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# Innovation Capacity, Entrepreneurial Orientation, and Flexibility: An Analysis from Industrial SMEs in Ecuador

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**Abstract:** Through the methodology of a case study, this paper presents a holistic analysis of the relationship between innovation capacity, entrepreneurial orientation, flexibility, and environmental factors. Three studies were conducted in the context of chemical-pharmaceutical industries, SMEs, in a small economy. Likewise, they analyze the relationship between the innovation capacity and internationalization of those companies. The studies provide further evidence of the relationships between areas of interest, where links among entrepreneurial orientation, flexibility, externalities (local and international), and innovation capacity are clear. Finally, this paper contributes to the theory-building on innovation capacity and internationalization from a scholarly perspective while presenting a practical view for practitioners.

**Keywords:** innovation capacity; entrepreneurial orientation; flexibility; internationalization; knowledge management; case study



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## 1. Introduction

Nowadays, the competition in the world market is increasingly intense due to the accelerated process of globalization. Companies must develop new business models and products that allow them to meet the needs of their customer niches and know the changes that occur in the market [1]. In this context, innovation plays a relevant role in the survival and growth of organizations [2,3]. In addition, globalization requires firms to consider internationalization approaches to generate a competitive strategy [4–6]. Hence, it is necessary to identify the strategic factors that motivate the capacity of companies for innovation and internationalization [5,7–9].

The relationship between innovation and growth is more intense in small and medium-sized enterprises (SMEs) [2,10]. The ability to develop and offer new products with state-of-the-art technology will consolidate them in the market while increasing their profits [11]. Innovation is among the important capacities that allow SMEs to have a high level of competitiveness in the national and international markets [12]. The source of SMEs' innovation relies on the capacity for developing solutions to serve customer needs and taking part in networks to exchange resources and capabilities [13–15]. Additionally, innovation capacity constitutes an instrument for a firm to leverage its competitive advantages and performance [16].

As SMEs contribute to the growth and well-being of their economies [17], this group of enterprises has gained significant attention among policymakers, scholars, and practitioners [9]. Several aspects are considered in the literature to analyze SMEs' internationalization performance, environmental factors, and competitive capabilities [10,18–22], though the research in this area of SMEs is far from arriving at a defined conclusion [9,21,23]. The pressure of the competitive business environment might lead the SME to bankruptcy

due to its limited capabilities and resources. Hence, these firms need to leverage their main capabilities to achieve a competitive advantage to take part in dynamic, uncertain, and complex markets [24–26].

The capacity for innovation emerges as one of the most effective tools for SMEs to overcome those challenges while gaining competitiveness [21]. Innovation has a direct impact on the performance of an organization reflected in its market, production, and financial results. SMEs with higher innovation performance report superior profitability, productivity, and growth rates compared to their less innovative competitors [9,27,28]. Furthermore, the importance perceived by business owners of activities related to R&D is positively associated with their expenditure on R&D [29]. In the context of global markets, the survival and success of a firm depend on the proper leverage of its internationalization and innovation capacities [30].

The development of innovation capacity may be slow due to a lack of resources and exposure to increased risk [18]. In the same venue, public infrastructure and policies, market environment, and competition, as external factors, influence firms' decision-making while planning their innovation strategies and internationalization processes [21,31,32]. SMEs' entrepreneurial orientation enables them to overcome these limitations and enhance innovation capacity and internationalization [33–36]. Likewise, flexibility is recognized as a capability that SMEs use to cope with their lacks and environmental uncertainty while improving their innovation capacity and internationalization process [6,24,25,37]. Therefore, innovation performance and internationalization of SMEs are subject to both company-specific factors and systemic factors [38]. While there is a real relationship between innovation and internationalization, it is not clear which leads to the other [39–41].

Due to the relevance of the areas of interest studied in this work, these factors have been broadly investigated, although primarily each one regarding innovation or internationalization. Further, most research has been conducted in developed or transitioning economies [9,21,23]. This highlights the gap in the literature to study these factors from an integrative approach. This research addresses this gap by analyzing from a holistic approach the relationship between innovation capacity and internationalization in connection with entrepreneurial orientation, flexibility, and environmental factors in industrial SMEs of a developing economy.

A qualitative study was conducted on three SMEs classified within the Ecuadorian chemical and pharmaceutical sector. This research studies the influence of these factors on innovation capacity and the development of internationalization processes. Hence, this work contributes to theory-building by providing an integrative understanding of the impact of entrepreneurial orientation, flexibility, and environmental factors on fashion SMEs' innovation capacity and internationalization in a small economy. This paper also sheds light on the relationship between innovation capacity and internationalization. The empirical inputs of this research provide practical implications to practitioners drawn from the analysis of the factors under study.

The remainder of this paper is organized as follows. Section 2 outlines a comprehensive theoretical framework to set the context of this study. In Section 3, the case study methodology and analyzed SMEs are introduced. In Section 4, findings of the case studies are discussed in relation to the existing literature. Finally, Section 5 draws remarks and conclusions with theoretical and practical implications.

## 2. Theoretical Framework

### *2.1. Defining Innovation Capacity*

Innovation defines the capacity to conceptualize and develop a new product or service, including new production methods, and maturing skills that promote creativity and knowledge transfer [11]. Innovation within companies constitutes a necessary strategy to facilitate the creation of competitive advantages [42]. It is a critical tool to achieve long-term growth, reach sustainable performance, and survive changes within the industry [43].

Innovation capacity contributes to improving the firm's performance through two innovation activities (Figure 1), either by introducing new innovative products that temporarily enhance the market position or by the innovation of process that allows the profit to persist as it transforms the internal capabilities of the company [44,45]. The latter is divided into three activities: process innovation, marketing innovation, and organizational innovation [31].

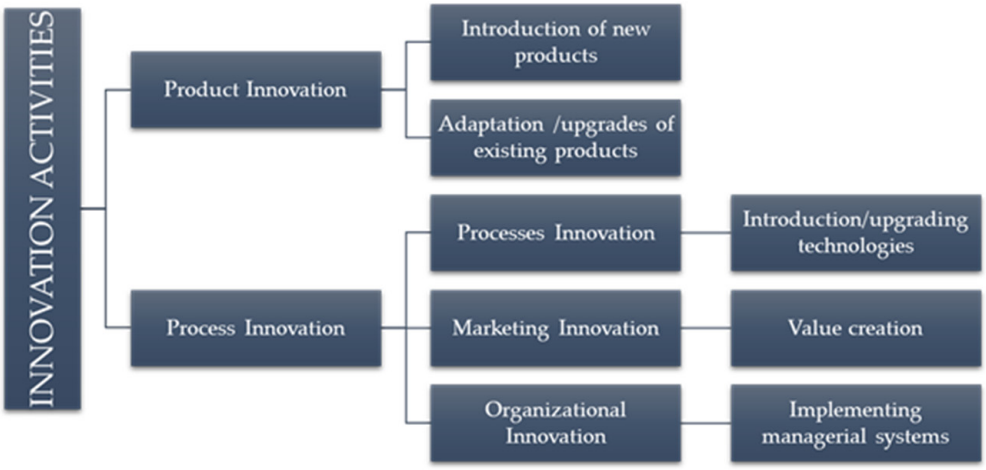


**Figure 1.** Innovation activities structure.

Product innovation results from the creation and introduction of new products, which differ from those already tested or are improved by the company [31,46]. These new products generate certain advantages and returns to the company risking to invest in product development [44]. Process innovation consists of new operating methods applied by introducing new technology or improving the existing one [47]. This allows organizations to reduce costs and generate economies of scale while improving product quality. The processes are related to a general strategy for developing the activities that transform the inputs into outputs, and the procedures establishing the steps to modify them [31]. Process innovations contribute to both business process and product innovation.

