

A qualitative-conceptual approach to competitiveness in SMEs technology-based companies in Latin America

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Abstract

This study examines the general circumstances for the growth of technology-based businesses (TBEs) in Latin America from a multifaceted standpoint that is characterized by examining the status of public institutions and individual actions that aid in their development in the absence of funding sources resources, both financial and non-financial. According to a survey of the literature covering the years 2015 to 2021, the major obstacle to their survival is the poor productivity of the elements that influence the ongoing presence of public organizations to ensure their functioning. This paper aids in understanding the degree of stability required by this group of businesses to make up for the inadequate diversity of Latin American national output.

Keywords: Technology-based companies, Latin America, competitiveness, factor productivity, literature review.

1. Introduction

The competitiveness of technology-based companies depends on the organization's ability to maintain efficient operations and meet customer demands, while also capitalizing on emerging trends in

technology. Entrepreneurial competitiveness is defined as the competitive advantages and performance of an entrepreneur's firm, independent of other firms. It includes all factors that are intrinsic to an entrepreneurial founder, his business model, or his entrepreneurship ecosystem: his knowledge, skills, core competencies, access to finance and technology. To attain a competitive edge over their rivals, businesses must integrate new technology with their existing research, design, and manufacturing processes (Cheah et al., 2022).

Technology-based companies are differentiated by their ability to add or increase their production or service capabilities, or both. An important factor in determining competitiveness involves the government policies that control how they do business at home and abroad (Astadi et al., 2022; Banicello et al., 2021). Many technology-based companies are facing challenges to maintain their competitive advantage and protect market share. These firms are taking a variety of measures to address research and development costs, production costs, and operating expenses to compete better in the marketplace (Hozler et al., 2021). Technology-based companies have a competitive advantage over traditional companies due to the nature of their product offerings. The ability to develop advanced products requires an extensive involvement of many different functions and departments, leaving few places for traditional competitors to compete against (Belitzki et al., 2022).

Technology-based companies are the ones that use technology as part of their core competencies. This builds on the previous concept of conceptual approaches on organizational behavior in organizations. In this approach, a technology-based entity is conceptualized as a corporation or business unit operating in a market with inherent physical and social constraints (Rico et al., 2022). In addition, the ideas and experiences of technology were considered necessary precondition for organizations to succeed in their inner workings and external relationships with their stakeholders (Landazury et al., 2022).

The social and economic inequalities that exist in Latin America are among the most severe in the world (Pozo-García et al., 2019). The persistent high levels of inequality and poverty that prevail across the region have created important barriers for access to funding for entrepreneurs, especially for low-income women who have little access to credit sources, who face greater challenges accessing capital markets and whose firms exhibit lower survival rates than their male counterparts (Mario Alberto de la Puente Pacheco et al., 2020; Zhang & Cang, 2021).

The primary findings of entrepreneurial competitiveness impact in Latin America include the following. a. Latin America is a highly heterogeneous region b. Entrepreneurial activity is more widespread, but more underdeveloped than in other regions of the world c. Innovative entrepreneurship appears to be developing but

entrepreneurial competitiveness is far from being effectively developed (Acevedo-Duque et al., 2021).

Entrepreneurship support in Latin America is the most important environmental factor for wealth creation, a key tool – and by itself a vital means of social inclusion – to achieve equitable economic growth in the region (Maurizio et al., 2022). Entrepreneurship support has become an increasingly important topic of interest to many countries across Latin America (Guerrero-Amezaga et al., 2022). A broader view of entrepreneurship at this time would also include rethinking approaches to fostering innovation clusters associated with creative industries and new technologies.

The region has a relative productivity lag, which reflect the asymmetries in their technical capacities relative to the international boundary (Cortés-Sánchez, 2019). The rate at which developed economies innovate and integrate technology into their production structures is greater than the rate at which Latin American nations can absorb, copy, adapt, and innovate based on global best practices. Latin America exhibits substantial productivity discrepancies across enterprises in each nation that are significantly greater than those seen in industrialized countries.

