

Direct effects of knowledge management practices on organizational performance

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Abstract

The relationship between knowledge management (KM) and firm performance is an interesting field for both scholars and practitioners. Despite the extant literature, more studies are required in order to clarify the abovementioned relationship. The purpose of this article is to examine the impact of KM practices on financial and nonfinancial performance. KM practices are knowledge creation practices, continuous learning practices (CLP), knowledge and feedback systems (KFS), and management of employees' individual competencies. Methodologically the study uses partial least squares structural equation modeling. The results show that KFS affect firms' financial performance and that CLP do not influence on either financial or nonfinancial performance.

Keywords

Financial performance, knowledge management, knowledge management practices, nonfinancial performance, organizational performance, PLS-SEM

Introduction

Research on strategic management has constantly sought to understand why firms achieve various levels of performance; that is to say, which are the underlying reasons for the differences in the results achieved by firms (McEvily and Zaheer, 1999; Nelson, 1991). The resource-based theory (RBT) holds that the resources accumulated by organizations and used as a basis for corporate competitiveness offer an explanation for such differences. The theory also holds that possessing unique organizational resources and practices enables some firms to generate sustainable competitive advantages and leads them to perform better than others (Barney, 1991; Grant, 1991; Wernerfelt, 1984). The explanation proposed from RBT has been complemented with the concept of dynamic capability and the way organizational routines transform these resources into the capabilities the organization needs to face a changing environment (Eisenhardt and Martin, 2000; McGrath et al., 1995; Teece, 2007, 2009; Teece et al., 1997).

Added to the above, the emergence of knowledge-based economy (Conner and Prahalad, 1996; Grant, 1996; Hayek, 1945; Kogut and Zander, 1996; Spender, 1996) has allowed knowledge creation and exploitation processes to become key resources for the development of firms' competitive advantages, which should positively affect their

performance (Grant, 1996; Spender, 1996; Teece et al., 1997). The said processes need effective management; otherwise, the consequences on firms' performance could be negative (Leonard-Barton, 1992; Sengupta and Abdelhamid, 1993; Sengupta and Te'eni, 1993). There lies the concern for understanding the role of knowledge management (KM) in the generation of such competitive advantages and its relationship with identifying and taking advantage of collective knowledge in an organization (Von Krogh, 1998).

Consequently, there are research works trying to explain the differences in organizations' performance from the perspective of KM and the way processes of knowledge creation and use become competencies and develop competitive advantages for the firm. Some authors have concluded that knowledge-creation companies have better results in terms of their performance (Nonaka and Takeuchi, 1995). Other works deal with quality practices and how these can potentiate knowledge creation and retention, impacting positively on the organization's performance (Linderman et al., 2004). There are also works that examine the role of KM in innovation, in which the authors claim

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that innovation is a result of effective KM (Alegre et al., 2013; Du Plessis, 2007).

Thus, in this article, we aim to contribute to the literature by studying the relationship between KM practices and organizational performance (OP). Specifically, we seek to establish the incidence of KM practices on financial organizational performance (FP) as proposed by Judge and Douglas (1998) and nonfinancial organizational performance (nFP), according to Lee et al. (2011). The KM practices that will be included in the study are four: knowledge creation practices (KCP), continuous learning practices (CLP), knowledge and feedback systems (KFS), and management of employees' individual competencies.

Review and hypotheses

KM practices and OP

According to RBT, firms accumulate resources that are valuable, rare, inimitable, and not substitutable (VRIN). Such resources are the support of corporate competitiveness (Barney, 1991; Grant, 1991; Wernerfelt, 1984). Eisenhardt and Martin (2000) consider that knowledge is the most important strategic resource for the development of competitive advantages. To complement RBT, there is the capabilities approach that proposes VRIN resources require capabilities, which are the way a firm deploys and reconfigures its resources to improve productivity and reach strategic goals (Eisenhardt and Martin, 2000; McGrath et al., 1995; Teece, 2007, 2009; Teece and Pisano, 1994; Teece et al., 1997). Because of the importance of knowledge as resource, the knowledge-based approach (KBA) was developed which considers that the firms' basic functions are around knowledge creation and application (Grant, 1996; Nonaka and Takeuchi, 1995; Spender, 1996) and that competitive advantages that are sustainable over time are developed through processes that facilitate knowledge creation and exploitation (Grant, 1996; Spender, 1996; Teece et al., 1997), which eventually makes it possible to reach a superior performance that remains over time (Newbert, 2007).