Marketing innovation focuses on creating more efficient strategies, generating greater product value for customers [48]. There exist three components of market orientation that companies should focus on: customer orientation, competition orientation, and cross-functional coordination [49]. According to the Oslo Manual [50], it consists of a marketing method not previously used in the company, providing significant changes in the design, packaging, positioning, promotion, or price to increase sales.

Organizational innovation involves implementing new management systems and internal functioning [51]. Organizational innovation originates from changes in the practices and procedures of the company, modifications in the workplace, and in external relations as an application of strategic decisions [50]. Designing innovation strategies requires applying innovation in products, marketing, and organizational processes, where the areas in the companies are linked [52]. These strategies allow not only to generate more profits but also a long-term presence. In addition, the innovation strategy must balance the portfolio of innovation activities concerning the degree of change, source, and risk span [53].

The Oslo Manual states that innovation activities include R&D, engineering, design, marketing, brand equity, activities related to intellectual property, employee training, software and database development, management activities, and efforts related to acquiring or renting tangible assets [31]. The innovation capacity of an organization encompasses the potential to produce innovations [54,55]. It is a fundamental element in innovation management as it adds value to the organization's processes. Companies with this capacity should leverage their skills and assets to promote new products, processes, services, management, marketing, or organizational systems [56,57].

Kostopoulos et al. [58] deepen the causes of this relationship and find that, due to customer demands and consumer preferences, companies introducing innovative products with advanced features and capabilities are more likely to achieve higher sales levels. Previous studies have pointed to the positive impact of innovation capacity and strategies on innovation activities, primarily product and process innovation, which in turn results in a positive influence on SMEs' performance [27,59–63]. Zatezalo and Gray [64] affirmed that SMEs have a greater capacity for innovation. Innovation activities are different from those carried out by large companies, as they are aimed at carrying out collaborative activities with other companies, customers, and suppliers [65]. Hence, SMEs' innovation capacity is crucial to gain a competitive advantage and a sustainable company [7,42,66,67]. This rises Proposition 1:

**Proposition 1.** *SMEs' innovation capacity has a positive impact on developing innovation activities.*

### *2.2. Entrepreneurial Orientation and Innovation Capacity*

To survive in highly dynamic and competitive environments, companies need not only an entrepreneurial spirit [68,69] but also the ability to translate this spirit into innovation activities [34,51,70]. Hence, Dess and Lumpkin [33] postulated that there is a strong link between entrepreneurship and innovative behavior. This is achieved by linking them with the owner's administrative competence, location, investment in information technology, management of the production cost, the creation of networks, and the ability to train and generate knowledge in the labor factor [71–73]. This positively impacts firms' innovative capacity by allowing all functions to behave together, also constituting, in this way, an ideal condition for innovation [42]. The development of these competencies positively affects the performance of an organization. Zahra and Das [52] support this hypothesis, concluding that adopting a comprehensive innovation strategy increases company profits and, in the long term, can generate growth and profitability.

Entrepreneurial orientation's construct encompasses methods, styles, and decision-making practices led by executives and owners to act entrepreneurially [74–76]. Additionally, this construct leads to how a firm will later perform value-creation activities [68]. Three main elements emerge from an entrepreneurial orientation, i.e., proactiveness, which involves acting on an unexplored opportunity before counterparts, risk-taking, and innovativeness for promoting creative ideas for new products and processes [76–83]. Regarding SMEs, Rosenbusch et al. [84] argued that these firms are able to undertake successful innovation activities thanks to their entrepreneurial orientation and smaller structures. Finally, scholars have found a positive effect of proactive entrepreneurship on innovation activities through the mediation of prospector strategy [80,85].

### *2.3. Entrepreneurial Orientation, Innovation and Internationalization*

McDougall and Oviatt [86] defined the international entrepreneurial orientation as combining proactive, risk-seeking, and innovative behavior seeking to create value in a firm while crossing national borders. The process of internationalization is in itself an innovation, as it is also viewed as a way to enter or create new markets [77,87–92]. Similarly, innovation constitutes a link between market orientation and company performance [79,83,93], where both internal experiential learning (including R&D) and external learning (e.g., market learning and network learning) enhance the innovative capacity [94]. Therefore, the innovation capacity is improved by the learning processes of a firm, which further leads to better performance of the company in international markets [21,77]. SMEs need to constantly enhance or innovate their processes and their products to become more efficient and effective in the niche in which they participate [19,63]. Though, innovation activities are typically linked to risk-taking decisions. Hence, organizations need to guard themselves against the probable negative effect of those risks [76]. Thus, SME decision-makers need to balance entrepreneurial orientation to an optimal level to further grow in the market [95,96]. On this basis, Proposition 2 is submitted:

**Proposition 2.** *SMEs' entrepreneurial orientation has a positive impact on innovation capacity.*

### *2.4. Flexibility and Innovation Capacity*

It is recognized that "a critical need in today's competitive environment is the ability to design and introduce new products as customer's needs, materials and technologies change" [97]. Furthermore, firms require a strategic plan to allocate their resources and define their innovation activities and results to serve their clients while keeping up with the changes in environmental businesses [98]. Hence, alongside an entrepreneurial orientation, the organization is required to outline its functional responsibilities in collaboration with its strategic partners [13,37].

Flexibility emerges as a dynamic capability of an organization to align with strategic partners for adapting to changes and market requirements while providing a rapid response in its business environment [6,99,100]. This capability allows organizations to react or respond to the market "to produce a variety of products in the quantities, costs, and qualities that customers expect, while still maintaining high performance" [101]. It is necessary to gain trust, market knowledge, and commitment to identify the required levels of flexibility and innovation in a certain business environment [25]. Nevertheless, flexibility is costly. Developing new products in a business network requires leveling between a committed and flexible relationship between the network partners to support risky decisions and duties that innovation activities and outcomes demand [102–104]. Hence, SMEs leveraging an optional level of flexibility as a dynamic capability will enhance their innovation capacity and firm performance [105–107].