This research article reviews the qualitative and perceptive impact of public support for the financing of technology-based companies in the region of Latin America from the intellectual production related to this topic, in addition to the consequences on the form of operation of these types of companies, especially regarding internal decision-making and the implementation of technological advances to the public. The general objective is to better understand the investigative and productive dynamics of technology-based companies based on the limited historical support for this type of organization in the study region. This research is justified in understanding the impact of public financing for the subsistence and growth of these organizations (especially those created in academic environments) on their operations in the markets they enter.

2. Literature review

2.1. Technology-Based Companies: a conceptual approach

Technology-Based Enterprises (TBEs) are a theoretical idea that materializes the conversion of information into products or services as a link key to a new process of industrialization that permits entry to the commercial market of technical and scientific activities (Tumelero et al., 2018). The term TBEs refers to businesses created to utilize goods or services that heavily rely on technology or know-how generated via research efforts. Given the close relationship of dependency with its

environment and the fact that, in most cases, the viability of its insertion in its target markets requires its complementation with other products or services without which your application is not possible, the possibility of development of self-employment by this type of company is relatively low (Clarysse, 2011). Among the benefits offered by TBEs, because of the activity that they carry out, in comparison to businesses with traditional activities, stand out: Rapid growth of its activities, a constant source of innovations, the creation of high-quality employment, and the capacity to generate high added value in the economic activity (Al-Mamary et al, 2020, Yáñez-Valdés, 2021). In addition, there are ongoing instances of collaboration across local, regional, and national micro and macro levels, making state initiatives vital but insufficient. Its significance rests in the crucial connection between the public, commercial, and academic initiatives that achieve, via participatory strategic planning, to support the development and competitiveness of these firms (Calzada Olvera, 2022).

Long-term profitability and liquidity issues are the two standout features that define the financing of its activities. In their earliest stages, the majority of TBEs are developed and use without commercially viable products (Paula & Silva Rocha, 2022). Lacking a cash flow to support its expansion, it is continuously forced to seek outside funding to pay for the costs of developing its initial products, creating significant internal financial conflicts. Conventional lenders, such as banks frequently reject projects of this kind because of their high risk, high cost of evaluation due to the complexity of these technologies, and incapacity of the corporations to provide guarantees due to the predominance of their intangible assets. This sort of project has more informational asymmetries between the lender and the entrepreneur, which worsens the imperfection of the market for access to these capitals (Raffo et al., 2008; Seker & Yang, 2014).

Due to the lack of a comparable product on the market or a lack of knowledge about the target market, it might be challenging to anticipate the future cash flow of a project when requesting funding. There are typically three steps to this sort of company's financing: In the first scenario, the new company's emergence, and connection to seed money are made possible by this finance. Start-up funds: After a firm is founded, this discussion occurs because it needs additional funding to expand to a scale that ensures its existence (Garone et al., 2020; Crespi et al., 2016).

Consolidation funds (expansion/purchase) are the ones that firms can use to finance their growth into new markets or to meet significantly higher production demands (Aguilera et al., 2017). They usually occur throughout the maturation phases of businesses.

In terms of marketing processes, advanced technologies are marketed and made available to consumers through a variety of techniques. The

advancement of technology does not guarantee that the company that created it can introduce it directly to the market (Chu, 2021). These technologies frequently do not reach the market because of the financial requirements to secure manufacturing-related investments. On the other hand, the granting of technological licenses, such as intermediate strategy, denotes an agreement with another organization for the commercialization of its technology, which was previously protected, in return for monetary compensation (Crespi & Dutrénit, 2014; Carvallo & Kasman, 2005). The most severe example of this tendency is patent transfer, which involves the selling of entire rights to a third party. The usefulness of competitive intelligence and surveillance system technology in businesses is highlighted by the significance of gathering and integrating environmental knowledge. Technology watch is the term used to describe the systematic method of observing technology developments in a market setting (Lugo Arias et al., 2020a).

