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Original Research Article

Identification of the Causes that Hinder Innovation in Companies in Chihuahua, Mexico

Dr. Juan Javier Gutiérrez García[1], Dr. J. Emilio Méndez-González[1*]

[1]Teacher-Researcher in Faculty of Accounting and Administration at the Autonomous University of Chihuahua

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***Corresponding author:** Dr. J. Emilio Méndez-González
Teacher-Researcher in Faculty of Accounting and Administration at the Autonomous University of Chihuahua

Abstract

Innovation is a fundamental activity for product diversification and market expansion through the improvement of production processes and product quality. Understanding the causes that hinder innovation within organizations will allow the establishment of mechanisms to reactivate this important activity. With the aim of identifying the causes that hinder innovation in commercial and industrial organizations, the survey identified as CIS-4 was applied to 169 organizations in the state of Chihuahua, with 101 corresponding to organizations in the industrial sector and the rest in the services sector. The results showed cost as the main obstacle, followed by the knowledge factor. By applying the standard instrument for measuring innovation CIS-4, a comparison was made with the application to 20,747 companies in the countries of France and Italy, similarly obtaining cost as the main determinant hindering innovation. The results help us understand how innovation can be stimulated and supported.

Keywords: Innovation, Obstacles, Services, Industry, CIS-4 Survey.

INTRODUCTION

One of the most important topics in the global economy is directly related to innovation. According to Beltrán-Morales *et al.*, (2018) [1], the essence of innovation is driven by human creativity, and they add that only through innovations can new models and market systems be created, along with new knowledge, closely linking growth and innovation. Innovation is a requirement for large, medium, and small enterprises. To achieve this, it is necessary to consider two main perspectives, one of which is discovering market needs, and the other is developing a vision of competitiveness that generates significant changes in the development of products and services that stand out in a large-scale economy (Aulleta & Ojeda, 2008) [2]. Therefore, to gain a competitive advantage in manufacturing and service organizations, it is crucial to engage in innovative activities (Galia, F *et al.*, 2017) [3]. Similarly, Furman *et al.*, (2002) [4], state that the ability to innovate, understood as the capacity to generate and market streams of innovation over time, is essential to understand the differences in innovation performance and growth among economies. Also, Rojo *et al.*, (2019) [5], express that innovation efforts in organizations place them in a better position in domestic and international markets. Companies that invest more in research and development (R&D) tend to be more competitive, diversify their products, and expand market coverage. In addition, they can improve production processes and the quality of products offered in the market. Organizations can start with very simple products and processes and, depending on the maturity of their business, manage products and processes with greater technical complexity. This organizational maturity occurs collectively, as it also means promoting knowledge of product and process management among people throughout the company, from operations departments to executive and management levels.

The organization's goal is to make innovation something systematic that can be managed, measured, and controlled, so it is necessary to develop and strengthen the skills to achieve it (Gómez & Valencia, 2020) [6]. Measuring innovation is an important criterion for selecting concepts, definitions, and classifications, as

well as knowledge as its foundation. Innovation should be analyzed through two approaches: as an activity and as the result of that activity. Given the above, we have: "Innovation is a new or improved product or process (or a combination of both) that differs significantly from the unit's previous product or process and is available to potential users (product) or being used by a unit (process)" (OECD/Eurostat, 2018, p.20) [7].

The World Intellectual Property Organization (WIPO) (2022) [8], reports on the performance of the innovation ecosystem in 132 economies and tracks the latest global innovation trends, positioning Mexico in the third place in the ranking of the top three economies in the Latin America and the Caribbean region, with Chile in first place and Brazil in second place. The latter is a newcomer to this important ranking. It also indicates that Mexico dropped a place compared to the year 2021. Globally, Switzerland is positioned in first place with 64.6 points, followed by the United States, Sweden, and the United Kingdom. Mexico is positioned in 58th place with 31 points, below Ukraine with 31.0 and the Republic of Moldova with 31.1 points, and above the Philippines with 30.7 and Montenegro with 30.3 points. However, the economic evolution observed between 2020 and 2022 cannot be seen in the context of a usual business cycle. Rather, there were two external shocks of historical proportions. One was the global pandemic, which caused a long period of economic stagnation worldwide. Then, just as the recovery was in full swing in 2021, the conflict in Ukraine had a significant impact on the world economy. However, key indicators of global investment in science and innovation (scientific publications, R&D spending, international patent applications, venture capital deals) remained robust in 2020 and 2021. In particular, venture capital has experienced a boom, although to varying degrees depending on the country and sector. However, the early signals for 2022 point to possible future challenges. While innovation was resilient in 2020 and thrived in 2021 in line with the global economic recovery, a second external shock that occurred shortly thereafter and, together, represents a true double blow, will be difficult to overcome.