**Proposition 3.** *SMEs' flexibility has a positive impact on innovation capacity.*

### *2.5. Environmental Factors and Innovation Capacity*

The performance of SMEs is influenced by specific factors and systemic factors, which go beyond their immediate management control, affecting their actions and competitive responses [38,108]. External factors are also identified and evaluated to define an organizational strategy or public policy [31]. Likewise, these have a significant impact on SMEs [109], prevent the development of organizations, and possess serious consequences on innovation capacity [110]. These factors include the activities of clients, competitors, suppliers, the labor market, legal, regulatory, competitive, and economic conditions, and the supply of technological know-how [31,110]. The perception of innovation systems highlights the importance of the external environment when conceptualizing the innovation activities of companies as an integral part of political, social, organizational, and economic systems [111–113].

The market environment is among the external factors driving the decision-making SMEs [114]. Meeting customer expectations through companies' products is vital for the company [115]. Customer feedback and its integration into the innovation processes bring advantages to a company [116]. This relationship provides the company with the information necessary to update the design and characteristics of products, adapting them to consumer preferences [117]. On the other hand, competition plays a key role in creating favorable conditions for innovation [118,119]. To increase market share, the companies need to analyze expansion opportunities. Ribau et al. [96] postulated that the company must analyze the competition to identify and define the strategy that guarantees the satisfaction of its customers by generating quality products or services at affordable prices. It is necessary to comprehend the strengths and weaknesses of competitors and long-term capabilities and strategies, and thus understand the products or processes capable of modifying the current competitive power [120].

Public policies and infrastructure influence investment decisions and affect or stimulate innovation [121,122]. Directly, through the regulatory framework, innovation can be promoted or hindered by clearly benefiting or harming the interests of a company [123].

If the regulatory framework is adequate, companies can appropriate the results of their innovation efforts [124]. The legal environment might influence the decisions of companies carrying out innovation processes by motivating or preventing investments in innovation [31]. The tax scheme impacts the cost of business activities. If taxes are high, innovation processes are discouraged by allocating fewer resources for this aim. Hence, regulations might affect the innovation activities of companies, including restrictions on trade, tariffs, interest rates, and employment [125,126]. With this in view:

**Proposition 4.** *Environmental factors influence SMEs' innovation capacity.*

### *2.6. Innovation Capacity and Internationalization*

Although SMEs face these threats caused by external factors, globalization has contributed to the development of these firms by creating new market opportunities and reducing communication costs and trade barriers [21]. In this regard, SMEs fostered their internationalization and possible development. Nevertheless, the dynamics between internationalization and innovation are not straightforward. It is believed that they reinforce each other [39–41]. There is no consensus on the studies evaluating the relationship between innovation and internationalization [30]. Lachenmaier and Rottmann [127] suggested that the industry context might be the primary cause of the heterogeneity. Nonetheless, studies focused on the effects of internationalization on innovation show a positive influence [21,89,128–130]. Competing in international markets implies accessing new knowledge and new forms of production, leading to opportunities for innovation. In addition, internationalization generates resources encouraging innovation capacity and, in turn, investing in activities oriented to R&D [131]. In light of this:

**Proposition 5.** *Internationalization and innovation capacity mutually reinforce each other.*

## 3. Methodology

Qualitative research of an exploratory nature was conducted primarily [132] to answer and conceptualize the research question: how do SMEs' entrepreneurial orientation, flexibility, and environmental factors surrounding the enterprise influence their innovative capacity to develop, in turn, a competitive strategy for international markets? Three Ecuadorian companies were analyzed from the chemical and pharmaceutical sector. These studies provided information to identify patterns that respond to the research question and derive a generalization from them [132]. The case study methodology provides a comprehensive understanding of the investigated issues within a given context [132–134]. Moreover, the case study as a qualitative research strategy allows for exploring elements related to each other within the study environment.

This methodology has facilitated the theoretical development (theorization) of the positive relationship that exists between innovation and internationalization [56,126,135–139]. Through the application of three case studies, this research seeks to expand the field of study and explore the factors of the environment, the entrepreneurial orientation, and flexibility of an organization in its capacity for innovation, and how these fashion the way companies carry out their activities of innovation (introduction of new products, introduction of new processes) [132,134]. These studies will allow for a broader understanding of the relationships of the analyzed elements in the environment of the chemical sector, which depends on the constant flow of new models and innovations, which encourages a moderate to high intensity of R&D to compete [140].

Despite the limitations of the methodology of case studies when subscribing to a specific context, this method is widely recognized for its contribution in the construction of theoretical frameworks in their initial stages by providing inputs through empirical observations, particularly for understanding highly complex topics [82,132,134]. Furthermore, " . . . case studies would provide missing input on how innovation capabilities

are actually understood and implemented among small businesses. Case studies could also bring clarity to the role of different contextual factors, as they are central in the development of innovation capability among small businesses" [2].

The following sections present a transparent, narrative, and systematic analysis of the data obtained through a series of interviews, allowing us to structure the cases in a coherent and well-founded way.

### *3.1. Case Studies Framework*

As aforementioned, the present study investigates the relationship between the externalities of an SME, its entrepreneurial orientation, flexibility, innovation capacity, and internationalization processes within the context of a developing economy. Figure 2 presents the framework, including the propositions posed for the exploratory analysis of this research.

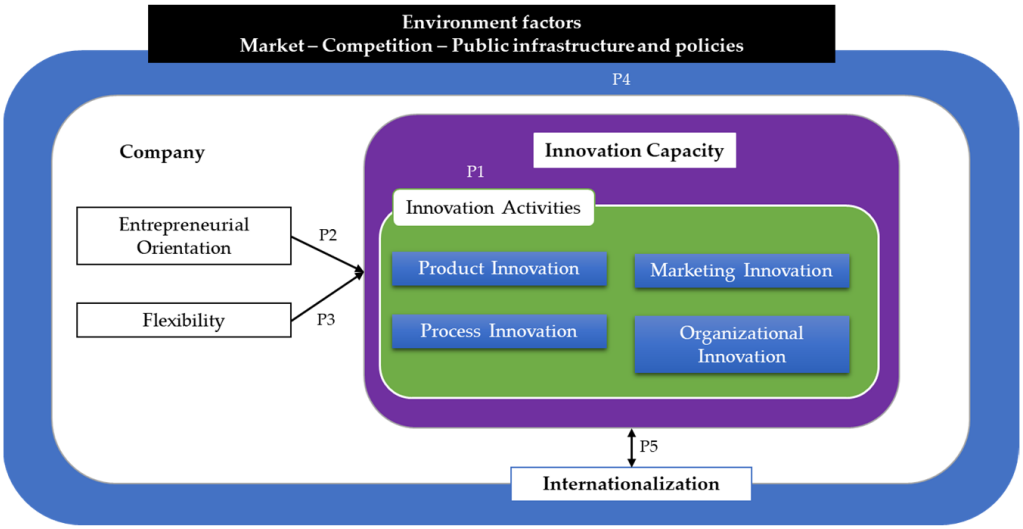


**Figure 2.** Case studies framework.

Through the analysis of three case studies of industrial SMEs of the Ecuadorian chemical sector, this research examines the impact of entrepreneurial orientation and flexibility as internal factors of these SMEs on their innovation capacity. This impact is evaluated in terms of their innovation activities: product innovation, process innovation, marketing innovation, and organizational innovation, as well as the influence of innovation externalities (i.e., market, competition, and public infrastructure and policies) on their innovation capacity. Finally, this research also explores the relationship between innovation capacity and the internationalization processes of these companies.