The first step for each business is to identify the knowledge providers around them. Among them are universities, governmental and private research institutes, and other businesses in the same industry or one completely unrelated to their own. Knowing the state of the art in science and technology will enable you to take advantage of potential advancements and forewarn any threats that may already be present (Lugo-Arias et al., 2020).

The understanding of the advancements made by other organizations might help with those that are planned to be made within the corporation. From a competitive point of view, patents are an invaluable source of information, both knowledge created by other entities and paths taken in their pursuit, such as patentable innovations, gives valuable information about the accomplishments of the competitor. At the same time, it is also feasible to locate potential investors or partners in research projects.

2.2. SMEs innovation in the Americas

The ability of SMEs to participate in the most formal processes of innovation, which is crucial in industries where competitive dynamics force frequent and significant changes in foundational knowledge is recently relevant. According to several scholars, the overall movement of commercialization of knowledge has made access to it more difficult in recent decades (Belitski et al., 2022). If there were information availability, potential users would gradually decrease and the international circuits of knowledge elaboration would become more closed and strictly controlled by highly hierarchical chains (Belitski et al., 2022).

The primary outcomes of these combined initiatives are cost benefits, which may be attained through more effective and competitive supplier negotiations, market access to high-volume clients, and technology.

SMEs incorporated into business networks can widen their network of contacts and, in doing so, multiply the sources of new knowledge; lower the cost of individual investments, and use the most productive technologies that manage to incorporate more effectively (Maurizio et al., 2022). Analyzing the performance of SMEs and their contribution to the productive processes of the region's countries is a relevant issue (Viglioni et al., 2020).

One approach is by quantifying the employees or by having the sales rates. The first one does not take into account sectorial differences (as well as differences across branches within sectors) If revenues are thought to be a better measure of a company's true economic size, the first criterion may overestimate the participation of SMEs (Rico et al., 2022; Chu, 2021; Dini et al., 2011). However, this criterion is employed by national statistics institutes that give the information accessible, whilst the institutions that formulate and implement policies use the sales variable as a cut-off criterion to determine the size of the firms (Paula et al., 2021).

It should be highlighted that several governments are undertaking steps to increase the quality and amount of information about this sort of firms. Based on the available data, it is possible to conclude that SMEs in Latin America makes a substantial contribution to employment creation.

The number of firms that fall within this category of economic actors is also important, however, there are significant disparities between nations. Official data from Colombia, Mexico, and Peru show a relatively high number of microenterprises, which explains the low involvement of SMEs in the overall number of firms (Tumelero et al., 2018). In Ecuador, the ratio of registered formal microenterprises is smaller, and as a result, the weight of SMEs is higher. However, SMEs have a small role in the export dynamics of the region's countries, accounting for less than 8% of overall exports in most cases (Rico et al., 2022; Chu, 2021).

In Latin America, these enterprises have a clear preference for the home market. The region's small and medium-sized businesses have a significant productivity gap when compared to major corporations. These production disparities are significantly more pronounced in the area than in the more industrialized countries, notably in the US. The productivity in the region achieves 44% of the productivity of large companies in the best of circumstances, whereas in North America, this number ranges between 72 and 80% (Dini et al., 2011)

Similarly, for medium-sized businesses, productivity is frequently less than 61% of that offered by the great corporations of Latin America, although in the European nations is roughly 84% (Dini et al., 2011). Similarly, the area has more variation within the category of SMEs than in European countries. Throughout fact, in Latin America, the agents range from small businesses barely surviving in the market to vibrant,

exporting medium-sized businesses. This has significant political ramifications and necessitates the development of programs, various tools, and intervention approaches based on the type of recipient. On the contrary, the heterogeneity of the agents is rarely taken into consideration in the design of interventions in the region. The following assumption is developed throughout this paper: H1: The funding of technology-based firms influences their innovation activities, which also recognizes and appreciates how businesses have changed in terms of management, structure, and marketing.

