Knowledge Management: Effects on Innovation in Micro, Small, and Medium-Sized Export Enterprises

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Abstract. Despite their informality, studies have shown the impact of knowledge management activities on innovative performance in SMEs. Consequently, the objective of the study is to establish whether knowledge management processes affect the innovation capability in micro, small, and medium-sized export enterprises in Departamento del Atlántico. This is achieved through a positivist, non-experimental, cross-sectional, and explanatory research, which applies a Likert-type survey to 71 managers. The results show the direct effect of the acquisition, exploitation, and transfer of knowledge, as well as the negative relationship of internalization and the non-significance of the measurement. This makes it possible to show that, although SMEs carry out knowledge management activities, they do not formally apply it, which can be explained from their nature and ways of responding to the demands of the environment.

Keywords: Knowledge acquisition · Knowledge internalization · Knowledge exploitation · Knowledge transfer · Knowledge measurement

1 Introduction

The literature allows us to identify the effect of innovative performance on competitiveness, mediated by the adaptation capability [1–5]. Likewise, knowledge management, understood as the acquisition, internalization, exploitation, transfer, and measurement of knowledge, is one of the main variables that explains innovation [5–8].

On the other hand, Matlay [9], Alegre et al. [6] and Castillo et al. [10], affirm that the survival of Micro, Small and Medium Enterprises (SMEs) requires a flexible structure, which facilitates the fluidity of knowledge within it (Adaptation capability) facilitating its innovative performance, thanks to the search of solutions to the demands of the environment. However, authors such as Durst and Runar [11], Velandia et al. [12]

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Granados et al. [13] highlight that, due to resource limitations, they normally do not develop a formal knowledge management structure, therefore, their learning strategies are generally short term.

Despite this informality, authors such as Grimsdottir and Edvardsson [14], Soto-Acosta et al. [5], Hassan and Raziq [15] showed that, in SMEs, there is a positive relationship between knowledge management processes and innovation. However, most of the studies found in the literature refer to companies located in European markets, generating research gaps due to the lack of studies that refer to companies in Latin America. Consequently, the objective of this work is to establish whether knowledge management processes affect the innovation capability in micro, small, and medium-sized export enterprises in Departamento del Atlántico; through a positivist research, non-experimental design, transversal and explanatory scope.

These approaches suggest that the study is necessary because the results help explain the relationship between knowledge management processes and innovation in SMEs in Latin American context. Pointing out the aspects that managers must consider for improving their innovative performance. In addition, it becomes relevant, due to these organizations represent 99% of formal Latin American companies and create 61% of jobs in the region [16]. Initially, the literature that supports the initial approaches related to the capability for innovation and knowledge management is presented. Subsequently, the methodology is presented to continue with the results and conclusions.

2 Literature Review

This section presents the theoretical fundament used to model the relationship be-tween knowledge management and innovation capability. On literature it is observed that acquisition, internalization, exploitation, and transfer are the basic learning processes in organizations. In addition, it could be understood as the main process to manage knowledge and generate intellectual capital when it is formalized across measurement and supported by information and communication technologies (ICT).

2.1 Innovation Capability

The rapid technological changes and high competition establish that the capability for innovation is a key success factor which forces organizations to implement strategic surveillance processes [5]. It is defined as organizational skill used for developing products and services, production methods, market identification, supply sources and organizational structure; new or substantially improved. An effective capability for innovation allows the organization to materialize economic benefits [17].

