

The 2nd International Workshop of Innovation and Technologies (IWIT 2021)
November 1-4, 2021, Leuven, Belgium

Interaction between dimensions of innovation on micro, small, and medium-sized export enterprises

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Abstract

The objective of the article is to analyze the interaction between the dimensions of innovation in the exporting SMEs of the Atlántico Department. A quantitative, explanatory, and non-experimental study was developed. The data are processed through central trend measurements, dispersion, and factorial analysis. Although all dimensions of innovation present a significant and positive factor load, the results show a greater factor load in innovation at the organizational level. Therefore, it is concluded that, if administrative systems, strategic planning, and quality management are aligned, SMEs will have more capacity to identify opportunities to innovate.

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Peer-review under responsibility of the Conference Program Chairs

Keywords: Product innovation, Innovation in process, Organizational innovation, Marketing innovation

1. Introduction

Innovation is a variable that contributes significantly to business growth, because it refers to the ability to achieve novel or substantially improved configurations of processes, products, management systems and marketing methodologies, which allow successful performance in dynamic markets, which affects competitiveness and contributes to meeting needs (Acosta and Luiz, 2013) [1]; (Guisado et al., 2016) [2]; (López et al., 2016) [3]; (Marín and Gil-Saura, 2017) [4]; (Pollák and Markovič, 2021) [5]. For their part, Matlay (2000) [6], García (2013) [7], Castillo et al (2017) [8] and Caballero-Morales (2021) [9] found that the survival of SMEs is related to the

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management of intangible resources. In addition, it is highlighted that, although the needs in terms of innovation management in any type of organization are similar, in SMEs it is much easier to transform tacit knowledge into explicit knowledge, due to the nature of their organizational climate.

For the OCDE (2006) [10], the dimensions from which innovation in organizations is manifested are: processes, products, marketing strategies and methodologies of management. Despite this, there is no consensus in the literature on which of these dimensions has the greatest impact on success in the capability to innovate. Based on the above and because it has been shown that there is some type of innovation in SMEs (Pastor *et al.*, 2019) [11]; (Tchouwo *et al.*, 2021) [12], the study analyzes the interaction between the dimensions of business innovation in SMEs exporters of the Atlántico Department.

2. Innovation in the context of micro, small and medium-sized enterprises

For Adler and Shenhar (1990) [13], innovation is the capability to develop new processes and technological tools. For Kogut and Zander (1992) [14] it responds to the presence of institutional processes aimed at the identification, transfer, retention, and combination of knowledge. On the other hand, Acosta and Luiz (2013) [1] consider that it manifests itself through the implementation of strategies that direct the organization towards a competitive position. For Garzón (2015) [15], the capability for innovation responds to the presence of corporate guidelines, which allow the organization to face market turbulence from the development of new or substantially new processes, management methods, products, and services. improved, which, in coherence with Nonaka and Takeuchi (1995) [16], requires the creation of corporate processes aimed at making individual learning capabilities explicit.

For Dini and Stumpo (2011) [17], innovation is a key factor for competitive success in Latin American SMEs, because they demonstrated that the development of new or substantially improved processes represents an opportunity to place themselves in a competitive position. Along the same lines, Tarapuez *et al.* (2016) [18] and Walter *et al.* (2021) [19] demonstrated that SMEs have an innovative profile supported by the implementation of practices related to strategic surveillance. The improvements acquired through these activities are manifested in management policies, comprehensive strategic processes, and increased profits. Where it is observed that, product innovation represents an opportunity for improvement.

According to what was expressed by the OCDE [10], innovation seeks to optimize the capability of the company to generate value from differentiation strategies (Innovation by product and marketing), cost leadership strategies (Innovation by process) and contextual factors related to organizational culture and climate (López *et al.* 2007) [20].

Finally, Contreras *et al.* (2012) [21] and González-Campo and Hurtado (2014) [22] established that, in the context of SMEs, there is a relationship between orientation to learning and innovation, while the absorption of knowledge is not configured in a determining capability. Furthermore, Gálvez and Pérez (2012) [23] affirm that innovation in processes and product has a positive effect on the performance of operations; for this reason, key aspects are considered to develop a competitive position. However, empirical evidence was presented that determines the little influence that innovation exerts at the organizational level in the generation of value.

