Knowledge Management and Organizational Performance: An Exploratory Survey

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Abstract

Ninety organizations were surveyed in an exploratory investigation of the organizational impact of knowledge management (KM). A search of the literature revealed 12 KM practices. Results indicated that these KM practices were directly related to organizational performance which, in turn, was directly related to financial performance. In addition, a different set of KM practices were associated with specific value disciplines (i.e., customer intimacy, product development and operational excellence). Interestingly, a significant gap exists between the KM practices that firms believe to be important and those that turned out to be directly related to organizational performance. The implications of this study are significant for both practitioners and academics. Suggestions are offered for future work in this area.

1. Introduction

Over the past 15 years, knowledge management (KM) has progressed from an emergent concept to an increasingly common function in business organizations. As evidence of its maturity as an area of academic study, a host of journals devoted to KM and intellectual capital management have been created (e.g., Journal of Knowledge Management, International Journal of Intellectual Capital and Learning, Journal of Knowledge Management Practice, Electronic Journal of Knowledge Management, Knowledge Management Research & Practice, Journal of Intellectual Capital, International Journal of Knowledge Management, Knowledge Management, Knowledge Management Review, and Knowledge and Process Management).

As might be expected for a still emerging discipline, little quantitative empirical research has been published [24]. The bulk of the published work in the KM area comprises conceptual frameworks and theoretical models. Extant empirical research relies primarily on a small number of descriptive exploratory qualitative case studies [e.g., 21, 31, 39, 46]. Although this body of work contains valuable and insightful concepts and frameworks that have helped to define and shape the KM discipline, it is time to begin testing and advancing this work using more precise methods.

Perhaps the most significant gap in the literature is the lack of large-scale empirical evidence that KM makes a difference to organizational performance. While survey research is beginning to appear in KM journals [e.g., 31, 41], the bulk is descriptive [11]. Of the few survey studies that examine relationships between KM and other factors [e.g., 43] only a few articles (discussed below) empirically investigate the relationship between KM and organizational performance.

Our objective for the research reported here was to conduct an exploratory quantitative survey to be able to create a broader set of evidence regarding the relationship between KM and organizational performance. While performance itself is a useful metric, the ultimate measure of value is the ability to support an organization's competitive strategy. This especially applies to KM, as knowledge has been considered an organization's most strategic resource [63]. We therefore administered a survey asking respondents to describe their organization's involvement in KM practices, the strategic focus of their KM initiatives, several intermediate performance measures aligned with strategic value disciplines [58], financial performance measures, and several contextual factors addressing characteristics about its competitive environment. Rather than merely describe the state of practice in our respondents' organizations, we investigated the relationships among KM practices, intermediate and financial outcomes, and the organization's competitive environment.

Our results indicate that KM practices are positively associated with organizational performance as generally suggested by the KM literature, both qualitative [21, 39, 46] and quantitative [14, 19, 36, 51, 53]. More specifically we found that KM practices are directly related to various intermediate measures of strategic

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organizational performance (viz., customer intimacy, product leadership, and operational excellence), and that those intermediate measures are, in turn, associated with financial performance. Based on this evidence, our assumption (whose further support is beyond the scope of this paper) is that as long as KM practices enhance intermediate organizational performance, positive financial performance will result [36].

2. Research model

The assumption underlying the practice of KM is that by locating and sharing useful knowledge, organizational performance will improve [21]. KM has been linked positively to non-financial performance measures such as quality [45], innovation [25], and productivity [32]. In reality, one might expect KM to influence many different aspects of organizational performance simultaneously.

Most of the recent surveys examining the performance impacts of KM have aggregated several different measures of impact or performance. Gold et al [27] examined the contribution of "knowledge infrastructure" (information technology, organization culture, and organization structure) and knowledge processing capability (i.e., the ability to acquire, convert, apply and protect knowledge) on several dimensions of organizational effectiveness. They found a strong and significant relationship between both knowledge infrastructure and knowledge processing with organizational effectiveness, measured using a broad set of non-financial outcomes (e.g., innovation, coordination, responsiveness, ability to identify market opportunities, speed to market, and process efficiency). They did not examine the relationship to financial performance. Mohrman et al. [44] extended the notion of organizational effectiveness to include financial measures. They surveyed 10 companies and established a weak positive relationship between the extent to which the organizations created and exploited knowledge and overall organizational performance, including financial metrics. However, by aggregating a broad set of financial and non-financial metrics, the strength of the relationship may have been reduced. Most of the remaining surveys we identified used a similar approach of aggregating financial and non-financial metrics to measure performance [e.g., 14, 19, 36, 52]. Refer to Appendix A for a summary of articles that examine the relationship between KM and organizational performance.