2.2 Knowledge Management

Knowledge management is a systematic and formal process, which directs the innate capacities of organizational learning towards the generation of value, from the efficient use of technology and intellectual capital, mediated by the acquisition, internalization, exploitation, transfer, and measurement of knowledge with potential value. Generating

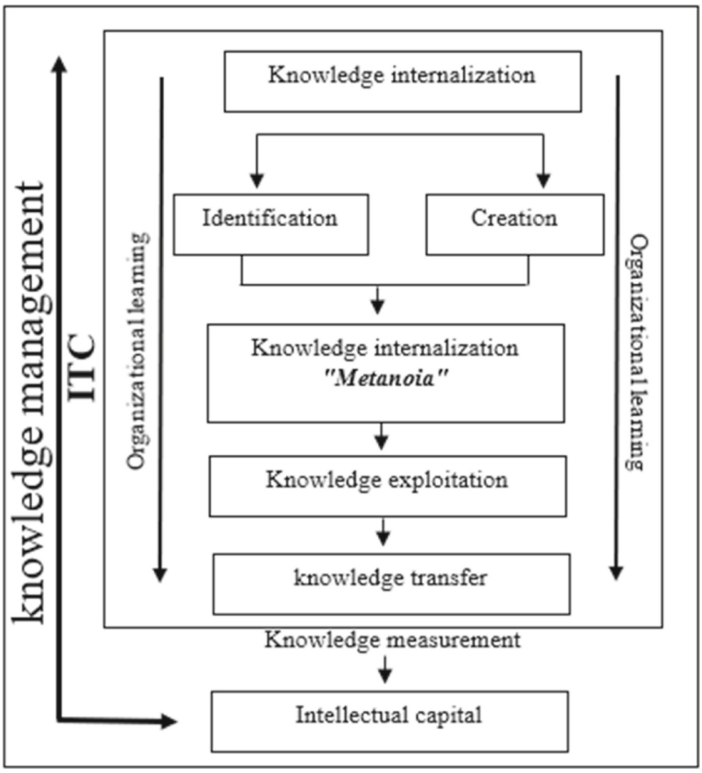

Fig. 1. Organizational learning. Own elaboration

distinctive capabilities that are difficult to imitate (innovation), thanks to the peculiarities of the learning processes and the accessibility of resources [18–26] (see Fig. 1).

Knowledge Acquisition. Knowledge acquisition is carried out internally or externally. The first materializes when the organization intends to absorb knowledge through the efficient use of human capital, creating capabilities that generate competitive advantages, and the second, implementing strategic surveillance, which allow identifying new knowledge with potential value for the organization [23, 27, 28].

Through the studies developed by Durst and Runar [11], Harris [7], Soto-Acosta [5] and Hussain et al. [8], it has been established that in turbulent environments where processes that optimize innovative performance are required, business success is related to the ability to acquire knowledge. Therefore, it can be established that:

H_1: knowledge acquisition has a positive effect on the innovation capability of SMEs.

Knowledge Internalization. It is constituted in the appropriation of acquired knowledge, which arrives tacitly and is transform in explicit by the learning administration [19]. Although the support of ICT is important at this stage, effective internalization requires much more than the simple distribution of information throughout the organization, since it requires the development of the ability to use the new knowledge in the

problem solving, and sometimes this activity, requires unlearning consolidated processes (metanoia) [29]. Consequently, knowledge internalization materializes in the execution of new products, services, methods, or strategies, which contribute to efficient innovative performance [30]. Based on this, it can be deduced that:

H_2: knowledge internalization has a positive effect on the innovation capability of SMEs.

Knowledge Exploitation. It constitutes the ability to use knowledge as a critical element that conditions innovative performance [27]. The effectiveness of the knowledge exploitation materializes when the organization develops the capability to apply it economically [31]; through routines that tend to redefine, improve, or create competencies [32]. Based on these approaches, it can be stated that:

H_3: knowledge exploitation has a positive effect on the innovation capability of SMEs.

Knowledge Transfer. It is an intrinsic quality of knowledge that can be used to transfer it to different parts of the organization or in an interorganizational way, with the aim of taking advantage of its economically. This is achieved through the support of ICT, from the collective use of databases and memories. In this way, concepts are structured, synthesized, and systematized, generating communication processes through which innovative performance is increased [33]. In this order of ideas, it is coherent to say that:

H_4: knowledge transfer has a positive effect on the innovation capability of SMEs.

