

## ■ Research Article

# Knowledge Management Practices and Results in Service-Oriented versus Product-Oriented Companies

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As service companies increasingly occupy a significant place as drivers of economic growth, there is a pressing need to understand their peculiarities in order to facilitate their effective management and governance. One important area where this kind of understanding is lacking is knowledge management (KM). Although KM has become a key value driver for all types of organizations, there has been a lack of systematic research into whether there are some fundamental differences between the nature of KM in service-oriented versus product-oriented companies. To address this gap in the existing knowledge, this paper examines the main differences between the KM practices and benefits produced by KM in service-oriented versus product-oriented companies. Empirical evidence is collected from 171 companies in Finland, China, and Russia and analyzed statistically. The results demonstrate that there are significant differences between service-oriented and product-oriented companies in time savings achieved through the application of KM and also on the impact of KM practices on KM benefits. Copyright © 2014 John Wiley & Sons, Ltd.

## INTRODUCTION

Services and products differ notably with respect to the format of their input and output, delivery, and consumption (Zeithaml *et al.*, 1985; Chesbrough and Spohrer, 2006). Services are intangible by nature and use information and knowledge as input, whereas traditional products are tangible and require material and intangible inputs (Zeithaml *et al.*, 1985; Nambisan, 2001; Chesbrough *et al.*, 2006; Macbeth and Ibanez de Opacua, 2010). These fundamental differences also influence how knowledge is embedded and managed in business processes. Many authors have argued that service-oriented companies are more reliant on knowledge work and accordingly place more importance on the knowledge resources (e.g., Kianto *et al.*, 2010).

The service sector nowadays employs a growing proportion of the labor force in the advanced economies. Economies where the proportion of those employed in the service sector is sufficiently high merit being called service-based economies (Chesbrough

*et al.*, 2006). As the role and significance of services in production and value creation has increased, some scholars have suggested that there is a need to designate a new area of specialized knowledge, namely Services Science (Vargo and Lusch, 2004). This suggestion is based on an assumption that service activities fundamentally differ from (material) production. In the following section, we explore whether this means that knowledge management (KM) also should acknowledge and address services organizations as a distinct group from material production firms—and provide alternative theories to account for their differences.

Although there is some theoretical work suggesting that services have a distinct relationship with knowledge (Ritala *et al.*, 2011), Kianto *et al.* (2010) studied 335 Finnish firms and found that various dimensions of intellectual capital did not significantly differ between services and production companies. In this paper, we focus on whether there is a difference between KM practices in product and service companies' KM. Apart from few exceptions (Kianto *et al.*, 2010), comparative studies concerning the differences in KM activities between service-oriented and production-oriented companies have not been published.

The specific research questions addressed in this paper are the following:

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- What are the main differences between the KM practices of service-oriented versus product-oriented companies?
- What are the main differences between benefits acquired by KM of service-oriented versus product-oriented companies?
- Do KM practices produce different benefits for service-oriented versus product-oriented companies?

Using an international dataset of 171 companies, we quantitatively analyze the KM practices and benefits produced by KM in product-oriented and service-oriented companies. We examine the following KM practices: strategic management of knowledge, organizational culture, human resource management (HRM) practices, organizational design, and information and communication technology (ICT) tools that are all designed to support KM. We also examine if the KM practices producing KM performance differ between the two types of companies. The paper contributes to the KM literature by providing up-to-date empirical concerning the current differences in KM between the two types of companies. Further, it provides managerial implications by demonstrating which managerial and organizational practices are needed to manage knowledge successfully in production and service companies.

## KM PRACTICES AND KM PERFORMANCE IN SERVICE-ORIENTED AND PRODUCT-ORIENTED COMPANIES

### Service-oriented versus product-oriented companies: what makes a difference from the knowledge perspective?

The growing body of literature on services identifies several characteristics that make services a distinct type of business “product”: intangibility, heterogeneity, inseparability and perishability (typically referred as IHIP; e.g., Zeithaml *et al.*, 1985; Fitzsimmons and Fitzsimmons, 2000; Lovelock and Gummesson, 2004). How may these characteristics be interpreted from knowledge perspective?

In the case of services, both the input and the output are primarily intangible (Vargo and Lusch, 2004; Macbeth and Ibanez de Opacua, 2010). Of course, knowledge is also increasingly required as an input in the production of tangible products. However, some authors suggest, cogently, that knowledge and information as an input has higher significance for services business (e.g., Tien *et al.*, 2003).