With regard to the impact of KM, financial and non-financial outcomes are distinct constructs [53]. Changes to organization practices in general, and KM in particular, do not necessarily result in changes to financial performance [31], KM, rather, affects a set of intermediate capabilities that, in turn, should affect financial performance [36]. Our research model (Figure 1) proposes that KM practices will be positively associated with a set of intermediate outcomes that we call "organizational performance", and organizational performance will be positively associated with financial performance. Our primary research question is: Is the extent to which an organization engages in particular KM practices positively related to organizational performance, and is organizational performance, in turn, positively related to financial performance? We also were interested in learning if there was a direct relationship between KM practices and financial performance. Should these relationships prove to hold, we were interested in knowing which specific KM practices had the greatest relationship with organizational performance.

In identifying KM practices as antecedents to organizational performance, we attempted to include factors (e.g., knowledge processing behaviors, management practices, and organization culture) that are similar to those identified by Gold et al [27], Morhman et al [44] and others, yet maintain clarity regarding our research question. Our objective was to address the KM-performance issue directly. We were less interested in the detailed technological, socio-cultural, or structural mechanisms by which KM is supported or enhanced, and focused instead on the perceived quality and extent of KM practices and how they related to outcomes. In doing so, we hoped to more clearly show the existence (or lack thereof) of a relationship between KM practices and performance outcomes.

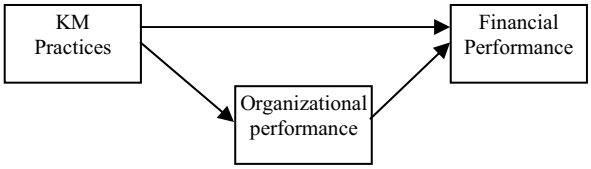

Figure 1. Research model

The following sections describe the constructs of our model and the survey items used to operationalize them.

2.1. KM practices

We define KM practices as "observable organizational activities that are related to knowledge management". We identified four key dimensions of KM practice from the literature that appear to relate to performance: 1) the ability to locate and share existing knowledge, 2) the ability to experiment and create new knowledge, 3) a culture that encourages knowledge creation and sharing, and 4) a regard for the strategic value of knowledge and learning. The literature to support these dimensions follows.

According to Davenport and Prusak [21], KM is focused on processes and mechanisms for locating and sharing what is known by an organization or its external

stakeholders. The ability to share internal best practices is important to overall organizational performance [54], and exploiting external knowledge is crucial in driving new product innovation [61] and to organization performance in general [52]. To this end, we have included items to measure the extent to which the organization is able to identify internal sources of expertise, transfer best practice throughout the organization, and exploit external knowledge of stakeholders such as customers.

Culture is perhaps the most influential factor in promoting or inhibiting the practice of KM [20, 36]. Specifically, organizations that value their employees for what they know, and reward employees for sharing that knowledge create a climate that is more conducive to KM. We therefore included items to measure these aspects of organizational culture.

Organizational learning may be the most strategically valuable dynamic capability [56]. Learning is the process by which knowledge comes into being and is enhanced over time, and is therefore intimately associated with KM. Organizational performance requires not only exploiting what is known, but also exploring new domains of knowledge to create opportunities for future exploitation [38]. Organizations that enjoy knowledge superiority today may find themselves at a competitive disadvantage in the future if their competitors are more capable of learning within similar domains [64]. We therefore included items to measure the extent to which the organization experimented and learned about customers, markets, products and services.