Knowledge Measurement. For Gómez [34] measurement refers to the evaluation process of the value that is generated from applying knowledge economically. Along the same lines, Larios [35] highlights that this process becomes a mediating variable in the recognition of intangibles with critical value for the company and that potentially enables the development of competitive advantages; making privileged information available to management that facilitates the decision-making process, which has repercussions on innovative performance. These fundamentals allow to state that:

H_5: knowledge measurement has a positive effect on the innovation capability of SMEs.

Figure 2 presents the model made up of the hypotheses proposed in the theoretical framework.

3 Methods and Material

The study was applied to seventy-one (71) micro, small, and medium-sized export enterprises from Departamento del Atlántico, which were selected through simple random probabilistic sampling, supported by the database of the Cámara de Comercio de Barranquilla, conformed for a population of 87 companies. The parameters to define the sample were: margin of error 5%, confidence interval 95% and estimated percentage of 50%.

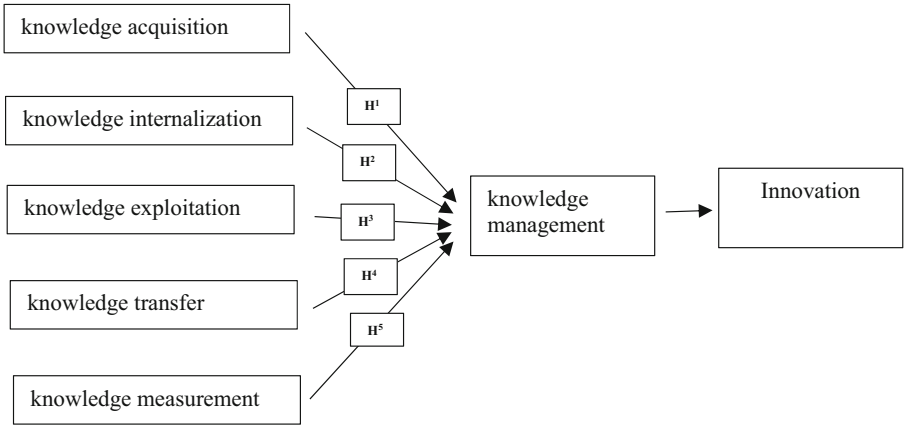

Fig. 2. The proposed research model. Own elaboration

Considering previous studies on knowledge management and innovation showed on Table 1, where there is evidence of use of the Likert scale for its measurement, a survey with this type of scale was used. Designed with five response options and an index of Cronbach's alpha of 0.944. Which suggests a non-experimental, cross-sectional research. The statistical support program was the Statistical Package for the Social Sciences (SPSS) version 24.

Table 1. Scales used in the measurement of the variables

Variable	Scale	Values	Research background
Innovation	Ordinal	5: Totally agree 4: Agree 3: Neither agree nor disagree 2: In disagreement 1: Strongly disagree	Lekhanya [36]; Oskouei [37]; Ngibe and Lekhanya [38]; Sonmez et al. [39]; Soewarno et al. [40]
Knowledge management			Hussain et al. [15]; Al Ahbabi et al. [41]; Maryani et al. [42]; Tamana [43]; Chawla [44]

Source: own elaboration

The survey was built supported by the coherence matrix and the theoretical framework, obtaining a total of 143 statements, which were validated by the judgment of five (5) experts. Subsequently, through the Cronbach's Alpha reliability test, it was reduced to 82 statements, that constitute empirical indicators that tend to measure the processes of knowledge management and the capability for innovation in the empirical reality of the organizations involved in the study. The final instrument was delivered to the 71 managers of the SMEs studied, through email and in person, achieving a response rate of 100%.

The data collected was analyzed through statistical tools such as measures of central tendency, dispersion, and correlation coefficients (Pearson). On the other hand, the hypotheses were contrasted through a multiple linear regression model, from which it was sought to estimate the pattern that adequately explains innovation in micro, small, and medium-sized export enterprises, through the acquisition, internalization, exploitation, transfer, and measurement as elements of knowledge management. To estimate the *betas* (β) and the error (ε) of the model, the method of ordinary least squares (OLS) was used Eq. (1).

$$INNV_t = \beta_0 + \beta_1 ACQ_t + \beta_2 INT_t + \beta_3 EXP_t + \beta_4 TRA_t + \beta_5 MEA_t + \varepsilon \quad (1)$$

where:

INNV: Innovation.
ACQ: knowledge acquisition.
INT: knowledge internalization.
EXP: knowledge exploitation.
TRA: knowledge transfer.
MEA: knowledge measurement.

