

Knowledge Management and Performance in Mexican Manufacturing Small Business

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Abstract

Knowledge management has been recently considered in business administration literature, as a new discipline that has made an important contribution to the development and implementation of business strategies in organizations. Likewise, it has been considered that businesses, regardless of their size, that have implemented knowledge management as another one of their strategies have obtained significant benefits, being a higher level of performance one of them. In this sense, this paper with a sample of 124 firms analyzes the existing relation between knowledge management and the performance of small business in Aguascalientes state (Mexico). The obtained results show that knowledge management has a significant positive relation in the performance level of the small business.

Keywords

knowledge management, performance, small business

1. Introduction

It has been some decades since Knowledge Management (KM) has gained interest among researchers, academics, and professionals in the field of business management, which has translated in the publishing of a significant number of studies. However, most studies presented in the literature have focused on presenting a theoretical analysis of this construct, and have given little importance to the application of KM in businesses (Palacios & Garrigós, 2006), and the few studies that have implemented KM in organizations have commonly done so using for example intellectual capital, patent development, the creation of data bases or the innovation or performance in large businesses in developed countries (Palacios & Garrigós, 2006), and small business have been left unattended.

Likewise, there is a difficulty in literature to present a concept of KM that is commonly accepted by the majority of researchers and academics. However, Dibella and Nevis (1998) considered that the concept of organization must be an essential factor in the adoption of KM in firms, so KM must be understood

from a global point of view of the business and not only refer to some functions of the firms, since all the functional areas or departments of the organization are generating sources of knowledge. Hence, the definition of KM must be a formal process that determines the type of internal information that must be used to benefit the enterprise (Roy, 2002).

In this sense, KM should be defined as the effective use of systems to collect, use and re-use the knowledge generated in the organization (Davis, 2002); since the use of KM systems has generally produced a sustained growth in companies during the past ten years (Teece, 2001; Castillo, 2002). Therefore, it can be considered that economic performance, strategic development and performance of innovation depend on the degree on which firms can use all the knowledge generated in the organizations, and return this knowledge in activities and generate more value to it (Krogh, 1998).

For this reason, more empirical evidence is needed in literature regarding the consequences that an effective and efficient KM can have in enterprises, especially in small business, which must include competitive advantages (Hall, 1993; Connor & Prahalad, 1996); innovation (Nonaka & Takeuchi, 1995; Dove & Antonelli, 1999; Carneiro, 2000); problems anticipation (Carneiro, 2000); increase in the comprehension of the organization (Buckley & Carter, 2000); efficient use of information (Carneiro, 2000); and firm performance (Wiig, 1997; Teece, 1998).

Even when in current literature there is an important number of studies that have analyzed KM in small business (Beijerse, Lim, & Klobas, 2000; Frey, Sparrow, Heng, Kautz, Thaysen, Wickert, & Herschel, 2001; Salojärvi et al., 2005; Gray, Moffett, & McAdam, 2006; Chan & Chao, 2008; Kruger & Johnson, 2009), no papers was found that related KM and small business performance in developed countries as well as in developing nations. Therefore, Beijerse (2000); Claycom et al. (2001), Salojärvi et al. (2005) and Kruger and Johnson (2009), considered that more investigation is needed in empirical studies that analyze the relation of KM in small business, and especially in developing countries.

In this context, a first contribution of this paper is the presentation of empirical evidence that relates KM and performance in small business in a developing nation, as is the case of Mexico, which contributes to the analysis and discussions of the theory of KM. Another contribution is in the methodology used in this paper, since the information obtained was analyzed through structural equations modeling, which allow to examine the theoretical model in its whole and provides more information for decision making. Therefore, through a sample of 124 firms this paper presents the results of the relation between KM and small business performance.

2. Method

KM has recently been considered in literature as an important resource that besides generating greater competitive advantages in firms (Nahapiet & Ghoshal, 1998; Ginsburg & Kambil, 1999), is an essential function that provides and coordinates mechanisms which increase the resources available in the organization in capacities (Darroch, 2005). Likewise, in a highly competitive environment like the one in which businesses currently participate, it is not enough to make capital, work or prime matter

investment to achieve success, but also investment in improving innovative abilities and knowledge of all members of the organization, since knowledge has become the best strategic resource for companies (Chin-Tsang, 2009).