For knowledge and the creation and application processes to effectively have the desired impact on OP, an effective management is required; otherwise, the consequences on the firm's performance could be negative (Leonard-Barton, 1992; Sengupta and Abdelhamid, 1993; Sengupta and Te'eni, 1993). It is at this point that KM arises as the capability that will eventually allow managers to effectively create and apply knowledge (Grant, 1996; Nonaka, 1994; Spender, 1996); take advantage of an organization's collective knowledge (von Krogh, 1998); mobilize knowledge-related resources, turning them into value-generating activities (Alavi and Leidner, 2001; Grant, 1996); and serve as the basis for the development of new capabilities in the organization (Lei et al., 1996).

KM basic components are knowledge creation, knowledge retention, and knowledge transfer (Grant, 1996; Spender, 1996). KM has recourse to a set of techniques, systems, and processes dedicated to creating, storing, transferring, and applying knowledge. Such techniques, systems, and processes are known as KM practices (Alavi and Leidner, 2001). After conducting a literature review, it was found that Alegre Vidal and Lapidra Alcamí (2005) propose four KM practices: KCP, CLP, KFS, and employees' individual competency management (ICM).

In line with the purpose of this article and to be able to examine the relationship between KM practices and OP, as already mentioned, this work will examine the relationship between KM practices and FP and nFP. In the literature, it is common to find OP measurements in financial terms or with the use of constructs that mix financial and nonfinancial indicators. Therefore, dealing with FP and nFP independently is a novel approach, since it is not common to find works that analyze the constructs in a completely independent manner (Lee et al., 2011; Saunila et al., 2014). Next, the four KM practices proposed by Alegre Vidal and Lapidra Alcamí (2005) will be related and the work hypotheses will be proposed regarding the use of processes, techniques, and systems necessary for KM to have the desired effect on OP (Alavi and Leidner, 2001; Grant, 1996; Leonard-Barton, 1992; Sengupta and Abdelhamid, 1993; Sengupta and Te'eni, 1993).

KCP are related to the process by which new knowledge is developed and remains available for use by the organization (Nonaka, 1994; Nonaka and Takeuchi, 1995). This practice, which supports KM, increases the firm's possibility to achieve greater performance. Therefore, the following hypotheses are proposed:

H1: KCP have influence on FP.

H2: KCP have influence on nFP.

CLP comprise having a systematic and uninterrupted process by which the organization tries to improve its current performance through the search for more effective solutions. CLP take into account that continuous learning is encouraged by training policies and incentive systems for employees (Alegre Vidal and Lapidra Alcamí, 2005). CLP have influence on OP; therefore, the following hypotheses are proposed:

H3: CLP have influence on FP.

H4: CLP have influence on nFP.

KFS are information systems applied to KM and are developed with the aim of supporting and promoting organizational processes for creation, storing, transfer, and application of knowledge (Alavi and Leidner, 2001). As happens with the above practices, it is proposed that KFS

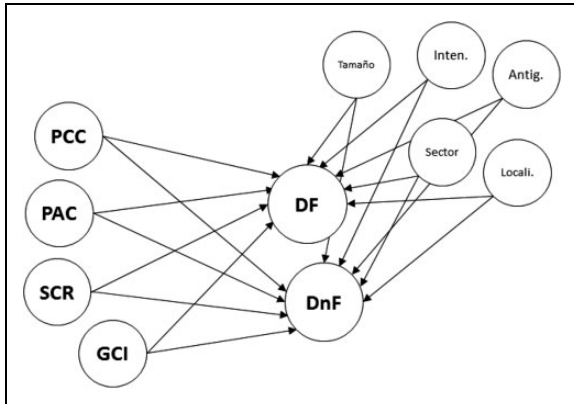


Figure 1. Hypothesis model.

impact on OP; therefore, the following hypotheses are proposed:

H5: KFS have influence on FP.

H6: KFS have influence on nFP.

ICM is related with human resource and knowledge and learning management (Nonaka, 1994; Nonaka and Takeuchi, 1995). ICM is the KM practice that includes the procedures to measure, develop, and reward employees' skills (Alegre Vidal and Lapiedra Alcamí, 2005), and similarly, the following hypotheses on organizational development are proposed:

H7: ICM has influence on FP.

H8: ICM has influence on nFP.