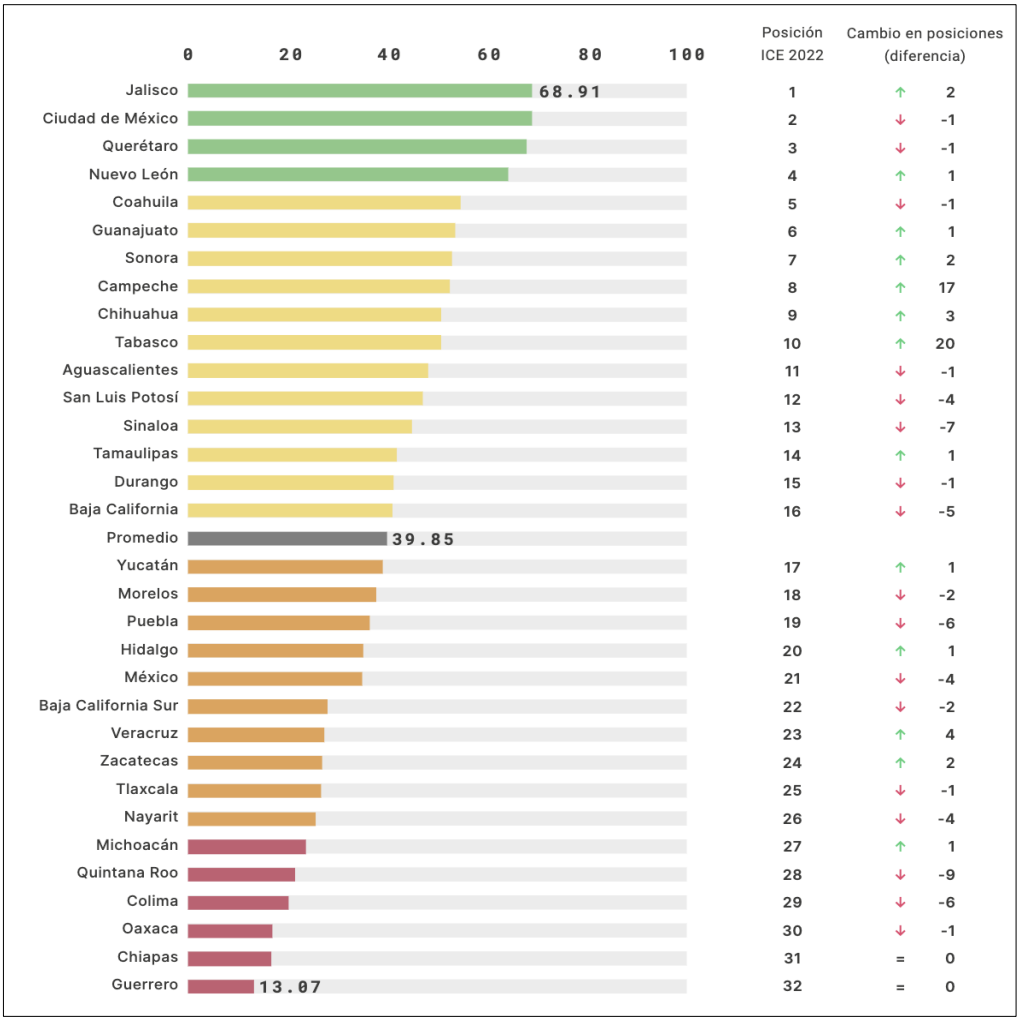

Figure 1: Innovation Subindex Positions
Source: **Mexican Institute for Competitiveness, A.C. (2022) [9]**

The Mexican Institute for Competitiveness, A.C. (2022) [9], quantifies the capacity of an organization to create, attract, and retain talent and investment in Mexico. A competitive state is one that creates conditions and capabilities for the sustainable development of human and physical capital, leading to higher productivity and well-being of its population. The index calculates the structural capacities and favorable circumstances of the entities, through 72 indicators classified into 10 sub-indices that calculate the different dimensions and nature that make up the foundation of growth and development in the 32 entities. One of the sub-indices is Innovation, which calculates the sufficiency of the states to compete successfully in the economy, especially in areas of high added value, intensive use of knowledge, and cutting-edge technology. It takes into account the ability to generate and apply new knowledge, so it has indicators on the characteristics of organizations, background related to R&D, and patent creation. States with more innovative economic sectors attract more investments, creating a virtuous circle of training and knowledge creation. Based on the innovation sub-index, it is found that Chihuahua is positioned in 9th place above the average of the states, as shown in Figure 1.