3. Methodology

The following references gathered are evidence of work done and results attained and are the base for the present study: Research and innovation spending as a percentage of GDP and the number of researchers working full-time equivalent hours per thousand people in the labor force. The results include the number of articles with SCI citations per thousand people and resources in R&D investment. Second, assess the total number of patents granted in 2018, 2019, and 2021, as well as the value of the reliance rate (the proportion of resident-submitted patent applications to non-resident-submitted patent applications) during the same period.

4. Results

There is a significant gap in the number of scientific publications, but the indicator that measures publications concerning R&D investment is higher than that of the three industrialized countries used as a reference (the United States, Spain, and Canada), implying that the expenditure is more efficient. Regarding patents, the collected data shows that in all the Ibero-American countries studied, the variation in the number of registered patents (which in some cases, such as Mexico, has been very significant) has occurred concurrently with a significant increase in the dependency rate, in contrast to what is recorded in the United States (dependency rate stable) and Canada (declining dependency ratio). Most data on SMEs' creative activity comes from surveys on innovation.

Unfortunately, they are non-comparable studies that define the reference world in various ways. Nonetheless, these studies enable us to establish certain regularities or key elements of SMEs behavior: Process innovations often outnumber R&D activity; and intersectoral variance is substantial.

Although precise statistics are difficult to obtain, extrapolation of data from innovation surveys suggests that the percentage of SMEs with innovation initiatives ranges between 29 and 32% of the total. The proportion is greater for medium-sized businesses and substantially

lower for small businesses, yet smaller businesses that innovate may spend resources that, as a percentage of their sales, exceed those of large corporations. There's also evidence of a link between export performance and economic activity.

Expenditure on innovation activities is much greater among successful exporting organizations. They work harder in all categories: technology development and adaptation; purchase of incorporated technology (capital goods, hardware, and software); and acquisition of divested technology (transfer, training, and consultation).

At this point, the outcomes that are significant for the advancement of technology include the establishment of research institutes, universities, and public businesses devoted to funding scientific and technological research; the promotion of research projects targeted at industries thought to be important for the industrial development of the nations; and the creation of incentive systems to encourage research.

A top-down intervention methodology and a linear view of innovation, which ignored the importance of demand and customer and supplier articulation, were other characteristics of this phase. This pattern saw a reversal in the nineties. The logic of supply supported a method centered on demand and market dynamics to address the inefficiencies caused by the import substitution system because of the divergence between the technological institutions' offer and the demands of the producing system limited the state's involvement, which was only justifiable when markets and, particularly public goods showed signs of collapse.

Many of the organizations established in the previous stage, as well as the incentives for innovation that were created, were primarily made to meet the demands of the most innovative businesses, which had the capacity to recognize their needs, formulate petitions or proposals, and direct those resources toward supporting organizations. These support measures have contributed to the development of the gap between them and organizations with high and low competitiveness because of the significant structural variability associated with the production of the Latin American nations. Then, a fairer assessment of a systemic character is contrasted, where the significance of the relationship between supply and demand, innovation as a learning process, which unites public and private players at various points in the production chain, is recognized.

With very few exceptions, strategies or initiatives promoting the growth of innovation have just recently been created. In terms of resources, although it is not always feasible to quantify precisely the investments made openly and only for the innovation of SMEs in the nations under study, it is plausible to infer that these investments have been increasing considerably in recent years.

These resources increased by almost 111,8% from 2015 to 2019. In Chile, the situation has become slightly complicated: the resources of the innovation plans increased from 214 million dollars of the first Science and Technology Program from 1993 to 1997 to 402 million dollars with the Technological Innovation Program (1997–2002) before being decreased to 179 million dollars with the Program Technological Development and Innovation (Rico et al., 2022).

A sizeable portion was used to finance the instruments of the management of promotion of the development corporation, which increase SMEs productive capabilities. The implementation of the most recent science and technology programs has helped build or enhance a more complex institutional structure marked by the development of coordinating organizations that place a larger emphasis on the private sector.

The task of developing a long-term national innovation plan falls within the purview of Chile's Innovation Council for Competitiveness, which is connected to the Republic's Presidency. There are no institutions devoted solely to the development of innovation in SMEs, and while in some cases this responsibility is delegated to the innovation entities, in others the instruments intended to stimulate the innovation of SMEs are administered by the productive promotion entities.