Inseparability and perishability imply that the production and delivery and consumption stages are closely intertwined (Tien and Berg, 2003, Zeithaml *et al.*, 1985). This, together with the characteristic of heterogeneity, inevitably leads to high customer involvement in service process (Vargo and Lusch, 2006) and, consequently, to more

intensive knowledge exchange between service supplier and client (e.g., Chesbrough *et al.*, 2006). In production-oriented businesses, provider and customer communicate between each other by the products themselves. In contrast, in the case of tangible products, as their features become understood, suppliers do not need to know about the customers’ businesses, nor do customers need to know about the suppliers’ capabilities, because the products have well-defined characteristics and qualities.

In contrast, we have noted earlier that there is a need for knowledge interchange to take place in service-oriented businesses, as both supplier and customer contribute extensively to the production process in order to reach the favorable outcome. So, whereas in the production of a tangible product, the supplier and customer focus on their own businesses, whereas in the case of services, production is all about knowledge interchange between the two parties.

Altogether, these distinctive differences make services highly dependent on human factors—employees who actually provide the service (Gittel and Seidner, 2009). This fact implies the importance of employees’ skills and knowledge (including the tacit one) for all types of services. This proposition is supported by recent empirical evidence, suggesting that human capital is more important for service firms compared with manufacturing ones (Kianto *et al.*, 2010).

To summarize, the very nature of services implies that any service relies at least on some human knowledge and involves at least some knowledge sharing. Thus, knowledge is more likely to be a key value driver in service business. Therefore, efficient management of organizational and individual knowledge, as well as of knowledge exchange with customers, is essential for the competitiveness of the services sector. Taking into account these peculiarities, it can be hypothesized that KM practices applied in services sector, as well as the perceived benefits from their application, might differ from those of production sector. The next section specifies this statement in more detail.

### KM practices and performance in service-oriented versus product-oriented companies

We define KM practices as the set of intentional organizational and managerial activities that are aimed at enhancing knowledge processes of the firm. As the KM discipline is still in the development phase, a unified and widely accepted list of the KM practices has not yet been established. However, a number of key constellations of KM practices evolve from the discussions in the literature (Heisig, 2007), these include strategic management of knowledge (e.g., Zack, 1999), organizational culture (e.g., DeLong and Fahey, 2000), HRM (e.g., Svetlik

and Stavrou-Costea, 2007), organizational design (e.g., Nonaka and Takeuchi, 1995), and ICT tools (e.g., Alavi and Leidner, 2001) that are all specially designed in order to support KM. We will discuss them in more detail in the next paragraphs.

#### *KM strategy*

The existing literature suggests that various KM efforts would be useless if they are not clearly linked to organizational strategy (Hansen *et al.*, 1999; Zack, 1999; Choi and Lee, 2002). Indeed, strategic focus allows to identify the KM initiatives that are needed and worth efforts for a particular organization in order to strengthen its competitiveness. From this perspective, clear strategic management of knowledge is important for any type of an organization. However, taking into account that knowledge can be a more critical driver of value for service organizations, it is possible to hypothesize that KM strategy might have stronger influence on KM performance for service businesses.

*H1a:* Service-oriented and production-oriented companies use KM strategy practices equally frequently.

*H1b:* KM strategy has a stronger impact on KM performance for service companies compared with production-oriented companies.

#### *Organizational culture*

Organizational culture can be considered to be a combination of shared history, expectations, unwritten rules, and social customs that are rarely articulated but can influence people's communicational behaviors. Many authors agree that the organizational culture is a critical facilitator of KM and significantly influences efficiency of both knowledge creation and knowledge sharing (Davenport and Prusak, 1998; DeLong and Fahey, 2000; McDermott and O'Dell, 2001; Alavi *et al.*, 2006; Heisig, 2007). The values that are discussed as supporting KM include trust to colleagues and organization, helping colleagues, risk-taking, tolerance to mistakes, open communications, and so on, and they can be relevant for different types of businesses. However, as services depend mainly on their human assets, one can hypothesize that organizational culture would be one of the key managerial tools in such companies, and therefore, it might have stronger influence on KM performance.

*H2a:* Service-oriented and production-oriented companies develop knowledge-management-friendly organizational culture equally frequently.

*H2b:* Knowledge-management-friendly organizational culture has a stronger impact on KM performance for service companies compared with production-oriented companies.