For this reason, KM is considered in literature as a strategic process in which the value of information is fundamental, and it plays an essential role in the integration of the processes that have a control in the results of the intellectual capital of the enterprise (Loshin, 2001). Hence, the use of KM allows the decision-making process to be more effective for firms, and it facilitates the generation of new knowledge inside the enterprise and the application of this knowledge to generate a greater level of innovation in products, improvement of strategies, processes and firm performance (Probit & Tacit, 2002). Likewise, most of the economic, strategic and innovative performance depends in great measure on the degree in which businesses can use all or part of the knowledge generated inside the organization, and the return of this knowledge in activities that generate more value (Krogh, 1998).

In this sense, one of the main goals of KM is sharing knowledge between all the employees in the organization, which can help all the members to make better decisions, improving significantly the production processes and, in the future, the increase of the performance level of the firm (O'Dell & Grayson, 1999; Milton et al., 1999). Likewise, Drucker (1993) considered that KM can be adopted in different ways according to the businesses' activities, but it has to be oriented generally in the perspectives of generating new knowledge, and eventually its application in the organizational systems to generate new products or services. For this reason, Arthur Andersen Business Consulting (1999) concluded that KM can also provide the quality and quantity of innovative knowledge that the organization requires improving its performance.

Based on what has previously been stated and a detailed revision of literature, then KM can be considered as the most important strategy that can be implemented in organizations, since all business activities can provide value through the application of knowledge (Chin-Tsang, 2009). So, the study of KM has to focus on the management of the knowledge-generating process (AABC, 1999) since, according to Gold et al. (2001), KM must be evaluated in terms of the knowledge capacities of the infrastructure and of the competences in the business, given that these two variables have a significant positive relation with the effectiveness and performance of the firm.

Thus, the competences and capacities of knowledge of the organization will depend in great measure on the knowledge and abilities that its employees possess, since human resources are considered the most important active, more than economic resources, even, in the current society of knowledge (Bertoncelj & Kovac, 2008), given that in KM operations, human resource is the most important element (Chin-Tsang, 2009), and is basic for the creation of knowledge in the organization (Davenport & Prusak, 1998; Ndlela & Toit, 2001; Phusavat et al., 2008). This way, Goh (2002) reached the conclusion that the effectiveness of KM depends in great measure on the capacities that the employees in a business have.

In addition, the evaluation of the employees' capacities can be focused on the increase of value (Niven,

2003; Boomer, 2004), and on the will the employees have to share their knowledge (Foster & Skyrme, 1999; Moore et al., 2001; Niven, 2003; Boomer, 2004), when the organization makes an evaluation on how to distribute the human resources in a more efficient and effective way for KM. Also, to make an evaluation of the employees the organization requires a correct implementation of the human resources policy, an investment in employee training and managers with good training on information systems (Niven, 2003; Boomer, 2004).

On the other hand, the study of the possible effects of the adoption of KM in firms has generally been centered in obtaining quantifiable results (Palacios & Garrigós, 2006), which is the reason why Davenport (1999) was one of the first researchers that considered the relation between KM and performance, and reached the conclusion that a positive relation exists between KM activities and firm performance. Likewise, Firestone (2001) proposed a model called *global estimation of benefits*, in which he clarifies the relation that exists between KM, corporate goals and the benefits of the organization, and he considered that the adoption of KM by firms has a strong influence in the performance.

For his part, Wiig (1999) proposed a cause-and-effect diagram to analyze the adoption of KM in firms, and considered that the addition of value in the model generates different positive effects inside the organization, for example the creation and exchange of knowledge between middle ranks, and employees. Likewise, Decarolis and Deeds (1999) analyzed the impact that organizational knowledge has on the firm performance, considering knowledge as the accumulation and flow of the current knowledge and new knowledge inside the organization (Dierickx & Cool, 1989).

This way, Decarolis and Deeds (1999) concluded that of all variables used for making the flows of operational organizational knowledge, only the location of the geographical area is significant, since geographical location can influence the acquisition of knowledge that is external to the firm. Regarding the variables used to measure the accumulation of knowledge, two of them had a significant positive impact on the firm performance, them being the number of products developed and the number of employments created. Additionally, the accumulation of organizational knowledge and the flow of knowledge had strong significant positive impacts on the firm performance.

Likewise, Dibella and Nevis (1998) considered that adopting KM in firms facilitates the acquisition of new knowledge, which can have a strong influence in the creation and development of new work routines and new mental schemes for employees, generating a higher level of firm performance. Furthermore, Ranft and Lord (2002) concluded that the transfer of knowledge occurs only when the actives of the base of knowledge are acquired and used. Hence, the development of knowledge inside the business is commonly transferred through the human capital, which is why access to knowledge should not be impeded to employees (Szulanski, 1996), since knowledge is an essential element that facilitates the competitive advantages and can improve a firm performance (Decarolis & Deeds, 1999).