Following Barney [3], a strategic resource should result in strategies that produce greater value than those of competitors. Taking the knowledge based view, the knowledge resource should similarly be linked to value-creating strategies [7, 63]. To that end, knowledge should be considered as a central strategic resource within the strategic planning process and its creation and use explicitly mapped to some notion of value [17]. Taking a strategic view also requires benchmarking knowledge resources against those of competitors ([63]. To capture explicitly this link between KM practices and strategic value, we included items to measure the extent to which knowledge was included in the strategic planning process, knowledge was benchmarked against competitors, and knowledge was explicitly mapped to value creation. We also measured the extent to which the organizational unit responsible for KM was perceived to be creating value for the organization.

In total, we identified twelve KM practices, each having been suggested elsewhere as being important for effective KM. These are listed in Appendix B. We used a five-point Likert-type scale to ascertain the extent to which an organization was actively engaged in each of these KM practices.

2.2. Organizational performance

The potential for KM to create competitive advantage is positively linked to organizational performance [51]. Tracey and Wiesema [58] proposed three "value disciplines" or strategic performance capabilities, each offering a path towards competitive advantage. *Product leadership* represents competition based primarily on product or service innovation. *Customer intimacy* represents competition based on understanding, satisfying and retaining customers. *Operational excellence* represents competition based on efficient internal operations. We chose to link KM practices to these three indicators of strategic organizational performance. O'Dell et al. suggest that organizations implement KM practices often to improve one or more of these three value disciplines [47] We included items that measured the extent of product and service innovation, quality, customer satisfaction and retention, and operating efficiency, relative to other organizations in the respondent's industry (Appendix B).

2.3. Financial performance

To the extent that organizations are able to excel in one or more value disciplines, they should realize competitive advantage and positive financial performance [58]. We included two items for financial performance, one measuring return on assets or equity and the other profitability, both relative to other organizations in the respondent's industry (Appendix B).

2.4. Contextual influences

According to the contingency theory school, an organization's environment can be a significant influence on performance [33, 34, 57]. Environments that are overly complex, uncertain or dynamic may hinder learning [33]. The more complex, uncertain or ambiguous the environment, the more organizations must rely on intellectual resources and KM capabilities [42]. To control for environmental differences across industries, we included items addressing rate of industry growth, competitive change and intensity, and technology change and predictability. We also controlled for other contextual factors including age of organization, size of organization, revenue relative to industry, share of market relative to industry, organization structure, and whether the organization was private or public.

3. Research method

We developed a survey to test the research model. All our measures including performance measures were based on respondents' perception. Although this is a limitation

of this research, such measures are often used and are acceptable in research (see [10, 27, 55]). The survey was piloted with two groups of knowledge managers – one based in Canada and one based in the US. These managers assessed the survey in terms of its content, terminology, length and clarity. We then validated the survey with a group of executives attending an executive development program at a leading North American Business School. The final survey was launched on the Business School's web site. An e-newsletter was then sent to 1,500 executives who had recently attended one of the School's executive programs. They were notified of our research project and invited to complete the survey. We received 106 responses. Of these, 16 non-profit firms were removed, as the financial performance indicators did not apply. The final sample size was 90. The response rate (about 7%) was lower than hoped and likely due to a number of factors including incorrect email addresses, deletion of unsolicited email, and/or lack of interest in the topic of KM given that the e-newsletter was untargeted. Nevertheless, we believe that sample is valid. It consists of firms from Canada, USA and Australia representing 10 different industry sectors. Revenues ranged from $2M to $10B and the age of the firms ranged from 2-187 years with employees ranging from 30 to over 300,000. Respondents were mid-level managers and senior executives.

3.1. Data analysis

The final sample of 90 was checked to see if the data for KM practices, organizational performance and final performance indicators were missing. Less than 5% of the cases had data missing for one or two of their indicators. In addition, the missing data appeared random. Thus, we decided to retain those cases with mean value substitution. The normality of the data was also checked using SPSS. SPSS was also used to calculate reliability, correlation and other descriptive statistics.