The summary of the proposed hypotheses can be observed in Figure 1.

Methodology

Sample and data collection

The hypothesis model was tested in a sample of 160 companies located in an emerging country which is a technology follower. The greatest number of companies belong to the sector of professional, scientific, and technical activities (45), followed by companies from the sector of human health care and social assistance activities (20), education (13), and retail (12). The summary of the 10 sectors with the highest number of surveyed companies can be observed in Table 1.

Measurement scales

For the measurement of KM practices, the scales proposed by Alegre Vidal and Lapiedra Alcamí (2005) were employed. For all the practices, a 7-point Likert scale was

Table 1. Summary of company sectors in the sample.

Sector	Frequency	Percentage
Professional, scientific, and technical activities	45	28.1
Human health care and social assistance activities	20	12.5
Education	13	8.1
Retail	12	7.5
Food products manufacturing	9	5.6
Support and administrative services activities	8	5
Information and communications	8	5
Transport and warehousing	6	3.8
Financial and insurance activities	4	2.5
Hotel and food services	4	2.5

Table 2. Scales for KCP.

KCP
Systems for codifying explicit knowledge
Mechanisms to incentivize the organization's staff to share information
Techniques to stimulate knowledge transmission through participation instruments such as interfunctional teams, quality circles, improvement teams, and so on
Defined system for distributing information to staff, customers and suppliers, according to their needs

KCP: knowledge creation practices.

Table 3. Scales for CLP.

CLP
Application of a career plan that encourages employee continuous learning
Generalist training for employees which they later apply to their daily tasks
Continuous improvement system which allows to improve those processes that have reached the established quality standards

CLP: continuous learning practices.

used where 1 = *never used* and 7 = *always, as an established method*.

KCP were measured using a dimension made up of four observed variables that inquired about aspects related to the processes and mechanisms used by the companies to develop new knowledge and how this remains available for use in the organization. The description of the scales employed for the construct can be observed in Table 2.

The CLP construct contains three observed variables inquiring about career plan, incentives, training, and process improvement systems in the companies. The text used in the instrument applied can be observed in Table 3.

Table 4. Scales for KFS.

KFS
Systems for capture and integral treatment of process information
Control and revision mechanisms for R+D+I projects
Feedback obtained from finished R+D+I, which serves for the development of new projects

KFS: knowledge and feedback systems.

Table 5. Scales for ICM.

ICM
The management communicates and formally recognizes collaborators' achievements
System for measuring employees' competencies
Employee payment and promotion system that influences the development of their competences, ideas, and knowledge
Benchmarking techniques for improving employees' competencies

ICM: employees' individual competency management.

Table 6. FP scales.

FP
Return on investment
Profit growth
Sales growth
Market share increase

FP: financial organizational performance.

For the third construct, *KFS*, three variables were used which inquired about the information systems for capture and treatment of information and how feedback on finished R+D+I projects is obtained. Table 4 presents the scales used for *KFS*.

For measuring *ICM*, it was inquired about achievement recognition, measurement of competencies, payment and promotion systems, and employee competency improvement techniques. The four variables used can be observed in Table 5.

As for *FP*, we employed the scaled developed by Judge and Douglas (1998). The construct consists of four items inquiring about traditional indicators on the companies' financial performance. Table 6 presents the questions that were measured using a Likert scale going from 1 = *very inferior in comparison with other companies in the sector* to 5 = *very superior in comparison with other companies in the sector*.

For *nFP*, we used the scale proposed by Lee et al. (2011). The four variables of the construct were measured with a 5-point Likert scale going from 1 = *very inferior in comparison with other companies in the sector* to 5 = *very*

Table 7. Scales for nFP.

nFP
Increase in customer satisfaction
Improvement of corporate image
Increase in brand value
Increase in employee productivity

nFP: nonfinancial organizational performance.

superior in comparison with other companies in the sector. The four variables for the *nFP* construct can be observed in Table 7.

Control variables

To avoid distortions in the results, the study also included the control variables below.

Size: nominal variable where 1 = *micro*, 2 = *small*, 3 = *medium* and 4 = *large enterprises*.

Sector: dichotomous variable where 0 = *companies from the manufacturing sector* and 1 = *companies from the service sector*.

Geographic location: dichotomous variable where 1 = *regions with high investment in R+D* and 0 = *regions with low investment in R+D*.