In some nations, a process of decentralization of promotional activities is underway resulting in creating innovation funds, and establishing regional development initiatives and agencies (Lugo Arias et al, 2020b; Dini et al., 2011).

5. Discussion

The support tools to encourage innovation in SMEs have undergone an evolution that corresponds, albeit with a sizable lag, to the developments in the international discussion on innovation in smaller businesses. Two components of this phenomenon are: first, the adoption of a definition of extensive innovation that also acknowledges and values the transformations of businesses in terms of management, organization, and marketing; second, the methodological importance given to the relationship systems that businesses establish with their institutional and productive environments. Here is an overview of some information and ideas from experiments in innovation promotion. One of the crucial connections for the spread of new information is the contact between businesses.

Physical proximity, joint work, the development of trusting relationships are necessary to enhance continuous knowledge, sometimes explicitly and much more frequently tacitly. The development of associative practices between same-industries companies stimulate innovations in

small businesses, according to the experience of international organizations.

The development of associative strategies enables the visualization of new competitive opportunities that encourages entrepreneurs to implement improvements in their businesses. First, the development of a shared strategy almost immediately propels the main businesses in this coordinated effort toward the creation of instruments for shared management that enable them to collaborate on choices and track the success of their joint activity. Participating entrepreneurs are forced to change their management strategies changing management processes with formal organizational procedures. The adoption of standards and quality control systems is another aspect of innovation that is influenced by involvement in horizontal networks.

This is particularly clear when it comes to the inclusion and effective application of more productive technology in commercial settings as well as in the processes used for transformation and elaboration.

For the combined selling of goods or services or for concerted production, which entails, in many cases, it becomes necessary to establish shared standards. The spectrum of promotion initiatives that emphasize the importance of generating relationships between the company and its productive environment, the programs that promote the development of horizontal relationships with the coverage and performance of the Chilean SMEs are ratified as essential for a correct interpretation of the points. Numerous nations in the area, including Colombia, Perú, Uruguay, and Brazil have implemented supplier development programs that are focused on modernizing small enterprises.

Another kind of communication is to link businesses with organizations that aid in the development of tailored penetration tactics in fast-moving and competitive markets. This form of business development, known as a "business accelerator," which has been developed primarily in Mexico, aims to increase the impact of policies that support SMEs by encouraging commercial activities that can produce significant outcomes in terms of adding value through the creation of high-quality jobs.

6. Conclusions

When it comes to the resources invested and the data availability pertaining to the outcomes produced, the examination of policies to stimulate innovation in Latin American SMEs paints a picture that is still far from sufficient. SMEs are not often expressly included in the target demographics of programs, and in every instance, attention to this category of businesses is very new. Certain organizations and programs consider actively supporting innovation in small enterprises, while

others are restricted to adopting those innovation modalities that are seen to be more practical for SMEs. Important advancements are seen, though they are still sporadic, within the context of a broad definition of innovation that encompasses the commercial realm and the productive organization, which seems to suggest that some of the conceptual elements mentioned would have permeated the creation of Innovation programs and instruments for SMEs.

The competitive environment and businesses' capacity to interact with institutions and the surrounding economy play a significant role in these processes. It must not ignore the region's SMEs' heterogeneous performance conditions and significant performance backwardness. The existence of a significant number of businesses that cannot be supported by SMEs various programs are created with a specific category of businesses in mind—the most dynamic, capable of articulating their needs clearly, and able to effectively utilize the tools at their disposal. This helps to explain why SMEs receive so little support in Latin America (in all areas, not just the promotion of innovation). More direct support is needed for the creation and consolidation of applied research in technology-based companies to increase the chances of efficient productive diversification.

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Authors' Consent

The authors are aware of their appearance in this article based on their participation.

Ethical Standards

This article follows the publication guidelines of the journal.

Conflict of Interests

No conflict of interests.

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