We used the partial least squares (PLS) approach to test our model as it has several advantages. PLS has the ability to handle research models with formative constructs, relatively small sample sizes and does not require multivariate normality distributions for the underlying data. With PLS, the psychometric properties of the scales used to measure constructs are tested and the strengths and direction of the pre-specified relationships are analyzed simultaneously (for overview on PLS see [2, 13, 23]) using a combination of principal components analysis, path analysis, and regression [62]. PLS is also ideally suited to the early stages of theory development and testing [2, 12], as is the case with this research.

4. Discussion of results

4.1 KM practices

Table 1 shows the basic statistics of the responses regarding KM practices (listed in decreasing order of mean response), organizational performance and financial performance. Table 1 also reports the reliability of the items used to measure KM practices. Reliabilities were not measured for the formative measures organizational performance and financial performance. Reliability for the KM Practices was 0.88, well above the accepted level for exploratory research (.70).

Table 1. Means and standard deviations of key measures

Item	Mean	SD	α
KM Practices			.88
KP1: Knowledge is made a part of strategic planning	4.31	.87	
KP5: Employees are valued for what they know	4.27	.72	
KP4: Identifies internal sources of expertise	4.19	.98	
KP6: Experiments/learns regarding customers and markets	4.17	.92	
KP7: Experiments/learns regarding products and services	4.16	.75	
KP8: Experiments/learns regarding operations and technology	4.08	.87	
KP9: Encourages and rewards knowledge sharing	3.63	1.08	
KP11: Exploits external knowledge	3.56	1.03	
KP2: Benchmarks knowledge versus competitors	3.43	1.0	
KP12: KM group provides value	3.22	1.24	
KP10: Best practices are transferred within the organization	3.15	1.19	
KP3: Knowledge strategy maps knowledge to value creation	3.13	1.13	
Organizational Performance (OP) … see Note 1			Note 3
Product Leadership			
•Innovation	3.10	1.02	
•Quality	4.11	.75	
Customer Intimacy			Note 3
•Customer Satisfaction	3.82	.81	
•Customer Retention	3.92	.90	
Operational Excellence			N/A
•Operating Costs	2.99	1.13	
Financial Performance (FP) … see Note 2			Note 3
ROA/ROE	3.64	.91	
Profitability	3.75	.88	

Note 1: Organizational performance was formed by combining three constructs – product leadership, customer intimacy and operational excellence. Product leadership was formed by combining innovation and quality. Customer intimacy was formed by combining customer satisfaction and customer retention. Operational excellence was measured by operating costs.
Note 2: Financial performance was formed by combining two constructs – ROA/ROE and profitability.
Note 3: These constructs are formative (as opposed to reflective) so alphas were not calculated

Overall responses were strong regarding the extent to which respondent organizations made knowledge a part of strategic planning, valued employees for what they know, and identified internal sources of expertise; thus on average, the respondent firms tended to find value in employee knowledge. They tended to experiment and

learn about customers, products/services and internal operations and technology by encouraging and rewarding knowledge sharing. They also tended to look outside their organizations as well, both for benchmarking their knowledge against competitors, and to exploit external knowledge such as that held by customers. Firms were less actively engaged in KM practices to transfer best practices internally and develop strategies for mapping knowledge to value creation. Overall, the unit responsible for providing KM was rated only slightly better than "fair". For all KM practices, however, there was sufficient variance to provide interesting findings regarding the relationship between practice and performance. The overall KM practice score ranged from 3.13 to 4.31 out of a total score of 5 indicating that respondents perceived that their firm's engagement in KM practices was "good" on average.

4.2. Structural research model

Figure 2 illustrates the primary structural model. The overall extent to which the respondent organizations engaged in the set of KM practices was significantly ($p<.01$) and positively related to overall organizational performance. Organizational performance, in turn, was significantly ($p<.01$) and positively related to financial performance. There was no significant direct relationship between KM practices and financial performance. The data provided strong support for the overall research model. Based on the non-significant relationship between KM practices and financial performance, we conclude that organizational performance *fully mediates* the overall relationship; that is, KM practices enable organizational performance which enables financial performance much as the literature would predict.