In the model validation process, it was verified, through the Kolmogorov - Smirnov normality test, that the distribution of errors is normal. In addition, it is observed that the assumption of linearity and the lack of self-correlation between the explanatory variables are met. Besides, the latter do not have collinearity. Finally, it was confirmed that the model meets the criteria of homoscedasticity.

4 Finding

The correlation coefficient 0.864 indicates that there is a statistically strong linear correlation between the explanatory and the dependent variables. In addition, the R^2 determines the model explains the innovation in 74.6%, through the dimensions of knowledge management considered in this study. On the other hand, the typical frequency error was 0.4783. Finally, the value of the Durbin Watson statistic is 2.055, complying with the independence parameters (Table 2). Also, since the P-value is less than 0.05, there is a statistically significant relationship between the means of the variables (Table 3).

Table 2. Model summary

R		R square	R squared square	Standard error of the estimate	Durbin-watson
0.864		0.746	0.726	0.4783	2.055

Source: own elaboration based on the data processed with the Statistical Package for the Social Sciences (SPSS)

Table 3. ANOVA variance analysis test

Model	Sum of squares	gl	Quadratic mean	F	Sig.
Regression	43.610	5	8.722	38.130	0.000[b]
Residue	14.868	65	0.229		
Total	58.479	70			

Source: own elaboration based on the data processed with the Statistical Package for the Social Sciences (SPSS)

To test the hypotheses, the p-values were taken as a reference. In Table 4 it is observed that, the incidence of knowledge acquisition in innovation capability is positive and significant at 1% (β: 0.794, p-values: 0.000), thus confirming H_1. Similarly, a positive influence of knowledge exploitation is noticed, becoming evidence that supports H_3 (β: 0. 608, p-values: 0.000). On the other hand, the relationship between knowledge transfer and innovation is direct and presents a level of significance of 5% (β: 0.163, p-values: 0.040), which supports H_4 (Table 4).

Alternatively, the results do not present empirical evidence that supports H_2, because there is a negative incidence of knowledge internalization on innovation, significant at 1% (β: −0.833, p-values: 0.000). Finally, the causal relationship between the knowledge measurement variable and innovation does not have statistical significance, therefore, H_5 does not present empirical support in the context of the study (β: −0.140, p-values: 0.073) (Table 4).

Table 4. Hypothesis testing

Hypothesis	Model	Std. beta	Std. error	Sig.	Decision
	(Constant)	1.741	0.228	0.000**	
H_1	Knowledge acquisition	0.794	0.089	0.000**	Supported
H_2	Knowledge internalization	−0.833	0.130	0.000**	Not supported
H_3	Knowledge exploitation	0.608	0.119	0.000**	Supported
H_4	Knowledge transfer	0.163	0.078	0.040*	Supported
H_5	Knowledge measurement	−0.140	0.077	0.073	Not supported

Note: * $p < 0.05$ ** $p < 0.01$.
Source: own elaboration based on data

5 Discussion

The study contributes to the literature related to knowledge management and innovation in the context of SMEs, highlighting that the acquisition, exploitation and transfer of knowledge direct the innate capabilities of organizational learning towards innovative

performance, which has repercussions on the development of competitive advantages; confirming that, from these processes, organizational knowledge is aligned with corporate objectives, affecting its strategic positioning, according to the approaches of Cohen and Levinthal [27], Lane and Lubatkin [31], Zahra and George [32], Durst and Runar [11], Lopera and Ledi [33], Harris et al. [7], Soto-Acosta et al. [5] and Hussain et al. [8].