The above clearly indicates that we must develop strategies to enhance the competitiveness of the state of Chihuahua in three main aspects: the capacity for the generation and application of new knowledge, the research environment, and patent creation. Chandra, Erocal, Padoan, and Braga (2013) [10], suggest that innovation at national and international levels is adversely affected by economic crises, and this impact is reflected in reduced expenditures on R&D, human capital, risk acceptance, and technology expansion due to decreased trade and foreign direct investment (Chandra *et al*., 2013) [10].

However, it is not only external problems to the company that hinder innovation. This article posits that there are also internal barriers that can affect the willingness to innovate. Mirow *et al*., (2008) [11], indicate that specific barriers for an innovation project must be identified to outline possible deficiencies in a particular organizational structure. D'Este *et al*., (2012) [12], add that discovering these barriers will enable organizations to recognize the challenges they will face when embarking on innovative activities. Given this, the general objective was established to identify the causes that hinder innovation in industrial and service sector companies in Chihuahua, Mexico, using the CIS.4 survey, which is aimed at assessing innovation in organizations. The survey provides relevant information on innovation capacity, covering aspects of different sectors by organization type, types of innovation, and aspects of innovation progress, as well as objectives, sources of information, public financing, innovation expenses, etc.

As specific objectives of this research, they were:

1. Identify the causes that hinder innovation in industrial and service sector companies in Chihuahua, Mexico.
2. Compare the results obtained with other applications of the CIS.4 instrument in other countries.

The knowledge generated in this research will assist in structuring support for organizations by the Secretary of Innovation and Economic Development of the state of Chihuahua for innovation and continuous improvement with a positive impact on competitiveness in organizations. In this same vein, the Oslo Manual establishes innovation as a primary goal for improving the quality of life and reaching all individuals, institutions, economic sectors, and countries. In connection with this, innovation must be measured through research, and the resulting data should be used to help develop policies that drive innovation to achieve social and economic goals (OECD/Eurostat, 2018) [13].

MATERIALS AND METHODS

The research was empirical, employing a quantitative, cross-sectional, and descriptive approach. The CIS-4 instrument was used to collect information in the year 2022. The study subjects were organizations in the industrial and service sectors in the state of Chihuahua, Mexico. A random sample of 169 organizations was selected, with 101 belonging to the industrial sector and 68 to the service sector.

RESULTS AND DISCUSSION

Table 1 presents a summary of each obstacle with a high percentage of importance, grouped by its innovation factor.

Table 1: Causes Hindering Innovation

Cause	Obstacle	High Importance Rate Economic Sector	
		Services	Industry
Cost	Lack of funds within the company or group.	44.80%	46.20%
	Lack of external financing sources for the company	42.60%	37.60%
	Costs of innovation too high	38.20%	21.80%
Knowledge	Lack of qualified personnel	26.50%	19.80%
	Lack of information about markets	22.10%	16.80%
	Lack of information about technology	14.70%	13.90%

Cause	Obstacle	High Importance Rate Economic Sector	
		Services	Industry
	Difficulty in finding partners for innovation cooperation	0%	1.00%
Market Reasons	Factors of uncertainty in market demand for innovative products or services	11.80%	19.80%
	Market dominated by established companies	10.30%	16.80%
Reasons Not to Innovate	Not necessary due to previous innovations	4.40%	7.90%
	Not necessary due to no demand for innovations	4.50%	5.00%

As observed in the information, the lack of funds within the company or group is the major obstacle to innovation, with 44.8% in the services sector and 46.2% in the industrial sector. It is also noteworthy that cost is the primary cause hindering innovation, given the percentages shown for each obstacle, followed by knowledge as the second cause.

