information search, real-time learning, simulation and prediction were associated with innovativeness, but not with financial performance	38
Kim and Hancer (2010)	USA	Hospitality	*Senior management commitment* *Incentives* *Delegated organization* *IT*	To examine the influence of KM resource over organizational effectiveness	179	Regression analysis	Utilization of IT had the greatest impact on organizational effectiveness, as it enabled quicker access to critical information, assisted in decision-making, and enabled more effective and efficient handling of situations. Also, KM supportive incentive system and a knowledge sharing culture increased effectiveness	10

(*continued*)

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Author(s), year of publication	*Target country of the study*	*Industry*	*Included KM practices*	*Research objective(s)*	*Sample size*	*Methodology*	*Summarized findings*	*Citation count*
Steinfield *et al.* (2010)	Denmark, Sweden	Biotechnology	*ICT use on human capital*	To explore how ICT utilization, social capital, and means of accessing knowledge resources are related to market performance and market exposure	58	Regression analysis	The level of social capital, use of ICT for human capital, and the ease of access to knowledge were all associated with market exposure. Also, personal relationships and ICT applications improved company's visibility and overall market performance	29
Borzillo and Kaminska-Labbé (2011)	France	Chemicals	*Communities of practice*	To study the role of communities of practice in the context of organizational innovation	5	A four-year longitudinal case study	Communities of practice produced more radical innovations during the periods when managers voluntarily withdrew aside, as the community operated more casually. During the step-in periods, the output was typically knowledge expansion and incremental innovations, as the managers brought in discussions about client problems and other knowledge objectives	5
Camelo-Ordaz *et al.* (2011)	Spain	Innovative industries	*HRM:* intra-firm growth opportunities for employees, recruitment and selection, appraisal and reward systems, compensation practices, training and development and team building	To examine how HRM practices contribute to knowledge sharing and innovation performance	87	Structural equation modelling	HRM practices, which foster the mutual long-term exchange relationships, increased employees' affective commitment and innovation	81
Donate and Guadamillas (2011)	Spain	Technology	*Knowledge-oriented leadership Knowledge-centred HR practices:* interdisciplinary teamwork, planned job rotation, collection of employee proposals, delegation of responsibility, performance related pay, internal and external company training	To analyse how organizational factors such as cultural values, leadership and HR practices influence the knowledge exploration and exploitation practices and innovation	111	Regression analysis	Knowledge-oriented leadership moderated the effects of the exploration and exploitation practices over innovation, while HR practices moderated the relationship between exploitation practices and innovation	87

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Author(s), year of publication	*Target country of the study*	*Industry*	*Included KM practices*	*Research objective(s)*	*Sample size*	*Methodology*	*Summarized findings*	*Citation count*
Hurmelinna-Laukkanen (2011)	Finland	Multi-industry	*Knowledge protection*	To investigate the role of knowledge protection in relation to collaborative innovation endeavours	242	Regression analysis	Knowledge protection was positively related to knowledge sharing, which again increased the likelihood of better innovation performance. Collaboration, networking, and knowledge sharing were the antecedents of research and development, innovation and knowledge creation	25
Kuo (2011)	Taiwan	Technology	*HRM:* staffing, performance appraisals, reward and compensation, training and development and employee participation	To find a way of improving organizational performance (product or service quality, product or service innovation, employee attraction and retention, customer satisfaction management and employee relations) through learning, knowledge and innovation	213	Structural equation modelling	HRM was associated with the firm performance outcomes through organizational learning, administrative and technological innovation and KM capability (knowledge learning and acquiring, knowledge sharing and knowledge creating and improving)	29
Liao (2011)	Taiwan	Manufacturing	*HRM control systems:* Behaviour control: the degree to which standards and procedures are programmed top-down, performance is measured using superior surveillance of subordinate behaviour, appraisal is based upon improvement over time and feedback is provided frequently Output control: the degree to which performance is measured via results, evaluations are based upon preset targets, and rewards are tied to performance Input control: the degree of emphasis placed on staffing procedures and the opportunity provided for training and development	To examine whether the relationship between KM strategy and firm performance (overall success, market share, growth rate, profitability and innovativeness) is contingent on HRM control systems	111	Regression analysis	Behaviour control coupled with personalization KM strategy was the most likely approach to build overall success, market share, growth rate, profitability and innovativeness. Also, codification KM strategy combined with output control was associated with improved firm performance	12