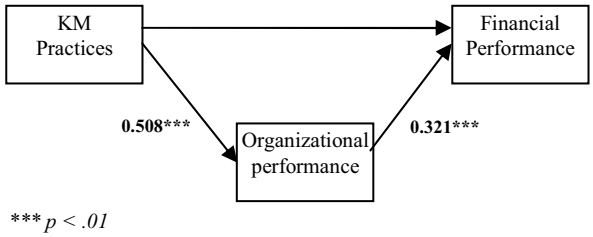

Figure 2. Research model results

Each of the contextual factors (as described earlier) was entered into the primary research model individually in order to control for any possible effects due to these factors. Two context factors were found to be significantly related to organizational performance (i.e., market share and revenue – both measured relative to the industry) but none of the context factors had significant interaction terms indicating that they did not moderate the relationship between KM practices and organizational performance. The fact that the primary research model held across a wide variety of organizational contexts is encouraging and suggests its robustness.

4.3. Value disciplines

In order to understand the linkage between KM practices and organizational performance in greater detail, we tested three sub-models – one for each of the strategic value disciplines (Figures 3). In each case, the outcome paralleled that of the overall model – that is, KM practices related significantly and positively to each of the value disciplines and each value discipline related significantly and positively to financial performance. The fact that the overall model linking KM practices to organizational performance to financial performance held over all value disciplines provides further evidence of its robustness.

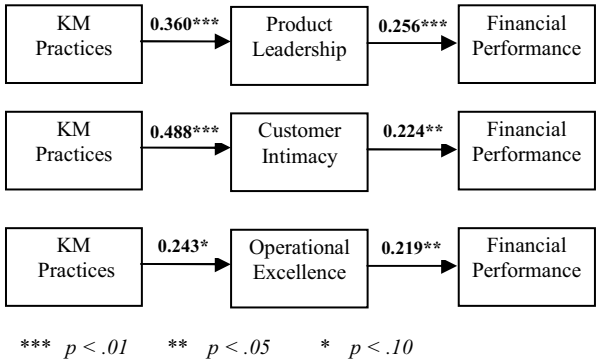

Figure 3. Main model effects by value discipline

Organizational performance was strongly related to 10 of the 12 KM practices – the two exceptions being KP6 (experimenting/learning about customers) and KP8 (experimenting/learning about technologies and internal operations) – both of which were significantly correlated with only one of the three components of organizational performance, namely customer intimacy. Operational excellence was associated with a highly focused set of KM practices (i.e., KP4, KP5, KP9 and KP10). These firms predominantly focused their KM practices internally by identifying sources of valuable employee knowledge, encouraging and rewarding the sharing of this knowledge, and by successfully transferring best practices within the firm. High performing firms in terms of product leadership engaged in the same set of KM practices as firms achieving operational excellence but in addition engaged in KP1, KP2, KP7 and KP12. These firms made knowledge a part of strategic planning, benchmarked their knowledge against competitors, experimented with products and services, and looked to their internal KM department to add significant value. Finally, firms achieving high customer intimacy significantly engaged in all KM practices.

Table 2. Pairwise correlation analysis between KM practices and organizational performance

KM Practice	Organizational Performance	Components of Organization Performance		
		Customer Intimacy	**Product Leader-ship**	**Oper'l Excellence**
KP1	0.251**	0.283***	0.231**	NS
KP2	0.259**	0.275***	0.213*	NS
KP3	0.261**	0.307***	NS	NS
KP4	0.393***	0.367***	0.272**	0.212**
KP5	0.326***	0.195*	0.317***	0.249**
KP6	NS	0.273**	NS	NS
KP7	0.298***	0.299***	0.258**	NS
KP8	NS	0.228**	NS	NS
KP9	0.410***	0.376***	0.199*	0.237**
KP10	0.387***	0.386***	0.284***	0.181*
KP11	0.337***	0.296***	NS	NS
KP12	0.334***	0.223**	0.201*	NS

*** p< .01 ** p< .05 * p< .10

Highlighted cells represent KM practices rated as important by respondents whose firms had focused their KM initiatives on specific value disciplines.