### *3.2. Selection of Cases*

The data collected correspond to the chemical and pharmaceutical sectors due to the intensity of R&D and innovation identified in that sector [140]. McKinsey Global Institute identified five large segments that group different industrial sectors depending on the sources of their competitive advantages, production factors and location of production centers, the intensity of R&D and innovation processes, and arrival in target markets [140]. The 'global innovation for local markets segment' includes the chemical industrial sectors (including the pharmaceutical sector) [140]. Industries grouped in this segment are characterized by a moderate to high intensity of R&D and depend on the constant flow of innovations in new models or products to compete. In addition, due to the nature of these products, the manufacturing and distribution centers must be close to the customers to minimize transport costs. Further, the effects of these industries on the environment and safety are subject to certain regulatory aspects and commercial agreements [140,141].

In the case of Ecuador, these sectors contribute to the development of parallel production sectors. Therefore, it is necessary to identify the makeup of these industries to have a precise idea of the current potential and future opportunities for these industries both in local markets and in international markets. The chemical sector has been relatively stable during recent years (2017 to 2020), with an average registered activity level index of 98.61 for the chemical and pharmaceutical sector (Level: 2, ISIC3 Code: D24,-Description: Manufacture of chemicals and chemical products) [142]. Nonetheless, the prices of raw materials, technological instruments, and trade restrictions affected the growth of the sector. Regarding the market segmentation of the Ecuadorian chemical sector, 49% corresponds to the local market, including transactions carried out throughout the Ecuadorian territory, representing the highest percentage of income in this sector. Production covers 47.2% of the local market, mainly focused on the provinces of Pichincha and Guayas, minimizing transportation and logistics distribution costs. Finally, the international market represents 3.5% of sales corresponding to exports [143,144].

SMEs were classified by their industry, annual turnover amount, and internationalization activities (export and/or import) during the years 2018 and 2019 from the Superintendency of Companies of Ecuador Companies database [145]. The representatives of the potential participants were contacted via email and telephone. They participated in a virtual meeting to be introduced to the research project, objectives, scope, and methodology for data collection. The selected companies received a formal letter informing them of the study processes, including a confidentiality clause for the data collected. This work presents three case studies, allowing it to capture the "complexity of the real world", but at the same time, it is feasible to process the information analytically and systematically [146,147]. Table 1 presents general information from the studied companies.

**Table 1.** Case studies general information.

| Company | Type of Company | Industrial Sector Classification | Principal Activity | N° Employees | Work Positions |
|---|---|---|---|---|---|
| A | Private Limited Company | Manufacture of chemical and pharmaceutical substances | Manufacture of active pharmaceutical ingredients for human consumption | 9 | Commercial Manager and General Manager |
| B | Private Limited Company | Manufacture of chemical substances and products | Manufacture of insecticides, rodenticides, fungicides, and herbicides | 27 | General Manager and Production Manager |
| C | Public Limited Company | Manufacture of chemical substances and products | Manufacture of plastics in primary forms | 42 | General Manager and Commercial Manager |

The selected companies are a significant sample of how entrepreneurial orientation, flexibility, and environmental factors affect the innovation capacity and internationalization processes of companies in the sector. These companies hold around 50% of the market share among the top 20 SMEs in the chemical industry in Ecuador. Furthermore, they represent around 29% of the exports during 2021 made by these 20 top SMEs. Regarding innovation, these three companies have investments in R&D initiatives of over 15% of their annual budget, which is above the average of manufacturing SMEs in Ecuador [148]. The information required for the development of the present cases was collected through a series of semi-structured interviews designed to conduct a fluid dialogue on the topics studied: internal and external factors, flexibility, and the entrepreneurial orientation that influences the SME's innovation capacity and its orientation towards international markets. Information and data from multiple sources were collected for data triangulation to enhance consistency and ensure reliability in the research [149,150]. The homogenization of the information and data collected allows for comparing the cases presented. By comparing the similarities and differences of companies, it is possible to explore the impact of entrepreneurial orientation, flexibility, and business environmental factors on the innovative capacity of companies and their international processes [147,149–151]. This study also examines the relationship between innovation capacity and internationalization.

## 4. Findings and Discussion

As aforementioned, innovation capacity is the ability of companies to introduce adaptations, improvements, new products, production processes, organizational models, or marketing practices [44–47,152].

Companies have adopted different approaches to take advantage of their capacity for innovation, though all of them perceive the importance of innovation in their organizations. Company A develops products based mainly on engineering design, including prototype construction, by generating ideas, concepts, and knowledge through specialized tools and techniques. Currently, the company is working on a new line of products promoting R&D capabilities. In addition, it has adapted or modified its processes and products to meet demand requirements and as a mechanism to face the competition. The company works primarily independently throughout its creative process, R&D, design, and prototype development. However, company A is currently collaborating with other organizations or companies to develop new products or processes.

Company B has adopted a comprehensive adaptation–modification approach for its current products and processes. This company is also involved actively in developing new products and procedures. Furthermore, this company recognizes trends and market opportunities prompting its innovative activities. In a similar fashion to company A, company B focuses its efforts on engineering design, including technical specifications, tools, and prototype construction, either on its own or in collaboration with third parties.

Company C used to focus mainly on imitating the products and processes of its competitors rather than adapting or modifying, nor actively developing new products or processes. Nevertheless, this company increased its innovative efforts by designing new pieces and molds during the last years. In addition, this company developed a digital catalog and digital marketing channels to strengthen its presence in the market and improve its competitiveness. The company did not get the expected response from the market due to the COVID-19 pandemic. Last, the director of this company stated that "these innovations help to generate more sales and make the processes more efficient and generate more employment".

On the other hand, the workforce within the organization plays a key role in its capacity for innovation through the generation of ideas and creative processes adding value [81,153]. These companies recognize the need for a specialized workforce with innovation capabilities. Thus, companies A and B have implemented training programs to get their workforce involved in R&D processes for new products. Finally, the three companies seek professionals with leadership skills and creativity to strengthen the level of innovation of their products and processes.