#### *Human resources management practices*

Human resource management and KM are very closely intertwined, as it is namely employees in the organization who possess the most part of the knowledge resources. Therefore, KM can benefit from HRM practices that are designed to support knowledge processes, for example, incentives for knowledge creation and knowledge sharing, mentoring, job rotation, special programs to support knowledge retention, and so on. (Despres and Hiltrop, 1995; Soliman and Spooner, 2000; Oltra, 2005; Svetlik and Stavrou-Costea, 2007). Following the similar logic as with organizational culture, we hypothesize that HRM practices that support KM have stronger influence on KM performance for service businesses. However, as people are the main asset of such companies, we also hypothesize that service business would use such practices more frequently.

*H3a:* Service companies use HRM practices that support KM more often than production-oriented companies.

*H3b:* HRM practices that support KM have a stronger impact on KM performance for service companies compared with production-oriented companies.

#### *Organizational design*

Organizational design includes division of work and responsibilities and coordination of work (Mintzberg, 1992). KM literature suggests that organizational design decisions may either inhibit or promote knowledge processes in the organization; for example, establishment of cross-functional teams may stimulate knowledge sharing, whereas too hierarchical structure slows knowledge flows (Nonaka and Takeuchi, 1995; Miles *et al.*, 1997; Davenport and Prusak, 1998; Child and McGrath, 2001). We suggest that these practices have equal importance for service-oriented and for production-oriented businesses.

*H4a:* Service-oriented and production-oriented companies use organizational design that supports KM equally frequently.

*H4b:* Organizational design that supports KM has an equal impact on KM performance for service-oriented and production-oriented companies.

#### *ICT tools*

Information and communication technology also can contribute to KM (Nonaka and Konno, 1998; Alavi and Leidner, 2001). On the one hand, ICT tools are critical for storage and retrieval of explicit organizational knowledge (Alavi and Leidner, 2001). On the other hand, it assists knowledge sharing and creation by providing communication channels that help to close time and physical distance gaps among employees. As ICT tools mainly store and support communication with explicit knowledge, whereas services

involve a lot of tacit knowledge, we hypothesize that ICT tools are less frequently used by service companies and have less impact on their KM performance.

*H5a:* Production-oriented companies use ICT tools that support KM more often than service companies.

*H5b:* Information and communication technology tools that support KM have less impact on KM performance for service companies compared with production-oriented companies.

## DATA COLLECTION, VARIABLES, AND METHODS

### Survey data collection

The data were collected in three countries—Finland, Russia, and China during February–April 2010. In order to obtain reliable, diverse, and comparable data, it was decided to select companies with 50 or more employees that represent both production and service sectors and industries with different growth rates.

The survey was run with the usage of the web-based survey software. Therefore, another criterion for selection of the companies into the research pool was added—the company should have a publicly available email address so that the link to the survey could be sent there. The survey has been formulated in a way that any employee of the organization can respond to it, in order to enlarge the potential sample. The administration of the survey proceeded in several stages and differed slightly among three countries because of differences in business culture and attitudes to surveys.

As a result of data collection efforts, 260 responses in three countries were collected. A total of 38 responses were excluded from further analyses as they belonged to companies with less than 50 employees or had failed to provide a response on the number of employees in the organization. Therefore, the usable sample consisted of 222 responses, quite evenly representing three countries of our survey with 84 Finnish (37.8%), 64 Russian (28.8%), and 74 (33.3%) Chinese responses.

The survey reached quite well the management level of the targeted organizations: in Finland and Russia, over 70% of respondents belonged to middle management or top management, and in China, over 53%. The rest of the surveyed respondents, with minor exceptions, informed that they hold specialist positions in their organizations. The organizations in our sample represent over 20 industries, with some domination of the production sector over the one of services (63% versus 37%). The majority of the companies employ between 50 and 500 employees (between 60% and 70% across three countries). Around 70% of the companies in each of the three countries are domestically owned.

### Measures

Division of the data into services-oriented and product-oriented companies purely based on industries that the companies represent would have seemed too simplistic, as most industries generate at least a proportion of sales from services. Following Kianto *et al.* (2010), we therefore used a relative measure of service orientation. The respondents were asked to assess the relative amount of products and services of their sales in 2006–2009 (total of 100%). In order to distinguish product-oriented and service-oriented companies, the firms that reported at least 75% of their turnover come from product category were coded as “product oriented”, and respectively, those with at least 75% of turnover from services were labeled as “service oriented”. Including all the eligible answers, this resulted in 98 product-oriented companies and 73 service-oriented companies, thus creating a population of 171 companies that were analyzed for this paper.