On the other hand, KM has been considered in current literature as an important topic in business management, and the evaluation of firm performance has been modified as the development of KM

advances (Chin-Tsang, 2009). Thus, studies that only focus on the evaluation of performance in the financial dimension obviously will only reflect the business operation and the use of resources in a sufficient way, especially knowledge centered in the firm. Nonetheless, in the current era of total customer satisfaction, the customer relation's management and KM are two of the most important topics for firms (Chin-Tsang, 2009).

In this sense, customer KM is one of the essential factors that determine the customer relation management success, and is one of the basic elements for the creation of value for customers (Wayland & Cole, 1997; Swift, 2001), since an efficient customer relation management can provide a greater level of satisfaction and loyalty (Fickel, 1999). Likewise, understanding customer necessities is an effect created by an efficient KM (Fickel, 1999), and this element is essential to increase the relations with customers. Therefore, customer KM is commonly used in literature to support the consult services (Wayland & Cole, 1997), which can increase the firm performance.

Additionally, Johannessen et al. (1999) combined a vision of knowledge with good KM in their study, and reached the conclusion that an organizational vision generates more creation of knowledge, and more creation of knowledge allows a better creation and use of knowledge in businesses, which can significantly improve innovation and firm performance. Likewise, the implementation of KM in firms contributes to the improvement of the processes of new product development, reduces the errors in the introduction of new products to the market, increases the efficiency of the productive processes and evaluates the improvement processes such as product quality, flexibility of production processes, decrease in process timing (Utterback, 1994; Bassi, 1997; Tauhert, 1998; Frey, 2001; Hollander & Mihaliak, 2002; Boomer, 2004), and sensibly improves firm performance (Chin-Tsang, 2009).

For this reason, the literature considers that KM can significantly improve the operation processes in firms, then it would be fundamental to also consider it in performance rates in firms, in the frequency of operational problem solving (Arora, 2002), and in the customer satisfaction (Wu, 1998), which would allow improving the decision-making support system in the organization (Foster & Skyrme, 1999; Boomer, 2004). In this context and considering the information previously presented, the hypothesis referring to the relation between KM and firm performance can be formulated:

H1: Higher KM level, higher firm performance level

2.1 Sample

For this study, the directory of the Business Information System for Mexico in Aguascalientes state was considered, and said directory registered 130 manufacturing firms with 20 to 250 employees up to July 30th. Given that the number of enterprises is very small, surveying all the firms was considered with a reliability level of 99% and a sampling error of $\pm 1\%$. Likewise, the survey was designed to be completed by the managers of the small business, and was applied through a personal interview to the 130 businesses that were selected in a time period between September and December 2010. In the end, 125 surveys were completed, reaching a response rate of 96% and an error margin of $\pm 1\%$.

KM was measured through 4 dimensions: 1) *employee training*, which was measured in a 5-item scale

and adapted from Bontis (2000) and OECD (2003); 2) *policies and strategies of knowledge management*, which was measured through a 13-item scale adapted from Bozbura (2004, 2007); 3) *creation and acquisition of external knowledge*, which was measured through 5-item and was adapted from OECD (2003) and Bozbura (2007); and 4) *effects of the organizational culture*, which were measured through a 4-item scale adapted from OECD (2003) and Bozbura (2007). All items of the four dimensions were measured in a Likert 5-point scale where 1 = total disagreement to 5 = total agreement as limits.

In measuring performance in small business, various authors have traditionally constructed indicators from the perception of small business's managers about their competitive position in regard to the market share, profitability and the obtained productivity by the businesses in a determined period of time (AECA, 2005), hence, performance was measured by a 12-item scale proposed by Quinn and Rohrbaugh (1983).

To evaluate the reliability and validity of the instrument that was used, a Confirmatory Factor Analysis (CFA) was carried out by using the method of maximum likelihood with the software EQS 6.1 (Bentler, 2005; Brown & Byrne, 2006). The reliability of the theoretical method was evaluated by means of Cronbach's alpha and the Composite Reliability Index (CRI) (Bagozzi & Yi, 1988). Additionally, the recommendations made by Chou, Bentler and Satorra (1991) and by Hu, Bentler and Kano (1992), were taken into consideration regarding the correction of statistics of the theoretical model when it is considered that the normalcy of data is present by using also the robust statistics which give a better statistical adjustment of data (Satorra & Bentler, 1988).