Table 2 summarizes the findings presented in this section.

**Table 2.** Case studies findings summary.

| Section | Company A | Company B | Company C |
| --- | --- | --- | --- |
| 4.1. Innovation Capacity and Strategic Orientation | - Market knowledge and opportunity recognition to define a strategic approach to the market.<br>- Strategic planning oriented toward product and process adaptation and innovation.<br>- Investment in a new laboratory.<br>- Price-quality strategy. | - Market knowledge and opportunity recognition to define an effective business model.<br>- Business model toward modifying and innovating products and processes.<br>- Investment in technology adaptation in a new laboratory<br>- Price-quality strategy. | - Market knowledge and opportunity recognition to define a strategic approach to the market.<br>- Strategic planning oriented toward product and process adaptation.<br>- Investment in technology adaptation for a new line of production.<br>- Price-based strategy. |
| 4.2. Entrepreneurial Orientation and Innovation Capacity | - Proactiveness toward an opportunity in the market.<br>- Avoids unnecessary risks.<br>- Following the market approach. | - Proactively develops a new business model.<br>- Proactively pursue a market opportunity.<br>- Calculated risk to invest in a new production line. | - Proactive—reactive approach depending on the market circumstances.<br>- Cautious risk-taking approach. |

**Table 2.** *Cont.*

| Section | Company A | Company B | Company C |
| --- | --- | --- | --- |
| 4.3. Flexibility and Innovation Capacity | - Flexible production system.<br>- High velocity to respond to customer requirements.<br>- Workforce capable of multitasking.<br>- Pool of suppliers.<br>- Limited flexibility due to financial resources. | - Flexibility toward product and process adoption.<br>- Workforce capable of multitasking.<br>- Close relationship with strategic suppliers.<br>- Limited flexibility due to financial resources. | - Acquisition of new technology for production process flexibility.<br>- Workforce capable of multitasking.<br>- Limited flexibility due to financial resources. |
| 4.4. Innovation Externalities | - Customer orientation.<br>- Cost-efficiency competition.<br>- Limited public policies to support innovation. | - Customer orientation.<br>- Cost-efficiency competition.<br>- Limited public policies to support innovation. | - Customer orientation.<br>- Cost-efficiency competition.<br>- Limited public policies to support innovation. |
| 4.5. Innovation Activities | - Developing a new line of products in collaboration with a third party.<br>- Continuously training workforce.<br>- Involvement of the workforce in R&D processes.<br>- Introduction of ICTs. | - Developing a new line of products.<br>- Continuously training workforce.<br>- Involvement of workforce in R&D processes.<br>- Introduction of ICTs. | - Adaptation of new technology for a new line of production.<br>- Regular training programs for the workforce.<br>- Introduction of ICTs. |
| 4.6. Innovation Capacity and Internationalization | - Largely focus on international markets.<br>- Product adaptation or modification for each market. | - Largely focus on international markets.<br>- Product adaptation or modification for each market. | - Restricted flexibility limited its participation in international markets. |

### *4.1. Innovation Capacity and Strategic Orientation*

Companies fashion their innovation capacity based on their strategic orientation [154,155]. Thus, company A directs its strategic efforts in a competition based on prices and quality. The company executives developed a strategic plan and shared it with the workforce to encourage their participation in achieving its strategic objectives. As noted above, this company has oriented its innovation capacity primarily to adapt or modify its products and processes. Additionally, the company has acquired and updated technologies and equipment to improve its internal processes, mainly production processes, to enhance its innovation capacity. Finally, the company established collaborative efforts with third parties to develop new products and achieve the goal of becoming a market leader, where it is currently reactive. Similarly, company B competes based on the price and quality of its products while seeking to be a market leader through highly competitive strategies. Hence, it focuses its efforts on finding new business models. The company recognizes the need to implement new technologies to improve its products and processes and modifying its technologies to better adjust to the company's needs. On the other hand, company C adopted a price-based strategy with a rather reactive approach of following market competitors, although it seeks to have leadership in the future. Additionally, company C has acquired and adapted existing technology to improve its products and processes.

With this overview, it is possible to identify the main innovation activities implemented in these companies. The commercial representative from company A affirms that "gaining knowledge from the market and having a good understanding of our product and processes is critical for our business. This is why we manage the creative process inside the company. R&D activities are monitored constantly to identify the processes and actions to be improved". In the same regard, the manager from company B pointed out that "after identifying a market opportunity, R&D efforts are constantly oriented toward updating our laboratory, training our employees and generating new products to broaden our market". Finally, the manager from company C states that "our company depends on the market. It is critical to have a good knowledge of our customers and the competitors to develop a strategy considering these factors".

The relationship between market knowledge, R&D, and innovation is highlighted. This relationship begins with the learning process as a tool to acquire knowledge. Through this process, the three companies identify opportunities in the market to specialize their products and procedures. As part of the learning process, companies train their workforce in new production processes to create new products or use new technologies. This, in turn, encourages companies to acquire new technologies and even modify their infrastructure

to implement improvements in their production processes. These actions facilitated R&D processes to design products and processes that meet market requirements and competition. However, the lack of information regarding access to new technologies, markets, or to partnership is recognized as a significant barrier to developing their innovation capacity. Hence, by managing their market knowledge, these companies are capable of recognizing trends in new products, processes, or technology.

### *4.2. Entrepreneurial Orientation and Innovation Capacity*

This research also analyzes the relationship between entrepreneurial orientation and innovation capacity. Risk-taking, proactive, and innovative behaviors constitute part of the entrepreneurial orientation of decision-makers. Thus, entrepreneurial orientation promotes the leadership capacity of decision-makers.

They are proactive and willing to take greater risks in the design of competitive strategies by proposing new business models oriented towards innovation and in response to changes in the business environment. The increase of the body of knowledge regarding the business environment has a positive impact on the level of proactivity, risk-taking, and innovation associated with entrepreneurial orientation. With this in view, the management of each of the companies has taken action to support the projects associated with a good degree of entrepreneurship and risk. Company A recognizes opportunities to adapt improvements made by competitors to add value to its processes and products. The company has incorporated new technologies as part of taking advantage of market opportunities. However, the company's manager recognizes the approach of following the market and being cautious when making decisions that imply a high level of uncertainty regarding the possible trade-offs and the allocation of resources to new areas of operation.