Drawing from previous literature discussing the conscious and systematic management practices used for facilitating knowledge processes in organizations, we examined KM practices from five perspectives, as identified in our literature review: strategic management of knowledge, organizational culture, HRM practices, organizational design, and ICT. However, as KM discipline is still in the development phase, widely utilized operationalizations of these concepts do not exist. Therefore, for the purposes of this research, the scales for KM practices were combined by the authors on the basis of the existing literature, constructing new items where needed. For all the KM practice items, the respondent was asked to indicate his/her agreement to a particular statement on a six-point Likert scale (1 = *strongly disagree*, 6 = *strongly agree*).

The scale for *strategic management of knowledge* aimed to measure the organization's ability to establish the knowledge-strategy link and existence of a clear KM strategy (Zack, 1999; Skyrme and Amidon, 1997). The scale consists of six items that were drawn from Kianto (2008) and McKeen *et al.* (2005). The scale for *organizational culture that supports KM* consists of six items, drawn from KMAT survey (2001), Kulkarni and St.Louis (2003), and Steyn and Kahn (2008). HRM practices scale includes five items, four of which are drawn from the Canada KMP Survey (2001) and one generated by the research team. Most of *organizational design* scale items were generated by the research team, and one item was adapted from Kianto (2008). For *information and communication technologies* scale items from Liu *et al.* (2006), Kulkarni and St.Louis (2003), Kruger and Snyman (2007), and Kianto (2008) were adopted to examine how organizations used technology and ICT tools and whether the present tools were efficient enough to support their daily work.

A principal component analysis with varimax rotation was conducted to discern dimensions among the variables. To ensure the appropriateness of the explorative factor analysis, normal pre-analysis checks (Hair *et al.*, 1995) were conducted. The Bartlett test of sphericity demonstrated a highly significant number of correlations in the correlation matrix ( $p < 0.001$ ). Both the Kaiser-Meyer-Olkin measure (KMO = 0.909) and the individual measures of sampling adequacy in the anti-image correlation matrix indicated the suitability of factor analysis.

The principal component analysis yielded a five-factor solution, representing the five KM practices. Composite measures were calculated from the averaged item responses of each construct. Table 1 presents the items, factor loadings, and internal consistencies of the KM practice variables. The coefficient alphas range from 0.854 to 0.942, exhibiting a good internal consistency of all the composites.

Finally, we wanted to find out whether and what kind of benefits KM had yielded to the respondents' companies. We therefore asked the respondents to evaluate the performance of KM in their organization. The scale examined performance improvement from KM through four perspectives: the money saving, the time saving, and increases in revenue and innovativeness (Zhu, 2004). The response format was a six-point Likert scale, anchored by "strongly disagree" and "strongly agree".

### Methods of analysis

In order to examine the differences in KM practices and KM benefits in services-oriented versus product-oriented firms, we tested for statistical difference in means of these two groups by using the independent samples *t*-test. To examine the impact of KM practices on KM outcomes, separate linear regression analyses were run for services-oriented and product-oriented companies.

## RESULTS

Tables 2–4 report the results of the empirical examination. Table 2 distinguishes between different KM practices, namely, strategic management of knowledge, organizational culture, HRM, organizational structures, and ICTs. Overall, activities related with building a knowledge-friendly culture are the most widely used KM practices for both product-oriented and service-oriented firms, followed by strategic management of knowledge and ICTs. HRM is the least employed supporting factor.

According to the results, there only are minor and nonsignificant differences between the KM practices employed in product-oriented as opposed to service-oriented firms. Service-oriented firms tend to emphasize slightly more strategic management of knowledge,

structural arrangements, and ICTs to facilitate efficient usage of knowledge, whereas product-oriented firms have a preference for paying attention to organizational culture, but these differences are not statistically significant. Therefore, our hypotheses 1a, 2a, and 4a were supported, whereas 3a and 5a were not. The lack of distinct approaches to KM is somewhat surprising, considering the knowledge-intensive nature of services (Nambisan, 2001; Chesbrough and Spohrer, 2006), which seems to propose that services firms would employ more KM practices.