4.4. KM focus

We also explored the organizational focus for KM activities. Respondents were asked to rate the extent to which their KM activities were focused on each of the three value disciplines – customer intimacy, product leadership and operational excellence. In addition, they were asked to rate the importance of each of the KM practices in achieving success given their KM focus. The highlighted cells in Table 2 identify KM practices that respondents rated as important for each value discipline. Table 2 allows us to contrast KM practices that were *significantly related* to achieving value disciplines versus KM practices that were *considered important* for achieving value disciplines. In terms of customer intimacy and product leadership, the sets of KM practices that respondents rated as important constitute a reduced subset of those that were shown to be strongly related to success. Respondents were unable to agree which KM practices were important in terms of operational excellence. We are left to conclude that there appears to be a significant gap between what respondents *think is* important and *what is* actually important! The finding is consistent with that of O'Dell and Grayson [48], who suggest that it is often very tricky to identify KM best practices within an organization.

5. Summary

Our purpose in conducting this research was to study the perceived quality and extent of KM practices in order to more clearly show the existence of a relationship between KM practices and performance outcomes. In this regard, the study was successful. Not only did KM practices have a direct relationship with intermediate measures of organizational performance but organizational performance also exhibited a significant and direct relationship to financial performance. This is an important finding for both practitioners and academics. Practitioners can now select KM practices based on empirical evidence with a reasonable expectation that these initiatives will be in alignment with their organizational strategy. This study also encourages practitioners to focus their KM initiatives on specific *intermediate* outcomes. Practitioners should also be cognizant of the range and variety of KM practices and the extent to which so many of these are significantly related to performance. Adopting an overly focused set of KM practices (or worse yet, adopting a single KM practice) might not result in the desired impact. Finally, the existence of a significant gap between what we believe is important and what has been demonstrated to be important calls for attention.

Academics should be equally encouraged by these results for no greater reason than the demonstrated impact of KM practices on organizational performance. This aside, our study was exploratory and, as such, there remains much work to be done. Given that the majority of our constructs were formative, efforts to improve the measurement of KM practices (and possibly the identification of additional practices) will prove vital for the validation and extension of our findings. Research designs which target respondents and industry sectors may yield greater insight and understanding as well. Finally, we need to understand how organizations are to develop a "KM mindset" to enable KM practices to get traction within organizations. Without this mindset, many KM initiatives flounder.

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Appendix A - Articles linking KM to organizational performance

Article	Nature of Study	Method of Study	Key Finding(s)
[1]	Non empirical	N/A	Taking a KM view, a knowledge chain model is suggested to gain competitive advantage in e-commerce.
[4]	Non empirical	N/A	Develops a framework with three KM strategies – acquisition, retention, exploitation, to gain competitive advantage.
[5]	Non empirical	N/A	KM affects competitive advantage through its effect on quality management.
[6]	Non empirical	N/A	In order to gain competitive advantage from KM, organization ought to treat KM within the context of technological and social system.
[8]	Non empirical	N/A	KM affects competitiveness through innovation
[9]	Non empirical	N/A	Identifies that there are three KM activities –knowledge protection, knowledge leverage and knowledge accumulation. No knowledge base can lead to sustainable advantage unless organizations continuously create new knowledge. There is also a paradox associated with the three KM activities. For instance aggressive attempts at leveraging knowledge can inhibit knowledge accumulation because the later may typically not offer financial returns in the short run whereas the former often does.
[14]	Empirical	Survey	There are four style of KM – human oriented, passive, system oriented and dynamic. The dynamic style of KM leads to better corporate performance
[15]	Empirical	Survey	The study builds KM capability from four KM resources – technical, human, cultural, and structural. The KM capability is related to competitive advantage.
[16]	Non empirical	N/A	Organizations must build a strategy around their KM so that it is reflects their competitive strategy.
[18]	Empirical	Case study	It is argued that the RBV view of KM is limited because it emphasizes knowledge that must be protected and unique. But some organizations in Australia build competitive advantage by building alliances and relationships. Thus, KM needs a broader perspective then just RBV.
[19]	Empirical	Survey, Secondary	Organizations with KM orientation outperformed organizations with market orientation.
[22]	Non empirical	N/A	KM will provide performance benefits only if organizations develop strategies for filtering knowledge, strengthening corporate philosophy, and facilitating effective communication.
[25]	Empirical	Case study	KM allows Irizar (a company in Spain) to continuously innovate. Firm culture plays a significant role at the company.
[26]	Empirical	Survey	KM when implemented with human