Similarly, the direction of company B makes decisions aimed at supporting innovation projects where clear business opportunities are identified with controlled risk. For example, the manager commented that "company is developing a new product line based on an identified opportunity with clear trade-offs in the market. To take advantage of this opportunity, the company decided to risk its resources and invested in technology and training of its workforce to increase its R&D capacity to develop this new product line". For developing this new line of products, the company showed its proactivity by implementing and adopting new technologies and infrastructure necessary to adapt and innovate its production processes. Nonetheless, the management recognizes that in cases of high uncertainty, its decisions are cautious. The director of the company drives a constant work towards innovation with the conviction that "innovation makes a significant change in the business and leads it ahead of the market". Finally, company C focuses on its innovation capacity to develop new products and processes, adopting a proactive–reactive approach. In practical terms, the company invests in the design of new molds for new products and the modification and adaptation of processes, as well as in acquiring the technologies and equipment ready to be implemented. Company C management maintains a cautious risk-taking approach.

With this in view, as these three companies gain market knowledge, they have engaged in more proactive and risk-taking behaviors, which in turn, lead them to increase their innovation capacity, supporting Proposition 2.

### *4.3. Flexibility and Innovation Capacity*

Developing new products and innovation of the processes need an effective calculation [31,156]. To provide a quick and effective response to the market, organizations need to achieve a flexible performance for responding strategically. Thus, company A has structured its flexibility capability to serve its customers in a timely manner. To this company, the capability to adjust its production levels given the changes in the order volume is key, which is why, over the years, this company has adopted more flexible production systems compared to its competitors. Moreover, its workforce is trained to perform a wide range of functions and tasks, enabling flexible production planning. This company has a qualified

pool of strategic suppliers to ease the supply. Nevertheless, due to the limited access to financial resources in the industrial sector, the company is not as flexible in developing R&D programs as it would like. In this regard, the manager pointed out that "sometimes the company can be a little behind on these issues as generating new production techniques requires a high degree of research, financing, and the approval of certain control entities".

On the other hand, company B is flexible enough to adopt a product and process innovation approach after identifying a significant trend for new products in the market. The investment in machinery, R&D, and training has given the organization greater flexibility in adapting and responding to changes in the market. In addition, the strategic relationship with its suppliers has allowed it to develop a new line of products. However, limited financing restricts its access to even more flexible production systems. Leveraging flexibility strategically has allowed company B to reach international markets, especially by implementing e-commerce tools. Finally, company C has a staff capable of executing different tasks and functions. Additionally, the company is flexible enough to develop new products depending on market requirements. Nevertheless, it has limited flexibility introducing new production technologies and systems compared to its competitors. According to its executive, " ... accessing financing is not a limitation to our response capacity. Nevertheless, our degree of flexibility might have had a negative impact on our participation in international markets, as well as in reacting to changes in the distribution channels".

These SMEs identified the influence of their ability to provide a flexible response to changes in their business environment on their capacity to develop innovative processes, processes, and engage with R&D efforts, backing Proposition 3.

### *4.4. Innovation Externalities*

#### 4.4.1. Market Environmental Factors

Market orientation and the role of competition are the most relevant external triggers for innovation. The three companies highlight the role of clients and competitors in structuring the business environment of the chemical and pharmaceutical sector. Market trends concerning customer demand and competitors' offerings determine the required level of innovation of products, processes, marketing, and business model.

Company A is developing a new line of products to respond to a new trend in the market. The company also had to close a project after two years of working on it due to concerns about its environmental impact. This company has focused its investments on redesigning its production plan and updating lab equipment to adapt to the changes in the industrial sector. The manager of the company stated that " ... been in permanent contact with our customers... allows us to know the needs of our customers and their satisfaction with our products and services. We try to provide a quick response to their requirement". The representative also recognized the importance of gaining market knowledge and aligning their business strategies to properly serve their customers.

Company B implemented a new laboratory and continuously trains its collaborators to develop new products, enlarge its R&D, and increase its offer. These innovation efforts aim to cope with the competitive environment of international markets. The company also created a new line of products based on the demand for environmentally friendly products. Furthermore, the company has a training program oriented to communicate to its customers the features and usages of its new products.

Company C invested in a new line of production and labeling by implementing a new technology. This action was motivated due to the intense competition in the market and to gain a competitive advantage in the market.

The studied companies highlighted how their market is characterized by the preponderance of price and new sustainability requirements for products and processes as the defining factors for sales. On the other hand, among the limitations these companies face is access to customers and competition information to anticipate market changes. In particular, it has been a great challenge for companies to overcome the uncertainty of their

business environment during COVID-19 and post-pandemic. This scenario of uncertainty has motivated these companies to increase the use of information and communication technologies, mainly Internet platforms, to counteract the changes in the business environment. Moreover, the companies hire graduates to gain knowledge transfer between the university and the companies. It has contributed positively to the level of specialization, innovation capacity, and quality in the design and adaptation of companies to remain in the market.

#### 4.4.2. Competition External Factors

Another noteworthy catalyst for innovation is competition in the chemical and pharmaceutical sector. Companies require the ability to identify the level of innovation introduced by competition to the market. The analyzed companies perceive the competition as an obstacle and a threat to overcome or avoid. Concerning the three companies, competition determines the innovation degree to meet demand trends, and it also defines the use of new technologies for developing or improving products or processes. The willingness of the companies to assume risk determines the attitude towards designing strategies for developing products or processes by imitating competitors or exercising the same or greater innovation degree as the competition.

The innovation or imitation degree depends on access to new technologies, the relationship with the market, a trained workforce, and the capability to identify trends and implement more effective processes. The chemical and pharmaceutical markets on which these companies operate base the purchasing decision on the price–quality ratio. This leads their innovation efforts to design more efficient processes and products. Hence, the three companies recognize the necessity to introduce products at prices that the market is willing to pay, using a highly efficient structure.

#### 4.4.3. Public Infrastructure and Policies

Public policies and infrastructure impact directly structuring innovation systems of nations [20,157,158]. Concerning the public infrastructure, the three companies are located in industrial parks with access to interprovincial roads to transport their products, water and electricity supply, and other public services. These facilities are perceived as advantageous in all three cases.

On the other hand, the three companies identify limited public policies to strengthen innovation systems. They point to the insufficient mechanisms for protecting intellectual property (IP) and the lack of fiscal policies to encourage R&D. The executives of the three companies advocate public policies oriented to enhance the innovation capacity of the productive sectors they represent.

Managers aim for more effective IP protection legislation and mechanisms, as well as fiscal tools for tax reduction for companies carrying out innovation activities. Furthermore, they also point out the need for access to credit, loans, and capital lines of credit to manage R&D. On the other hand, the political instability of the business and political environment is also a determining factor for these SMEs in access to investment in this productive sector. It seems to be the case for these companies. Although the SMEs design new products and processes to satisfy their customers, the three of them find it fruitless to develop patents or intellectual property as, from their perception, their markets would not value them. Moreover, the companies identify two main innovation barriers related to the public policies: (a) limited promotion and protection of intellectual property; and (b) the costs associated with obtaining and registering patents. This has discouraged the efforts of these companies to enhance their innovation capacity by developing new patents.