3. Methodological framework

The paradigm used is the positivist one, because the research object was built prior to its empirical approach, using theoretical perspectives that allowed modeling the variable addressed (Hernández *et al.* 2014) [24]. The scope of the work is explanatory, since the dimensions that intervene in the variance of innovation were analyzed, to establish which of them has greater weight. Likewise, the design used was non-experimental, cross-sectional in the field, since the variable was approached in its natural context without being deliberately manipulated (Bernal, 2010) [25]. Data collection was done in a single period, through a questionnaire with an ordinal Likert-type scale, whose reliability index is 0.944 out of 82 statements, which was applied to a sample made up of seventy-one (71) Exporting industrial SMEs from Atlántico Department, which were chosen from simple random probability sampling (Hernández *et al.* 2014) [24].

In developing the empirical approach, exporting SMEs from Atlántico Department of the industrial sector were used as the target population. According to the data provided by the Chamber of Commerce of the city of Barranquilla, there were eighty-seven organizations that meet the inclusion criteria (87). The definition of the sample was carried out according to the following parameters: margin of error 5%, confidence interval 95% and an estimated percentage of 50%. The information collected was processed in the Statistical Package for the Social Sciences (SPSS) version 18 and analyzed through measures of central tendency, dispersion, and multivalent tests such as factorial analysis (Montoya, 2007) [26]; (Ferrando and Anguiano, 2010) [27]; (Hernández et al. 2014) [24].

4. Analysis and discussion of results

Regarding innovation by product, the results show that the organizations under study introduced new or substantially improved articles, which are considered by the agents surveyed as superior to those of the competition. In addition to the above, another of the strategies used has to do with the adoption or modification of valuables (See Table 1). This is consistent with what was expressed by Tarapuez et al. (2016) [18].

Likewise, it was established that these organizations implemented new or significantly improved methods of logistics, delivery, or distribution of goods. What allowed to increase its participation in the market. Indeed, the mode determines that option (4) (Agree) is the valuation with the highest frequency. In addition, the median verifies that 50% consider that procedures have been structured for an efficient materialization of activities. Indeed, an arithmetic average of 4.07 with an average degree of dispersion of 0.576, shows that the strengthening of the productive system through innovations becomes important. This agrees with what was expressed by Dini and Stumpo (2011) [17] and Gálvez and Pérez (2012) [23] (See Table 1).

The development of new or substantially improved practices related to supply chain management, process reengineering, quality management, management systems, training, restructuring or the establishment of alliances was observed (See Table 1). In fact, the responses to the innovation indicator at the organizational level ranged between the categories (2) (Disagree) and (5) (Strongly agree), being option (4) (Agree) the one that represented the opinion of the managers. Similarly, an average of 4.09 with a dispersion of 0.645 allows us to infer that, in SMEs, tools are developed for the efficient use of resources. This is consistent with the results of Contreras et al. (2012) [21] and González-Campo and Hurtado (2014) [22].

Finally, it was determined that the exporting SMEs introduced relevant changes in the design, packaging, and packaging of the products. The implementation of promotion techniques and distribution channels superior to those of the competition stands out (See Table 1). Evidenced in the mode that, the category that represents the opinion of the managers was (4) (Agreement option). For this indicator, the arithmetic mean of response was 3.89 with a mean dispersion of 0.668. Based on these results, are reinforced the arguments derived from the empirical studies carried out by Dini and Stumpo (2011) [17] and Gálvez and Pérez (2012) [23].

Table 1. Descriptive statistics Innovation in SMEs

Type of Innovation	Mode	Median	Mean	Standard deviation
Product	4	4	4,16	0,588
Process	4	4	4,07	0,576
Organizational	4	4	4,09	0,645
Marketing	4	4	3,89	0,668

4.1. Innovation in exporting SMEs: Factorial Analysis

When performing the factorial analysis technique, the relationship between the indicators should be indicated from Pearson's r coefficient. The data presented in Table No 2, show a degree of positive, strong, and significant correlation between the different types of innovation. These results suggest the validation of the theoretical assumptions of Garzón (2015) [15].

Table 2. Correlation matrix

Type of Innovation	Product	Process	Organizational	Marketing
Product	1,000	0,935*	0,980*	0,888*
Process	0,935*	1,000	0,954*	0,920*
Organizational	0,980*	0,954*	1,000	0,912*
Marketing	0,888*	0,920*	0,912*	1,000

* Sig. al 0,01

a. Determinant = 0,001

After having examined the correlations, Ferrando and Anguiano (2010) [27] state that the existence of significant interrelationships between the studied factors must be verified. For this, the Bartlett test and the Kaiser, Meyer and Olkin (KMO) analysis are applied. Taking Table 3 as a reference, it is inferred that the dimensions of the variable studied meet the requirements for the purpose of developing the factorial analysis.