Table 3 illustrates the differences related with perceived benefits of the conducted KM practices. The analyses show that whereas innovativeness is the most important KM benefit for product-oriented firms, service-oriented firms view that in addition to innovativeness, also time savings are a prime outcome of KM practices. Service-oriented firms perceive to have had more positive results from their efforts in KM than product-oriented firms, especially so in terms of time saving.

These results are understandable, because service-oriented firms rely more on knowledge work, and knowledge is more likely to be a key value driver in their business (Vargo and Lusch, 2004). Thus, they can more readily reap benefits from improved management of knowledge.

Service innovations are based on extensive and deep knowledge of customer needs (Hipp and Grupp 2005), and thus, it seems logical that KM practices, by improving knowledge sharing and creation, are able to power them significantly. Also, product innovations benefit from KM but perhaps to a lesser extent than creation of new service concepts and products, which are based on inter-social understanding.

Furthermore, one distinguishing feature in services business is the immediate and real-time nature of service delivery (Zeithaml *et al.*, 1985). Thus, the time-saving benefits afforded to services-oriented firms by KM practices are especially valuable.

Finally, to examine the interrelations of KM practices and outcomes, we first ran correlation analysis among these variables separately for both types of firms. Results in Table 4 show that all KM practices are related with all KM outcomes for services-oriented and product-oriented firms. However, the correlations seem somewhat stronger in the case of product-oriented firms. For product-oriented firms, HRM seems to be the most influential KM practice, exhibiting the highest correlations with all of the outcomes. For services-oriented firms, in contrast, the most influential KM practices vary: money saving is especially connected with organizational design, time saving and innovativeness with strategic KM, and revenue increase with KM culture.

To further inspect the KM practices leading to beneficial outcomes, we ran linear regression analyses separately for services-oriented and product-oriented companies. Table 5 demonstrates the results concerning the impact of the KM practices on achieved KM benefits. However, it should be noted that the

Table 1 Factor loadings and coefficient alphas of knowledge management practices scales

Items	Component				
	1	2	3	4	5
Strategic management of knowledge Cronbach's $\alpha = 0.892$					
Our organization has a clear understanding of our current core knowledge		0.748			
Our organization has a clear view of what knowledge and competences are the most relevant for the objectives		0.755			
Our organization's knowledge and competences are evaluated systematically		0.724			
Our organization benchmarks our strategic knowledge against that of our competitors		0.531			
Our organization explicitly recognizes knowledge as a key element in the strategic planning exercises		0.747			
Our organization has a clear strategy for developing knowledge and competences		0.713	0.306		0.308
Organizational culture Cronbach's $\alpha = 0.942$					
Openness and trust are valued in our organization	0.764				
Flexibility and a desire to innovate are valued in our organization	0.799				
Employees who take initiative of their own learning are highly valued in our organization	0.835				
Willingness to share lessons learned is valued in our organization	0.824				
In our organization, lessons learned both successful and unsuccessful are considered valuable	0.805				
In our organization various units are encouraged to collaborate with each other	0.592			0.312	
Human resource management Cronbach's $\alpha = 0.877$					
Our organization specifically rewards knowledge sharing with monetary incentives			0.821		
Our organization specifically rewards knowledge sharing with non-monetary incentives			0.751		
Our organization specifically rewards knowledge creation with monetary incentives			0.743		
Our organization specifically rewards knowledge creation with non-monetary incentives			0.666		
In our organization, knowledge sharing is a component in employees' performance evaluation			0.708		
Organizational structure Cronbach's $\alpha = 0.853$					
People from different parts of our organization interact informally with each other in a frequent manner				0.739	
In our organization, open dialogs are common among/between employees and manager	0.389			0.680	
In our projects, our organization uses teams consisting of people with skills and expertise from diverse fields	0.375			0.674	
In our organization, we frequently use cross-functional teams and projects				0.672	
In our organization, we have purposeful overlap of functional responsibilities				0.675	
Information and communication technologies Cronbach's $\alpha = 0.884$					
Our organization uses technologies (e.g., Intranet, Internet, e-mail, and e-learning) to facilitate employees sharing new ideas/knowledge with each other					0.708
KM systems and tools in our organization are widely accepted, monitored, and updated					0.746
Our organization's ICT is capable of supporting management decisions and knowledge work					0.791
Our organization's ICT architecture is capable of sharing data and information, knowledge, and expertise with all stakeholders in the organization's extended value chain					0.746
Our organization's current ICT systems are sufficient to support the daily work					0.658

KM, knowledge management; ICT, information and communication technology.