As discussed in this section, external factors fashion the ever-changing business environment of chemical-pharmaceutical industries in Ecuador. Customers' requirements for new and sustainable practices, products, and services, and high-efficiency-based competition have stimulated these SMEs' capacity to innovate and keep up with the market. In contrast, the limited support from public policies and infrastructure has prevented the

three SMEs from engaging in innovation practices, such as developing new patents or investing in utility models, backing Proposition 4.

### *4.5. Innovation Activities*

#### 4.5.1. Product Innovation

The product innovation process requires the generation of creative ideas that, after being tested by R&D processes, result in the design and introduction of new or improved products. Thus, the three case studies have led recent efforts to serve the market by improving, adapting, or innovating products. The director of company A affirmed: "the need to innovate its products is based on the timely identification of needs and trends in the market, mainly through direct communication with customers". This company has chosen to assume the risk involved in developing innovative products by assessing the trade-offs of expanding their market share in contrast to not being accepted or replaced. In addition, the representative of company B also highlighted the importance of integrating its workforce into the product innovation process, providing ideas, knowledge, methodologies, and developing research processes. Company B has heavily invested in new technologies to develop new products according to the requirements of the market. Thus, the involvement of its labor force in R&D activities allows this firm to leverage their investment. Company C also has invested in a new line of production, introducing new technology in the chemical industry in the country. This allows the company to gain an edge in the development of the products this firm offers. It should be noted that companies A and B recognize the importance of being flexible enough to adapt their processes and products to meet the requirements of international markets and the offers from competitors.

#### 4.5.2. Process Innovation

Process innovation turns out to be the component of innovation capacity to which these SMEs direct most of their efforts, as they perceive this kind of innovation as the predominant one in the productive sector. In the case of these companies, process innovation begins by identifying trends of best practices of the competition through networking and knowledge acquired from the business environment. Companies' investments in training their employees, the infrastructure of their companies, and the acquisition of new technologies result in greater specialization and innovation in the workforce and production processes. Regarding the competitive environment of these SMEs, process innovation is largely influenced by the quality and price set by the market and the competition. Thus, their efforts to innovate production processes aim to standardize production lines to generate greater efficiency and achieve competitive costs, as well as the level of quality required. In this line, the marketing director of company A agrees that "although it may be difficult to introduce significant changes in the product portfolio, it is important to introduce changes in the processes to make them more cost-effective". In addition, company B's management recognized the need to incorporate R&D processes for developing new products and improving their production processes. Its production manager pointed out that "updating our laboratory and training our collaborators enhanced our R&D processes leading to growing locally and internationally". This company identified a market opportunity for environmentally friendly products and packaging, leading the company to develop a new line of products, design manufacturing processes, and invest in specialized technology. The company has also trained its employees with an orientation towards innovation. Finally, the acquisition of the new technology by company C had a positive impact on the production line, allowing some modifications and innovations to its production processes.

#### 4.5.3. Marketing Innovation

The development and implementation of communication and data exchange systems, as external factors, play a relevant role in the marketing innovation activities of the studied SMEs. The three companies recognize the importance of implementing digital platforms to communicate with their customers and monitor the business environment. The usage of

the Internet serves as a means of approaching and accessing their market niche, especially during the pandemic, when traditional marketing channels were limited. However, these companies do not fully exploit the potential of ICTs for business intelligence, business analytics, and digital benchmarking. Through these emerging practices, companies can identify in a timely and even anticipated manner market trends and customer preferences to develop innovative products and marketing initiatives. Company B has introduced changes to its product as the result of its innovation in its marketing strategies and business intelligence. Whereas company A has focused its marketing innovation on improving connections with its customers and potential market, company C has developed customized marketing efforts towards social networks and improved its web page. Nonetheless, these SMEs have not taken advantage of the Internet's potential to collaborate and build business networks to strengthen their capacity for innovation in products and processes.

#### 4.5.4. Organizational Innovation

The organizational innovation capacity depends to a large extent on the decisions and guidelines established by the management of the analyzed companies. The manager of company B points out the relevance of training and the organizational learning processes to gain experience and knowledge of the business environment. "R&D orientation is among our priorities as organization" affirms. The representative of company A stated that " ... years of experience in the market have taught us to react to changes that may arise. When we started, we were a bit slow and did not react when we had to, but we learned that if we are not attentive, we can lose clients and the reputation we have gained". The director of the company decided to invest in infrastructure and information systems for managing the development of new processes and products according to market trends. In addition, the three companies recognize the importance of implementing management systems to strengthen their decision-making processes and support process innovation related to the business model, products, production, and marketing. Two of the three companies have developed strategic plans. Whereas company A communicated it in a general assembly, company C did it through the head of each department. However, the three companies maintain their organizational structure without significant changes or adaptations. The main changes occurred in the areas of production and marketing where new practices are implemented, e.g., the use of digital marketing channels.

Companies A, B, and C have developed the capacity to focus their innovative efforts where they might impact in a significant way their business model. Due to their limited access to skill, finances, and technological resources, these three companies have developed a strategic orientation when deciding which innovation activity should center their innovation capacity. Accordingly, Proposition 1 is supported.

### *4.6. Innovation Capacity and Internationalization*

One of the main objectives of the three companies is the possibility of expanding their market share and exercising leadership, though the behavior of the market is increasingly uncertain after the COVID-19 pandemic, where these companies have been forced to take measures to face the variation in demand and the threat of competition offering lower prices.

In its effort to improve its market share, company A chose to participate in the Andean Community (CAN) markets, taking advantage of the trade agreement signed between country members 40 years ago. The company proactively leveraged the signing of this agreement in its early days (1980) and took the risk of participating and positioning itself in these new markets. That reflects the entrepreneurial, flexible, and strategic orientation of the management. The company currently exports more than 90% of its products to eight countries in South America. Its internationalization enhanced its ability to innovate its products, processes, and organization to compete in the region. The company has a strong orientation towards the international market, as its turnover largely depends on

those markets. Company A has a direct relationship with its customers abroad, managing direct exports to them. The demand of its main customers and markets defines the level of product adaptation, design, and creation. It also modulates the velocity response in case of a modification or new design. Through the recent alliance with an external company, the directory seeks to respond quickly to changes in the market and develop new products according to newly identified trends.

Company B began its foreign trade operations approximately eight years ago, exporting 10% of its production to North and South America. The company strengthened its presence in South America, although it lost participation in North America. This company is in permanent communication with its customers abroad, delivering their orders through direct exports. Currently, it exports between 20 and 25% of its production. This company develops its new products according to the requirements of its main clients in the national market and adapts these products for international customers. Both companies, A and B, monitor continuously for possible threats, mainly the actions of competitors, in order to be prepared and react on time.