Article	Nature of Study	Method of Study	Key Finding(s)
			resource management practices and IT practices lead to higher innovation within an organization.
[27]	Empirical	Survey	A capability model of KM is built and it is shown that knowledge infrastructure capabilities and knowledge processes capabilities impact organizational performance.
[28]	Empirical	Case study	Organizations must mobilize new knowledge faster and efficiently to gain advantage.
[29]	Non empirical	N/A	Develops an idea of KM value chain. The focus of the paper is on primary activities of the value chain.
[30]	Non empirical	N/A	The idea of KM value chain is extended with a focus on the secondary activities of the chain.
[31]	Empirical	Case study	The effect of KM on organizational performance is contingent upon various firm level and organizational level contingencies. KM is divided into three processes – knowledge development, knowledge utilization and knowledge capitalization. Each process has its own contingencies factors and performance outcomes
[35]	Non empirical	N/A	Develops an idea of knowledge value chain (KVC) and suggests that competitive advantage comes from the way organization performs each knowledge activity in the (KVC)
[36]	Empirical	Survey	The study shows that KM enablers effect KM processes, which in turn effect organizational performance through intermediate impacts
[37]	Empirical	Survey	KM is positively correlated to performance.
[39]	Empirical	Case study	KM should be applied within a defined context. At Nortel, KM was applied to new product development process which led to significant improvements in product innovation.
[40]	Empirical	Survey	A theoretical model is developed and tested show that KM allows organizations to innovate
[49]	Empirical	Survey	Using Nonaka and Takeuchi's SECI model, the study shows that socialization and combination effects organizational effectiveness. The study also shows individual effectiveness affects group effectiveness, which in turn effects organizational effectiveness
[50]	Empirical	Case study	KM has enabled smaller pharmaceutical and biotechnology firms to compete and gain competitive advantage.
[51]	Empirical	Survey	The paper develops four strategies for KM – codification, tacitness, focused and unfocused. The results suggest that focused strategy results in superior firm performance.
[52]	Empirical	Survey	KM affects dynamic capabilities, which in turn effects firm's competitive advantage
[59]	Empirical	Survey	The relationship between marketing KM and business performance is mediated by marketing capabilities.
[60]	Empirical	Experimental	Knowledge integration strategy outperforms knowledge redundancy strategy

Appendix B - Measurement of research constructs

KM practices

The following twelve KM practices were assessed based on a five-point Likert-type scale. The extent of engagement in each KM practice was assessed as excellent, good, fair, poor and not at all.

KP1	We explicitly recognize knowledge as a key element in our strategic planning exercises
KP2	We benchmark our strategic knowledge against that of our competitors
KP3	We have developed a knowledge strategy that maps knowledge to value creation
KP4	We are able to identify sources of expertise within our organization
KP5	Our employees are valued for what they know
KP6	We look for opportunities to experiment and learn more about customers
KP7	We look for opportunities to experiment and learn more about products and services
KP8	We look for opportunities to experiment and learn more about technologies and internal operations
KP9	Our organization encourages and rewards the sharing of knowledge
KP10	We have effective internal procedures for transferring best practices throughout the organization
KP11	We exploit external sources of knowledge effectively including customer knowledge
KP12	Our knowledge management group is a recognized source of value creation within the organization

Other constructs

Respondents were asked to rank their organization's performance in terms of profitability, ROA/ROE, quality of service/product, operation costs, innovation and rate of new product development, customer satisfaction and customer retention *relative to the other organizations in the industry* on a 5-point Likert-type scale (one of the lowest, below average, average, above average, one of the highest). Operating costs were reverse coded. These assessments were then used to form the following constructs:

- **Financial performance:** formed by combining ROA/ROE and profitability.
- **Organizational performance (overall):** formed by combining innovation, rate of new product development, customer satisfaction, customer retention and operating costs.
- **Organizational performance by value discipline:**
  - **Product leadership:** formed by combining innovation and rate of new product development.
  - **Customer intimacy:** formed by combining customer satisfaction and customer retention.
  - **Operational excellence:** operating costs