Table 3. KMO and Bartlett's test

Kaiser-Meyer-Olkin sample adaptation measure	Bartlett's sphericity test	
0,833	Chi ²	279,087
	Gl	6
	Sig.	0,000

From these tests, it was determined that factorial analysis is the ideal extraction method to establish the weight that each type of innovation has, in the total variance of this capability. For this, the statistical method "Main Components Analysis" was used. In this sense, the data in Table 4 show that innovation, from the organizational point of view, has a greater weight. So, it is the best explained variable. Which agrees with what was expressed by López et al. (2016) [3] because, in the context of SMEs, the development of new or substantially improved corporate policies will contribute to their strategic positioning, which refutes the empirical results of Gálvez and Pérez (2012) [23].

Table 4. Communalities

Type of Innovation	Initial	Extraction
Product	1,000	0,953
Process	1,000	0,956
Organizational	1,000	0,975
Marketing	1,000	0,910

Extraction Method: Main Components Analysis.

Citing Montoya (2007) [26], it can be expressed that a component integrates a series of variables that, in an interrelated way, determine the total variance of the phenomenon (Variable). Table 5 shows that the first component represents 94.855% of the variations presented by business innovation. Reason why, it is considered significant to extract it from the others to study each of the factors that comprise it.

Table 5. Total Variance explained

Component	Auto initial values			Sums of saturations to the square of the extraction
	Total	% of variance	% accumulated	Total
1	3,794	94,855	94,855	3,794
2	0,128	3,211	98,066	
3	0,060	1,495	99,561	
4	0,018	0,439	100,000	

Extraction Method: Main Components Analysis.

In this sense, Table 6 shows the factorial structure of business innovation, which shows that the development of new or substantially improved management methods has the highest factor load (0.987), followed by innovation

in process and product with a saturation of 0.978 and 0.976 respectively. Finally, innovation in marketing has a weight of 0.954. These results reinforce the postulates of Dini and Stumpo (2011) [17] and refute the findings of Gálvez and Pérez (2012) [23].

Table 6. Components Matrix

Type of Innovation	Component 1
Product	0,976
Process	0,978
Organizational	0,987
Marketing	0,954
Extraction Method: Main Components Analysis.	

The greater factor load of innovation at the organizational and process level can be explained from the arguments of Longenecker et al. (2007) [28], who states that due to the nature of these institutions, their effort to survive in the market originates a type of organizational structure, which favors flexibility in the performance of positions, which generates a favorable scenario for the establishment of new or substantially improved management methodologies and production processes.

On the other hand, the lower weight of the factorial load of innovation in marketing can be explained from what was expressed by García (2013) [7], who argues that, due to their low capital investments, these institutions must deal with marked shortage of turbulence in the environment, causing greater exposure to risks. In this sense, it can be deduced that, since management is normally reactive and informal, management would assign less importance to the investment of resources in marketing activities; promoting an adverse environment for the generation of strategies that affect significant modifications in the ability to market products.

5. Conclusions

Due to the socio-economic importance of SMEs and their environment conducive to innovation, this work sought from a quantitative study of non-experimental design and explanatory scope, to analyze the interaction between the dimensions of innovation in exporting SMEs of the Department of Atlántico, managing to establish that practices are carried out whose objective is to generate value, through the development of new or substantially improved processes, management methods, products and services, from which market turbulences can be faced.

Although the trend of generating sustainable solutions through innovative ideas could be evidenced, the factorial analysis showed a greater contribution of new or substantially improved production processes and organizational management mechanisms. Likewise, the reviewed literature defines that flexibility in the performance of functions generates an environment conducive to innovation; For this reason, it is suggested that managers focus their efforts on the development of innovations, taking advantage of the low rigidity in the performance of roles in this type of company.

Using the exporting SMEs of the Atlántico Department as the target population constitutes a limitation that makes it difficult to generalize the results to other sectors of the business reality, which is why it is recommended to develop research whose purpose is to characterize business innovation with another type units of analysis, to make comparisons with the results obtained.

Finally, because the study of business innovation is subject to the characteristics of each unit of analysis, where particular aspects of management styles have an influence, it is recommended to develop research whose methodological foundations are based on the paradigm of epistemological complementarity, in order to achieve a more in-depth empirical approach, which allows recognizing the subjectivities of managers, with the aim of strengthening the results and conclusions through qualitative views of the same object of study.

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