Age: quantitative variable that was measured as the natural logarithm of the company's years of existence.

Technological and knowledge intensity: dichotomous variable in the manufacturing sector where 0 = *groups companies with low and medium-low technological intensity* and 1 *groups companies with medium-high and high technological intensity*. In the service sector, 0 = *groups companies with low knowledge-intensity* and 1 = *groups companies with high knowledge-intensity*.

Data analysis

Common method variance

To control for common method variance problems, respondents were guaranteed total anonymity. They were also informed that the gathered data would be used for research purposes only and under total confidentiality. Lastly, Harman's single factor test was performed, allowing to establish that the variance accounted for in the first factor is 49.14 percent, which reduces the possibility that the data present common method variance problems (Podsakoff et al., 2003).

Reliability and validity

To analyze the reliability and validity of the specified model, the SmartPLS 3 software was used. In the case of individual reliability, it was verified that all items had a standardized factor loading greater than 0.7 (Carmines and Zeller, 1979).

Table 8. Reliability and convergent validity.

Constructs	Standardized loading	Standard error	t-Value	Composite reliability	Variance-extracted index
KCP				0.891	0.6716
KCP1	0.8369	0.0221	37.86		
KCP2	0.8368	0.0258	32.4589		
KCP3	0.8190	0.0323	25.3545		
KCP4	0.7841	0.0316	24.8377		
CLP				0.9362	0.8302
CLP1	0.9308	0.0096	97.3885		
CLP2	0.9070	0.0171	53.0514		
CLP3	0.8953	0.0153	58.5646		
KFS				0.9091	0.7697
KFS1	0.8071	0.0289	27.8905		
KFS2	0.9207	0.0104	88.5189		
KFS3	0.9000	0.0156	57.6141		
ICM				0.917	0.7344
ICM1	0.8081	0.0264	30.5567		
ICM2	0.8592	0.0211	40.8045		
ICM3	0.8696	0.0285	30.557		
ICM4	0.8890	0.0152	58.3602		
FP				0.9517	0.8313
FP4	0.8964	0.0163	54.9988		
FP5	0.9363	0.01	94.0895		
FP6	0.9098	0.0151	60.0573		
FP7	0.9041	0.013	69.5898		
nFP				0.9371	0.7884
nFP1	0.8664	0.0205	42.2926		
nFP2	0.9229	0.0114	80.7375		
nFP3	0.8968	0.0155	57.7263		
nPF4	0.8642	0.0171	50.5302		

KCP: knowledge creation practices; CLP: continuous learning practices; KFS: knowledge and feedback systems; ICM: employees' individual competency management; FP: financial organizational performance; nFP: nonfinancial organizational performance.

The composite reliability index was then verified for each of the constructs. In each case, values above 0.7 were found. It was also verified that the variance-extracted index of each construct exhibited values greater than 0.5. All the above proves the reliability of the constructs (Chin, 2010) and the convergent validity can be observed in Table 8 (Fornell and Larcker, 1981; Hair et al., 2014).

To prove discriminant validity, a confirmatory factorial analysis was conducted, verifying that the square root of the variance-extracted index of each construct exceeds the correlations between the different constructs (Chin, 1998). The correlation matrix and the square root of the variance-extracted index on the main diagonal can be observed in Table 9.

Results

After contrasting the proposed hypotheses in the specified model, four hypotheses were rejected and four were accepted. Table 10 presents the results obtained. The first hypothesis was rejected, which suggests that KCP do not influence on FP. The second hypothesis was not rejected, which allows to propose that KCP positively affect nFP.

Table 9. Discriminant validity.

Constants	CLP	ICM	KCP	FP	nFP	KFS
CLP	0.91					
ICM	0.67	0.86				
KCP	0.71	0.64	0.82			
FP	0.38	0.47	0.41	0.91		
nFP	0.44	0.57	0.53	0.73	0.89	
KFS	0.52	0.72	0.65	0.49	0.61	0.88

CLP: continuous learning practices; ICM: employees' individual competency management; KCP: knowledge creation practices; FP: financial organizational performance; nFP: nonfinancial organizational performance; KFS: knowledge and feedback systems.

The VEI in bold on the diagonal; squared correlations below the VEI.