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Table AI

Author(s), year of publication	*Target country of the study*	*Industry*	*Included KM practices*	*Research objective(s)*	*Sample size*	*Methodology*	*Summarized findings*	*Citation count*
Theriou *et al.* (2011)	Greece	Multi-industry	*Leadership* *KM strategy*	To investigate the effect of KM effectiveness on firm performance (the number of the firm's markets and in the firm's total profitability)	109	Structural equation modelling	Leadership was the only factor that had a significant effect on KM effectiveness and firm performance. KM strategy had a positive but statistically insignificant influence	24
Andreeva and Kianto (2012)	Finland, Russia, China	Multi-industry	*HRM practices*: compensation and performance review. *ICT practices:* support for decision making, utilization, monitoring and updating of KM systems, sharing of data, knowledge and expertise, supporting the daily work	To examine the link between KM practices, firm competitiveness and financial performance	234	Structural equation modelling	HRM practices had a positive direct effect on competitiveness and financial performance. HRM practices also mediated the relationship between ICT practices and financial performance. ICT practices had a direct positive link to firm's competitiveness, but direct negative link to financial performance, which was however turned around when combined with HRM practices	63
Chien and Tsai (2012)	Taiwan	Hospitality	*Learning mechanisms:* experience accumulation, knowledge articulation and knowledge codification	To examine how knowledge resources and learning mechanisms influence dynamic capabilities and firm performance (quality of service, level of sales, current profitability, sales growth rate and overall store performance)	132	Structural equation modelling	Learning mechanisms were needed to reap the benefits of firm's knowledge resources in terms of improved dynamic capabilities and firm performance	22
Donate and Canales (2012)	Spain	Multi-industry	*Knowledge strategy as a managerial instrument*	To study the effect of KM tools, KM implementation support practices and KM strategy on business performance and innovation (process and product)	111	Clustering	The firms were found to perform better if all the necessary strategic KM elements existed, e.g. the concept of KM for top-management, breath of knowledge strategy objectives and KM tools and implementation support elements, such as cultural principles, leadership and HR practices	24

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Author(s), year of publication	*Target country of the study*	*Industry*	*Included KM practices*	*Research objective(s)*	*Sample size*	*Methodology*	*Summarized findings*	*Citation count*
García-Morales *et al.* (2012)	Spain	Multi-industry	*Transformational leadership*	To analyse the influences of transformational leadership on firm performance (return on equity, return on assets, return on sales, market share, growth of sales) through the dynamic capabilities of organizational learning and innovation	168	Structural equation modelling	Transformational leadership influenced positively learning and innovation which in turn steered firms to higher financial performance	158
Kamhawi (2012)	Bahrain	Multi-industry	*Management support* *IT* Rewards *KM strategy* *Training*	To craft and test a framework for the link between KM and performance in organizations (comparative figures in terms of general success, market share, growth rate, profitability and size)	167	Structural equation modelling	Management support, IT use, and rewards were positively associated with knowledge acquisition, creation and sharing. Further, knowledge acquisition, creation and sharing together with organizational culture and availability of training supported innovation. Finally, innovation, KM strategy and business process reengineering capabilities had a combined positive affect over organizational agility, which resulted better performance	10
Lee *et al.* (2012)	South-Korea	Multi-industry	*Structure:* power decentralization. *Management:* top-management support, promotion. *Technology:* IT support	To analyse the relationship between KM infrastructures, knowledge process capabilities, creative organizational learning and firm performance (the capability to develop new products/services, predict business or risks, the improvement of capability to cope with new information of markets)	105	Structural equation modelling	Top-management support and IT support were positively associated with the level of knowledge processes, which supported creative organizational learning and firm performance. Decentralization of power was not a significant factor.	46
Abdullah *et al.* (2013)	Malaysia	Hospitality	*KM strategy*	To understand how different KM strategies influence the innovativeness and creativeness of human capital and the competitive advantage of the firms (hotel star rating)	7	Multiple-site case study	Human-oriented KM strategy was linked with highly rated hotels. Those hotels were characterized by the perceived importance of tacit knowledge and efficient sharing of it, encouragement for individual-level creativity and innovativeness, development of human capital, and knowledge acquisition through human channels	0

(*continued*)

Table AI

Author(s), year of publication	*Target country of the study*	*Industry*	*Included KM practices*	*Research objective(s)*	*Sample size*	*Methodology*	*Summarized findings*	*Citation count*
Cao *et al.* (2013)	The United States	High-tech	*KM system:* a tool that manages organizational knowledge and is used by individuals and organizations to perform and facilitate tasks	To investigate the impacts of the task–technology fit and KM systems utilization on individual and firm performance (accomplishment of a portfolio of tasks)	3	Multiple-site case study	IT was found that KM systems needed a strategic fit with the firm's business processes to help to accomplish a portfolio of tasks	5
Chuang *et al.* (2013)	Taiwan	High-tech	*KM with IT support* *Organizational incentive*	To study the firm performance (success, market share, growth rate, profitability, innovativeness) effects of KM with information technology support (KMIT)	119	Structural equation modelling	Organizational KM enabling factors of incentives, structure and culture increased the utilization of IT support for KM, which lead firms to general success, increase in market share, improved growth rate, better profitability and innovativeness.	9
Birasnav (2014)	Bahrain	Service	*Transformational leadership* *Transactional leadership*	To examine the various relationships between transformational and transactional leadership, KM process and firm performance (compared to organizations of the same kind)	119	Regression analysis	Transformational leadership style, in terms of idealized influence, intellectual stimulation, inspirational motivation and individualized consideration, had a positive association with knowledge acquisition and the firm's relative performance to its competitors	16
Soto-Acosta *et al.* (2014)	Spain	Multi-industry, SMEs	*Commitment-based HR practices:* training and development, work–life balance, selection process, career paths, fair promotion, performance appraisal and employee involvement in decision-making	To analyse the factors affecting Web Knowledge Sharing (WKS), and the impact of WKS on organizational innovation and the moderating effect of IT skills on this relation	535	Structural equation modelling	HR practices supported technological knowledge and product and process innovations by its influence on knowledge sharing	8
Cohen and Olsen (2015)	South Africa	Hospitality	*Codification practices*: documentation, integration, and cataloguing of knowledge. *IT support for KM*	To develop hypotheses consistent with underlying logics of universalistic, complementarity and contingency theories and to empirically test these hypotheses to determine which is best supported	112	Structural equation modelling	IT support for KM and codification practices (converting tacit knowledge into explicit), that built on human capital KM capabilities, were directly linked with financial and market performance potential	9