The obtained results to the application of the CFA are presented on Table 1, and suggest that the final measurement model provides a good adjustment of the statistical data ($S-BX^2 = 287.487$; $df = 224$; $p = 0.000$; $NFI = 0.888$; $NNFI = 0.935$; $CFI = 0.943$; $y RMSEA = 0.048$). Likewise, as evidence of the convergent validity of the theoretical model show that all the items of the related factors are significant ($p < 0.01$), the size of all standardized factorial loads are superior to the value 0.60 as recommended by Bagozzi and Yi (1988), and the Average Variance Extracted (AVE) of the relation between the factors is higher than 0.50 as suggested by Fornell and Larcker (1981).

Table 1. Internal Consistency and Convergent Validity of the Theoretical Model

Variable	Indicator	Factorial Load	Robust t Value	Cronbach's Alpha	CRI	AVE
Employee Training (F1)	BFT1	0.779***	1.000 ^a	0.842	0.842	0.640
	BFT3	0.850***	9.944			
	BFT4	0.769***	8.084			
Policies and Strategies (F2)	BPE1	0.710***	1.000 ^a	0.889	0.892	0.580
	BPE2	0.742***	9.415			
	BPE6	0.846***	7.353			

	BPE7	0.781***	6.282			
	BPE8	0.713***	5.441			
	BPE9	0.769***	7.261			
	BKO1	0.799***	1.000 ^a			
Acquisition of External Knowledge (F3)	BKO2	0.780***	13.104	0.832	0.834	0.557
	BKO3	0.732***	9.902			
	BKO4	0.668***	7.281			
	BOC1	0.815***	1.000 ^a			
Effects of the Organizational Culture (F4)	BOC2	0.817***	12.177	0.827	0.830	0.620
	BOC4	0.727***	8.084			
	F1	0.882***	11.601			
Knowledge Management	F2	0.724***	5.464	8.993	0.900	0.563
	F3	0.702***	7.492			
	F4	0.911***	7.554			
	PE1	0.685***	1.000 ^a			
	PE2	0.828***	7.762			
	PE3	0.815***	7.997			
Business Performance	PE4	0.764***	7.352	0.883	0.883	0.656
	PE5	0.768***	7.253			
	PE6	0.747***	8.094			
	PE10	0.627***	5.655			

$S-BX^2$ (df = 224) = 287.487; $p < 0.000$; NFI = 0.888; NNFI = 0.935; CFI = 0.943; RMSEA = 0.048.

^a = Parameters constricted to that value in the identification process.

*** = $p < 0.01$.

Regarding the discriminant validity, its measurements are presented in Table 2 through two different tests. Thus, below the diagonal, a confidence interval test is presented (Anderson & Gerbing, 1988), which shows that, with a confidentiality of 95%, none of the two individual elements of the latent factors in the correlation matrix contains the value 1.0. Above the diagonal, the Extracted Variance Test (Fornell & Larcker, 1981) was presented, showing that the AVE between the pair of constructs is greater to the square of the extracted variance. Hence, considering these results it can be concluded that the different measurements to the theoretical model show enough evidence of reliability and convergent and discriminant validity.

Table 2. Discriminant Validity of the Theoretical Model

Variables	Knowledge Management	Business Performance
Knowledge Management	0.656	0.092
Business Performance	0.146 - 0.462	0.563

The diagonal represents the Extracted Variance Rate (IVE), while above the diagonal the part of the variance is shown (the correlation to the table). Under the diagonal, the estimation of the correlation of the factors is shown with an interval of 95%.

3. Result

To validate the hypotheses formulated in this research paper, the Structural Equation Model (SEM) was used through the EQS software (Bentler, 2005; Byrne & Brown, 2006), which allowed to compare the structure of the theoretical model and to obtain the statistic results that permitted the contrast of said hypotheses. This way, the nomological validity of the theoretical model was analyzed through the Chi-square test, through which the theoretical model was compared to the measurement model, finding that the non-significant differences of the theoretical model are good for the explanation of the observed relations between the latent constructs (Anderson & Gerbing, 1988; Hatcher, 1994). The obtained results in the application of the SEM are presented in Table 3.

Table 3. Results of the Model's Hypothesis Test

Hypothesis	Structural Relation	Standarized Coeficient	Robust t-Value
H₁: Higher knowledge management level, higher business performance level.	Knowledge M. → Performance	0.664***	22.690

$S-BX^2$ (df = 217) = 268.030; $p < 0.000$; NFI= 0.946; CFI= 0.954; RMSEA= 0.044.