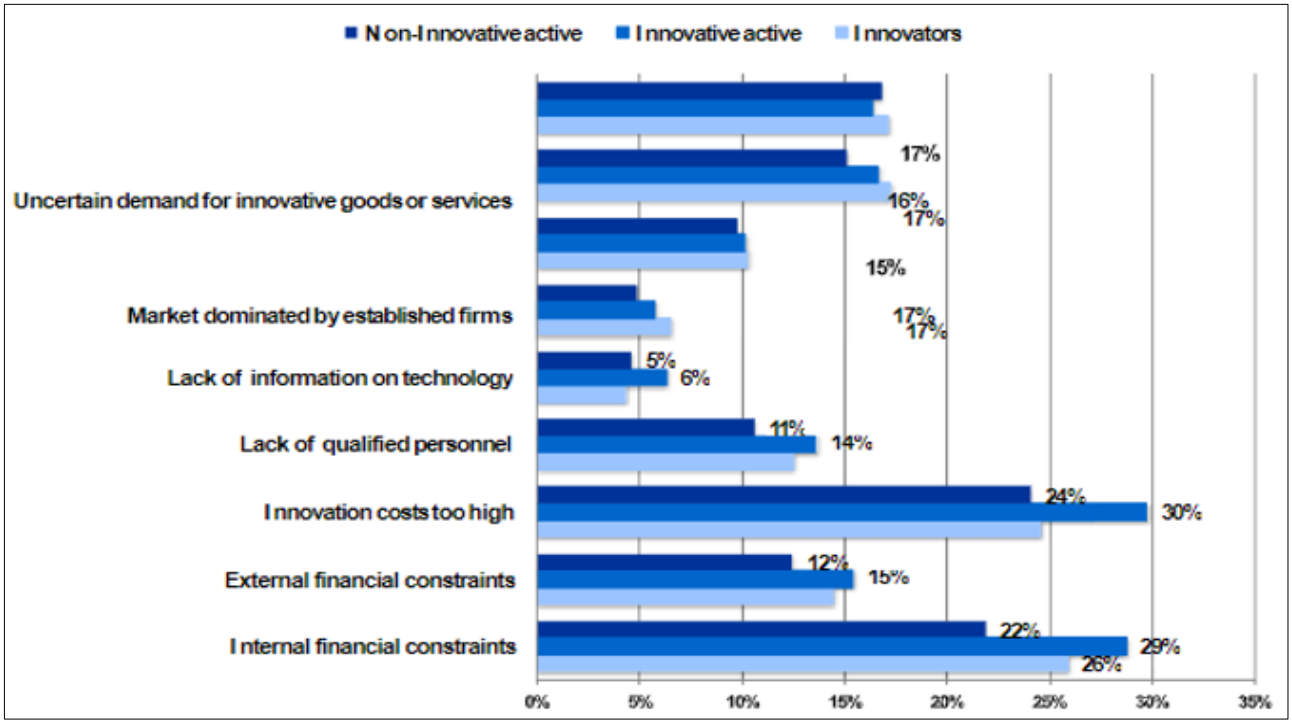

Figure 2: Innovation Profiles and Perception of Obstacles
Source: CIS 4 (France and Italy), 20,747 companies (Galia, F. *et al.*, 2017) [3]

It is observed that the cost factor is likewise the primary barrier to innovation, with percentages higher than 21% in all types of classified enterprises as follows: an enterprise is defined as Innovative if it introduced at least one new or improved product or process; an enterprise is defined as Active Innovator if it did not introduce a new or improved product or process but was involved in innovation activities that it abandoned or was still engaged in at the time of the survey application; and Non-Active Innovative Enterprises, which are indifferent to innovation activities (Galia, F *et al.*, 2017) [3].

CONCLUSIONS AND RECOMMENDATIONS

From the aforementioned results and discussion, it can be concluded that the study demonstrates the existence of internal factors hindering innovation in the industrial and service sectors in the state of Chihuahua, with cost being the most determining factor compared to knowledge, market reasons, and reasons for innovation. The results help understand how innovation can be stimulated and supported. The interconnection between these internal factors suggests that any strategy to boost innovation in Chihuahua must be comprehensive and simultaneously address the cost factor, as well as other underlying elements.

Since innovation is one of the main drivers of competitiveness, government support for investments in this area is crucial. The results of this research demonstrate the current and urgent need for companies to excel in a globalized and competitive world.

In this context, economic limitations play a crucial role in companies' ability to foster innovative processes. The relevance of the cost factor aligns with

the economic reality of the region, where investment and financial resources are positioned as fundamental elements to overcome internal challenges hindering innovation. Furthermore, it can be inferred that addressing these barriers would require strategic approaches that contemplate measures to mitigate the costs associated with innovation in these sectors.

This provides a deeper understanding of the challenges faced by companies in Chihuahua in their pursuit of innovation, emphasizing the need for specific strategies that address the financial component as a key driver for fostering innovation in the region.

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