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Author(s), year of publication	*Target country of the study*	*Industry*	*Included KM practices*	*Research objective(s)*	*Sample size*	*Methodology*	*Summarized findings*	*Citation count*
Harvey *et al.* (2015)	Canada	Videogaming	*Knowing community management*	To show how a firm can nurture and engage with its knowing communities to fuel the front end of innovation	1	A single-case study	Managers had an important role in assigning scripted internal and external activities and steering the community activities in a direction that benefited the firm's business goals: scripted internal activities ensured a right mix of expertise in knowledge creation and that new knowledge reached correct audiences, while the scripted external activities ensured that the community members got extra-organizational exposure and updated their knowledge on regular basis	2
Inkinen *et al.* (2015)	Finland	Multi-industry	*KM supportive supervisory work* *Knowledge protection* *Strategic management of knowledge and competence* *Knowledge-based HRM practices* *Learning mechanisms* *KM supportive IT practices* *KM supportive work organizing*	To examine the association between various KM practices and the firm's innovation performance	259	Structural equation modelling	Strategic management of knowledge and competence, knowledge-based compensation practices (one of the HRM components) and KM supportive IT practices were associated with the Finnish firms' innovation performance. The other KM practices seemed to be less significant predictors of the firm's innovation performance	0
Vanhala and Ritala (in press)	Finland	Multi-industry	*HRM practices:* training and development, performance evaluation schemes, participation in decision-making, career opportunities, communication and purposeful job design	To examine the mediating role of impersonal trust in the relationship between HRM practices and innovativeness	715	Structural equation modelling	HRM practices increased employees' affective commitment and innovativeness	0

Appendix 2

Table AII The inclusion criteria

No.	*Criteria*	*Reason for inclusion*
1.	Empirical articles	These papers provide empirical evidence on the relationship between KM practices and firm performance
2.	Peer reviewed journal articles	These papers guarantee the minimum quality of the relevant studies
3.	Articles written in English	These papers add to the transparency and replicability of the review
4.	Financial firm performance measures	These papers provide with understanding on how KM practices are associated with the firm's financial performance
5.	Non-financial firm performance measures	These papers provide with understanding on how KM practices are associated with the firm's non-financial performance
6.	Business, management and accounting	The literature from this focus area has the highest probability for managerial contribution

Appendix 3

Table AIII The exclusion criteria

No.	*Criteria*	*Reason for exclusion*
1.	Articles about KM processes	These papers do not discuss about the managerial and organizational practices.
2.	Theoretical papers	These papers do not provide the needed empirical evidence related to KM practices and firm performance.

Appendix 4

Table AIV Heizig's categorization of critical success factors for KM

Factor	*Main characteristics*	*Attributes*
Human-oriented factors	Culture, people and leadership	Corporate culture, knowledge culture, knowledge oriented culture, knowledge sharing culture, culture and power, culture of learning, cultural and social factors, value system, values and norms, values, employees, (organizational) personnel, skills, employees' skills, employees' knowledge and experience, personal characteristics, personal knowledge, personal knowledge capabilities, human, human resources, motivation and qualification, knowledge leadership, leadership and support, top management support, senior management support and knowledge-oriented management
Technology-oriented factors	Infrastructure and applications	Information and communication technology, technological infrastructure, technological systems and KM technologies
Organization-oriented factors	Processes and structures	Organizational processes, process organization, business processes, organizational structures, organizational design and organizational infrastructure
Management process-oriented	Strategy, goals and measurement	Goals, organizational goals, concrete and measurable goals, vision, knowledge-based strategy, strategic behaviour, mission, long-term vision and medium and short strategies, policy, planning, knowledge controlling, knowledge controlling and learning, metrics, measurement criteria, KM-performance measurement and performance indicators

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