*** = $P < 0.01$.

Table 3 shows the results obtained from applying the SEM. So, regarding hypothesis **H₁**, the results $\beta = 0.664$, $p < 0.01$ indicate that KM has positive and significant effects on the small business performance. In summary, it is possible to conclude that the KM is a good indicator in the small business performance.

4. Discussion

The results of this empirical study provide enough empirical evidence that demonstrate the existence of a close relation between KM and small business performance in Mexico. Hence, it can be concluded that for achieving a significant increase in performance, businesses must initially adopt and implement an efficient KM, since KM is precisely one of the few business strategies that can sensibly improve firm performance. Secondly, it can also be concluded that KM is an efficient and effective business strategy that provides good results on the firm performance, which is why owners/managers of manufacturing small business must seek training in this important topic, since not only will its correct adoption and application inside and out of the organization depend on it, but also the expected results and their translation into a better performance.

Lastly, it is viable to conclude that the increase of KM will also depend greatly on the abilities and knowledge that both workers and employees possess, since it is they who can transform knowledge into new products or services, for which owners and/or managers of manufacture small business must design and implement a training program for current employees as well as those to be hired in the near future, besides creating an environment in which there employees share their experiences, abilities and knowledge to their colleagues.

On the other hand, the results also show that the design and execution of policies and strategies of KM is the essential factor for KM in manufacturing small business, since KM in organizations will depend in great measure on the type of policies and strategies carried out in businesses. Hence, if enterprises want to improve KM in the organization, they will have to re-design their policies and strategies and adapt them to the changing necessities of the market and to the requirements of the consumers.

Likewise, organizational culture is another of the essential elements that significantly impact KM in businesses, since values obtained inside and out of the organization determine in great measure employees' behavior. Thus, for businesses to substantially improve the management of their knowledge it will require for them to generate a working environment that encourages and stimulates the transfer of knowledge and abilities amongst all the personnel in the organization, so that employees may suggest different ways to do their work and to provide possible solutions to the problems detected in the business.

Additionally, if organizations improve significantly their KM they will have a greater chance to improve the level of business profits, given that, as shown by the obtained results business management impacts positively on performance. Hence, if firms want to improve their performance level, amongst other actions, they must improve their KM. First hand, they must implement actions leaning toward providing for their employees a constant formal and informal formation related to the KM and use regularly formal practices of advising for their employees.

On the second hand, they must design and implement business policies and strategies leaning towards implementing and supporting on a regular basis de development of new ideas, improve the access to information that their employees require to undergo their activities, establish formal processes to

support the innovative activities and invest on research and development of new products. Thirdly, they must stimulate the acquisition of external knowledge, developed by other enterprises as well as public institutions and research centers for their own benefit, as well as the constant use of the Internet to obtain knowledge needed by the organization.

Lastly, organizations will have to make adjustments to their organizational culture in order to constantly encourage their directors and employees to transfer their experiences, knowledge and abilities to new employees, frequently motivate their employees to work as a team in their different activities, and constantly persuade their employees to develop and implement new ideas and to freely express their opinions.

Admittedly, this research paper has diverse limitations, being the following that stand out. The first limitation refers to the sample, given that only businesses consisting from 20 to 250 employees were considered, leaving aside enterprises with fewer than 20 employees, which represent more than 70% of the total number of firms in Mexico. Hence, in future studies it would be recommended to consider all micro and small businesses, as to verify if the theoretical model behaves similarly regardless of the size of the firm. The second limitation relates to the acquisition of information, given that a great number of businesses considered that the information that was asked was confidential, so the data provided by the managers not necessarily reflect the reality of the businesses regarding KM and performance.

The third limitation is that the survey was exclusively applied to the owners and/or managers of the small business selected, so it was assumed that they possessed good knowledge of the KM and firm performance. That is why, in future studies it is recommended that the same survey be applied to the employees, to obtain information that permits comparing both results. The fourth and last limitation of this research paper refers to the scales used to measure KM and performance, given that only qualitative variables were considered, and in future studies it would be recommended to use other types of scales with quantitative variables, as to allow verifying if the results are similar.

Finally, it is important at this moment to reflect and go beyond the obtained results and discuss in future studies, what effect would it have on small business if another scale with more quantitative scales was used to measure KM? What results would be obtained in manufacturing small business if more quantitative scales were used to measure KM as well as firm performance? What type of KM has more effect on small business performance? These and other questions that may come up from this research could be answered in future studies.

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