Table 2 Knowledge management practices

Orientation		Strategic KM	Organizational culture	HRM	Organizational structure	ICTs
Product oriented	Mean	4.04	4.34	3.13	3.90	4.02
	N	98	99	99	99	99
	Standard deviation	0.98	1.08	1.22	1.04	1.10
Service oriented	Mean	4.12	4.22	3.09	4.05	4.18
	N	72	73	71	71	71
	Standard deviation	1.06	1.35	1.21	0.99	1.36
	Mean difference	-0.08	0.12	0.03	-0.14	-0.16
	Significance (two-tailed)	<b>0.605</b>	<b>0.519</b>	<b>0.861</b>	<b>0.368</b>	<b>0.418</b>

KM, knowledge management; HRM, human resource management; ICTs, information and communication technologies.

Table 3 Knowledge management outcomes

Orientation		Money saving	Time saving	Increased revenue	Increased innovativeness
Product oriented	Mean	3.32	3.49	3.43	3.66
	N	85	90	86	90
	Standard deviation	1.31	1.31	1.40	1.33
Service oriented	Mean	3.53	4.02	3.74	4.02
	N	59	61	61	62
	Standard deviation	0.46	1.59	1.48	1.41
	Mean difference	-0.21	-0.53	-0.31	-0.36
	Significance (two-tailed)	<b>0.373</b>	<b>0.027</b>	<b>0.203</b>	<b>0.110</b>

Table 4 Correlation of knowledge management practices and outcomes

Orientation		KM outcome/ KM practice	Money saving	Time saving	Increased revenue	Increased innovativeness
Product oriented	Strategic KM		0.520**	0.506**	0.535**	0.635**
	KM culture		0.457**	0.413**	0.490**	0.580**
	HRM for KM		0.610**	0.579**	0.557**	0.696**
	Organizational structure		0.395**	0.385**	0.447**	0.586**
	ICT		0.415**	0.435**	0.424**	0.377**
Service oriented	Strategic KM		0.433**	0.451**	0.454**	0.447**
	KM culture		0.450**	0.331**	0.511**	0.392**
	HRM for KM		0.385**	0.211	0.305*	0.334**
	Organizational structure		0.471**	0.298*	0.363**	0.277*
	ICT		0.357**	0.337**	0.435**	0.368**

KM, knowledge management; HRM, human resource management; ICT, information and communication technology.

\*\*correlation is significant at the 0.01 level (two-tailed).

\*correlation is significant at the 0.05 level (two-tailed).

amount of observations in these analyses does not strictly conform to the recommendation of having at least 50 times as many observations as there are variables in the model, so the results should be understood as indicative.

As expected, the set of KM practices significantly explain a large part of the variance of the KM benefits. Our results point to some interesting differences between product-oriented and service-oriented companies concerning which KM practices lead to greatest benefits.

Overall, HRM activities rewarding knowledge sharing and creation activities are a powerful means

to improve KM benefits of all kinds in product-oriented firms. On the basis of the results, it can be stated that for product firms, HRM is crucial for gaining benefits from KM. HRM rewarding mechanisms, both monetary and non-monetary, make an essential impact in guiding product firm employee behavior toward knowledge processes, which enable the firm to save money and time and to increase revenue and innovativeness. It seems that without this behavior guiding rewarding mechanisms, product companies would not be able to get their employees to deal with knowledge in a

Table 5 Impact of knowledge management practices on knowledge management benefits