The third and fourth hypotheses, related to CLP, were rejected. The fifth hypothesis was not rejected, which shows a relationship between KFS and FP. The sixth hypothesis indicates that KFS influence on nFP, since it was not rejected. In turn, the seventh hypothesis was rejected; thus ICM does not influence on FP. Lastly, there is a positive relationship between ICM and nFP since the eighth hypothesis was not rejected.

Table 10. Reliability and convergent validity.

Hypothesis	Standardized loading	t-Value	Conclusion
H1 KCP → FP	0.0741	0.9003	Not accepted
H2 KCP → nFP	0.1743	2.2210*	Accepted
H3 CLP → FP	0.0294	0.3129	Not accepted
H4 CLP → nFP	-0.0136	0.1909	Not accepted
H5 KFS → FP	0.2929	2.5348*	Accepted
H6 KFS → nFP	0.3477	3.8485*	Accepted
H7 ICM → FP	0.1802	1.7560	Not accepted
H8 ICM → nFP	0.2069	2.1159*	Accepted

KCP: knowledge creation practices; CLP: continuous learning practices; KFS: knowledge and feedback systems; ICM: employees' individual competency management; FP: financial organizational performance; nFP: non-financial organizational performance.

* $p \leq 0.05$.

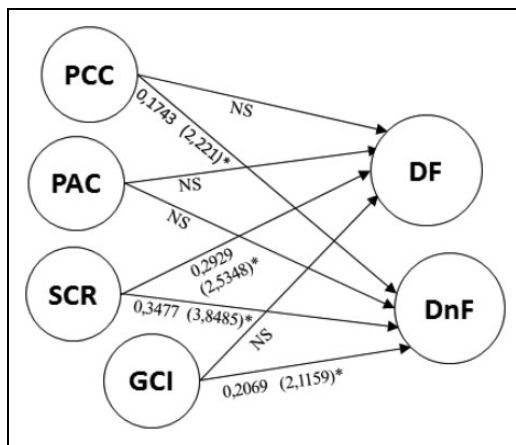


Figure 2. Hypothesis model and results. * $p \leq 0.05$.

The hypothesis model with the results, the rejected (not supported) hypotheses and those not rejected can be observed in Figure 2. For the hypotheses that were not rejected, the value of the standardized loading is presented and the t value of the test appears in parenthesis.

The two hypotheses related to the *CLP* construct were rejected, which indicates that these do not have an effect on firm performance. It must also be noted that the hypotheses related to the *ICM* construct were not rejected; that is to say, positive relationships were found between *ICM* and financial and nonfinancial firm performance.

Discussion and conclusions

This work represents an effort to empirically test the link between *KM* and firm performance. Separating financial from nonfinancial performance in the analysis is a novel approach in the literature.

The main finding of the study lies in the construct that involves *learning practices*. The results suggest that the construct does not affect firm performance in general; that

is to say, it affects neither financial nor nonfinancial performance. On the other hand, the results suggest that *KFS* positively affect firm performance in its two dimensions: financial and nonfinancial.

This result has some significant academic implications, since it is evidenced that soft *KM* practices such as *KCP* and *ICM* only influence on *nFP*; unlike a hard practice such as *KFS*, based on information technologies, which positively impacts on both aspects of *OP*. This finding differs from what other studies have proposed, which have highlighted the key role of soft *KM* practices in high-technology firms. However, in the context of an emerging country which is a technology follower, hard practices become more relevant, as indicated by the present study. This could be explained by the fact that firms operating in traditional sectors, of lower technology intensity, are more pressed to absorb existing knowledge rather than generate it. Thus, *KFS* are of great usefulness to capture the said knowledge from the environment and disseminate it among the members of the organization with the aim of improving *OP*.

Regarding management practice, the above means that giving greater importance to *KFS* could lead to better general firm performance. For this, the management must adopt practices aiming at implementing systems for capture and integral treatment of information on processes, control and revision mechanisms for *R+D+I* projects and systems, facilitating feedback from finished *R+D+I* projects that serve for the development of new projects.

The results also suggest that the adoption of *KCP*, *KFS*, and *ICM* could improve nonfinancial performance indicators such as an increase in customer satisfaction, improvement of corporate image, increase in brand value, and increase in employee productivity.

The results contribute to the discussion around the effect of *KM* practices on firm performance. The separate analysis of such effects on financial and nonfinancial performance is also suggested as a possible research topic. Finally, as future lines of research, it is suggested to conduct studies inquiring on what lies behind the rejection of the hypotheses that relate *CLP* and firm performance.


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