On the other hand, it was established that knowledge internalization has a negative effect on innovation. In addition, the measurement does not present statistical significance, which may be associated with resource limitations in SMEs, which makes it difficult to implement technological tools for storage, coding, and evaluation. This is consistent with what was expressed by Durst and Runar [11], Velandia et al. [12] and Granados et al. [13]. These results do not imply that these organizations do not take advantage of knowledge; in fact, Matlay [9], Alegre et al. [6] and Castillo et al. [10], affirm that their survival requires that internal fluidity be facilitated; however, due to their informality, they solve the demands of the environment, without implementing systematic and planned knowledge management processes, giving little importance to internalization and measurement processes, since they do not find immediate useful results in them.

In this order of ideas, it is valid to make a separation of the dimensions of knowledge management: those that provide immediate results, easy and economical implementation and those of long-term results, difficult and expensive implementation. Thus, the acquisition, exploitation and transfer of knowledge represent, for SMEs, an economic and effective opportunity to cope with the demands of the environment, contrary to the processes of measurement and internalization, which due to their complexity, high costs and lack of results immediate, they are usually despised.

The efficient measurement of knowledge requires the integration of all the processes inherent to its management, however, SMEs to respond to the demands of the environment with scarce resources, assign greater importance to processes of relatively easy applicability, which contribute to solve circumstantial problems (acquisition, exploitation, and transfer). For this reason, it is possible that the decomposition of intellectual capital is not useful, but expensive and not very significant for decision making. Scenario that is consistent with the results obtained. That is, if a process is not formally and completely implemented, how is it measured?

Finally, knowledge internalization is a process that, in addition to demanding technological resources, requires changes in the core competencies of the organization, which aims to affect the organizational culture, which usually requires investment of time and money that will yield long-term results, little related to the efforts. This is contradictory to the nature of these organizations. Under this perception, it is consistent that in the model it has a negative effect on innovation.

6 Conclusions

The objective of the study was to establish whether knowledge management processes have a positive effect on the capability for innovation in export SMEs. The results allow to conclude that the variables acquisition, exploitation, and transfer have a direct and significant effect, while the internalization has a negative impact, and the measurement

has no statistical significance in the model. The latter may be related to the nature of the organizations that participated in the study, which give value to strategies that present short-term and low-cost solutions.

It was evidenced that in the analyzed SMEs there is no formal knowledge management process, however, they have activities related to organizational learning. Normally in literature these concepts tend to be confused; however, managing knowledge requires a formal, planned, and systematized process. On the other hand, learning is an activity that occurs naturally, which can be unplanned and informal and, likewise, present results that affect innovation.

In this sense, export SMEs mainly take advantage of those aspects of learning that are easy to apply and low cost, to respond circumstantially to the demands of the environment. Thus, for this type of companies it is sufficient to acquire, use (exploit) and transfer, normally informally the knowledge that is useful to meet their needs without incurring greater efforts that does not mean for their managers an immediate tangible result, which makes sense within the analyzed model.

The limited use that SMEs give to the dimensions of knowledge management, constitutes a competitive strategy that tends to maximize resources and opportunities, in a type of organization that is characterized by the relative scarcity. The implementation of formal internalization and measurement processes, from the cost-benefit logic, can be negative for the administration. Therefore, from the point of view of SME managers, knowledge management processes can be divided into those of short-term results of economic application (acquisition, exploitation, and transfer), relatively effective to cover short-term needs and the expensive that give long term results (internalization and measurement).

7 Implications

The findings highlight that, to strengthen innovative performance in the context of SMEs, activities related to the acquisition, exploitation and transfer of knowledge become more relevant for managers; nevertheless, it is suggested to extrapolate this research to other contexts, implementing experimental and longitudinal designs that include a larger population and allow the behavior of the explanatory variables to be analyzed over a given period. In addition, it is recommended to include variables such as size and sector, as well as qualitative studies that complement their understanding, when considering the subjectivities included by managers that affect the processes of organizational learning, knowledge management and innovation.

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