Criterion	Predictor	Product-oriented companies			Service-oriented companies		
		B	T	Adjusted R <sup>2</sup>	$\beta$	t	Adjusted R <sup>2</sup>
Money saving	Constant		0.679	0.447		-0.555	0.420
	Strategic KM	0.217	1.833		0.226	1.606	
	KM culture	0.101	0.840		0.317	2.240*	
	HRM	0.540	4.712***		0.190	1.623	
	Organizational structure	-0.110	-0.947		0.209	1.369	
	ICT	0.005	0.049		-0.105	-0.801	
Time saving	Constant		1.061	0.397		1.798	0.369
	Strategic KM	0.243	2.098*		0.587	3.881***	
	KM culture	-0.027	-0.226		0.321	2.096*	
	HRM	0.518	4.610***		0.010	0.082	
	Organizational structure	-0.050	-0.442		-0.386	-2.234*	
	ICT	0.080	0.763		0.122	0.879	
Revenue increase	Constant		-0.432	0.456		-0.204	0.456
	Strategic KM	0.272	2.293*		0.356	2.679**	
	KM culture	0.105	0.878		0.420	3.179**	
	HRM	0.372	3.163**		0.110	0.998	
	Organizational structure	0.095	0.824		-0.171	-1.171	
	ICT	-0.032	-0.291		0.156	1.257	
Increased innovativeness	Constant		-1.149	0.668		0.733	0.381
	Strategic KM	0.334	3.755***		0.335	2.396*	
	KM culture	0.166	1.848		0.272	1.956	
	HRM	0.439	4.991***		0.171	1.461	
	Organizational structure	0.170	1.955		-0.105	-0.673	
	ICT	-0.169	-2.032*		0.183	1.422	

KM, knowledge management; HRM, human resource management; ICT, information and communication technology.

\* $p < 0.05$ . \*\* $p < 0.01$ . \*\*\* $p < 0.001$ .

more effective and efficient manner. In contrast, in service companies, the employees might be more inclined for knowledge-friendly behaviors regardless of additional rewards for it—and therefore, emphasizing this in their remuneration system does not produce additional increase in KM benefits.

For service-oriented companies, the most important KM practice yielding benefits are strategic management of knowledge and knowledge-friendly organizational culture. The strategic management of knowledge serves to formulate clear and well-communicated goals for the knowledge-based activities in the firm and therefore helps in guiding and coordinating behaviors. Strategic management also is an important enabler of KM benefits for product companies. Knowledge-friendly culture enables employees to utilize, share, and create new knowledge in their tasks and also in collaboration with one another. This kind of generalized positive and supportive attitude to knowledge behaviors can be a more important enabler of productive behavior in services, where the ability to adapt to situational customer demands and to listen and understand various opinions and backgrounds is likely to be more important than in production activities.

Paying attention to the negative coefficients, it is interesting to note that an emphasis on the technological

tools of KM seems to decrease innovativeness in product-oriented firms. Fluid and collaborative organizational structures on the other hand diminish the time-saving benefits of KM in service-oriented firms. It might be that in these kinds of structural arrangements, time is spent on getting the arrangements to work and lost from some other activities.

## CONCLUSIONS

The existing research literature has discussed knowledge as one of the key value drivers in service business (Nambisan, 2001; Chesbrough *et al.*, 2006; Macbeth and Ibanez de Opacua, 2010), but evidence on how knowledge management practices and benefits differ in services- versus production-oriented firms has so far been very quite scarce (Kianto *et al.*, 2010). This paper aimed to investigate in more detail what KM practices are more widely used in service business and how they contribute to KM performance. On the basis of the literature review, we identified groups of KM practices—strategic management of knowledge, organizational culture, HRM practices, organizational design, and ICT tools that are all designed to support



KM—and hypothesized for each of them whether their application and benefits would differ between service-oriented and product-oriented businesses.

Specifically, we hypothesized that strategic management of knowledge, organizational culture, and organizational design that support KM would be equally used in service-oriented and production-oriented businesses, whereas HRM and ICT practices would differ in their frequency of application, with first being more applied in services and latter more applied in production-oriented companies. However, service-oriented and production-oriented companies in our sample did not demonstrate significant differences in their portfolios on KM practices.

In terms of KM outcomes, service-oriented and product-oriented companies significantly differed only in one out of four potential benefits included in our survey, namely time-saving, as it was found to be more relevant for service companies. This finding might be explained by the nature of services business where service provision and delivery are simultaneous, and thus, timing becomes more critical.

Regarding the impact of the KM practices on KM benefits, our findings go against mainstream literature, as they demonstrate that the overall explanatory power of KM practices is somewhat stronger for product-oriented companies. Also, contrary to our hypothesis 3b, HRM appears to be the most influential KM practice for production-oriented companies. One of the explanations for such finding might be linked to the fact that services are very heterogeneous; thus, the literature that postulates that all services are more knowledge-intensive might be misleading. Therefore, future research might take into account not only service versus product distinction but also knowledge intensity of the particular business.

The findings of this research have limited scope because of the size of the sample. Therefore, both theory and practice would benefit from further research addressing similar questions with larger samples.

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