On the other hand, company C, with over 20 years in the market, has tried to assume the risk of participating in new markets by exporting its products, participating in trade fairs, and establishing contact with foreign counterparts. Nonetheless, this company has not been able to overcome access barriers to compete internationally. The company reflects an entrepreneurial orientation in the domestic market but is highly cautious towards the international environment, which could affect its actions assuming risks abroad.

All three companies constantly monitor their customers and market competition to identify new, adapted, or modified product trends. These companies perceive that one of the main difficulties to face in the internationalization of chemical or pharmaceutical products is the physical distribution due to handling care, obtaining special permits, and transportation conditions, which can be cumbersome for a small company.

It should be noted that, for the three companies, the use of digital marketing platforms has strengthened their participation in the market. In the case of company C, it has retaken the efforts of expanding its markets. These companies have also adopted innovative marketing methods for the organization, and they perceive the Internet as an option to approach international markets.

These three companies have participated in international markets. Companies A and B rely on those markets, and their innovation efforts largely depend on the requirements of their clients abroad. The three companies continuously monitor new trends and assess the perception of their customers to introduce a modification or a new product. If their clients do not appreciate the innovation, the companies limit their innovative actions. Hence, it can be stated that their internationalization efforts trigger the development of their innovation capacity. Consequently, Proposition 5 lacks support.

## 5. Conclusions

From what is presented in this research, the studied companies have good potential growth and expansion opportunities in the Ecuadorian chemical and pharmaceutical sector. Figure 3 depicts the framework from the relationships drawn from the analysis of the case studies.

These case studies show the relationship between innovation capacity, entrepreneurial orientation, flexibility, and environmental factors of industrial SMEs in the chemical-pharmaceutical sector from a developing economy. From the findings, it is possible to deduce that their performance, in the local and international markets, depends on the extent to which companies exercise an entrepreneurial orientation and flexibility to drive their innovation capacity.

Their entrepreneurial orientation leads them to acquire and manage knowledge of the business environment in a dynamic fashion for implementing effective and competitive innovation activities. The studied companies took actions reflecting the entrepreneurial orientation of their managers. They have focused their innovation efforts mainly on

adapting or modifying their products and processes to meet the needs and trends of their market niche. However, collaboration with third parties is limited in all three cases. Companies prefer to work on innovation processes independently due to issues of trust and confidentiality. In that regard, company A has recently established collaborative efforts with third parties as part of its strategy for developing a new product line. This approach results from its experience in the market and identifying the need for a partner to enhance its capacity to design new products.

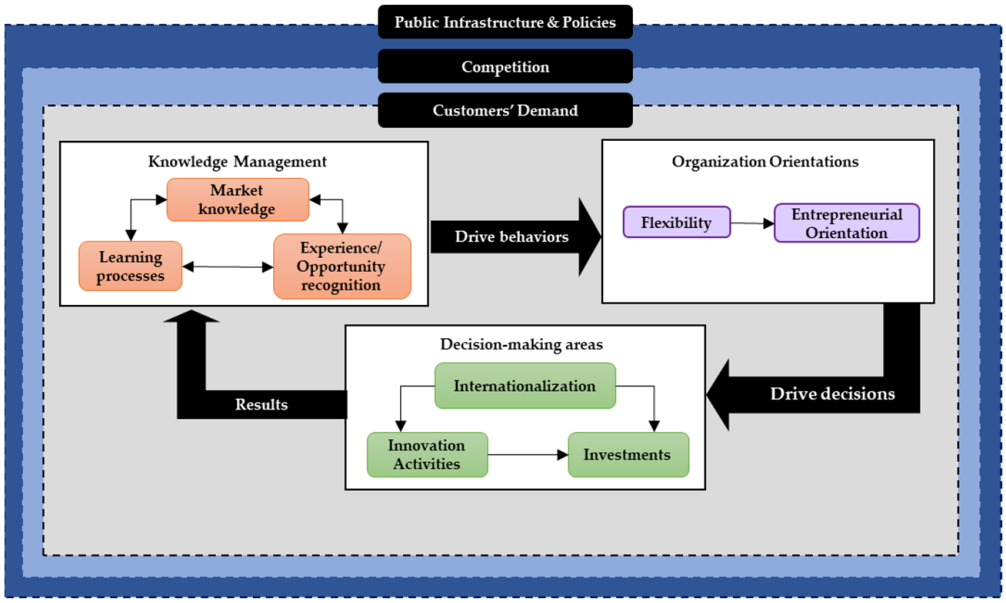


**Figure 3.** Framework of the relationships identified from the case studies.

These companies gain experience and build their knowledge through their learning processes. Experience and the body of knowledge enable them to identify opportunities and risks in the market to support their decision-making process, including innovation decisions. The gained experience is part of the body of knowledge of these SMEs. It contributes to design strategies and generates ideas that serve as the ground for R&D processes. Company A and company B have more experience operating in international markets. They oriented an extensive part of their learning and knowledge management toward internal R&D activities. In contrast, company C has less experience in overseas markets and has adopted an adaptative approach to its R&D efforts. In addition, knowledge management, through which opportunities and threats are systematized, is the basis for decision-making to acquire technology, software, machinery, and equipment. These SMEs invested in new technologies, equipment, molds, and know-how to enhance their innovation capacity in line with their customer/market orientation.

Knowledge management, including the gained experience, prompts organization leadership and modulates the flexibility to make decisions facing opportunities and risks identified in the business environment. Hence, leadership and flexibility influence the organization's willingness to make bold or cautious decisions. Leading and flexible companies generally adopt bold and risky positions toward product, process, and business model innovation. Those innovations may constitute part of the intellectual property of the organization. The studied SMEs understood their limited leadership in the market at the beginning of their operations. First, they adopted a cautious orientation for most of their decisions, where their innovation was characterized by adaptation or replication of products and processes. As these companies have gained experience, they are more flexible to seize opportunities that require bolder decisions and actions. This directly impacts the degree of innovation in products and processes. Thus, as company A and company B gained experience in the market, they assumed the risks of researching and developing new

products. These companies also implemented new technologies to innovate their products and processes. Company C has been more cautious in taking risks. This company adopted a reactive approach, imitating or adapting the product design or procedures following the competition. Nonetheless, in the last few years, company C has been investing in developing new products, technology, and processes.

While analyzing these SMEs, the external factors driving their innovation are the structure and legislation of the chemical–pharmaceutical sector and market access through trade agreements (for international markets). Regarding the competitive environment of these SMEs, process innovation is largely influenced by the quality and price set by the market and the competition. These factors prompt the improvement, adaptation, and innovation of their products and processes. Technological developments emerge among the most relevant external factors triggering innovation for process management in this productive sector. Due to its innovative and adaptive nature, technology enables improving and innovating product design processes, production processes, and knowledge management within these SMEs. Internet and new technologies for production are the primary technologies implemented as the fundamental engines in the case of the three companies.

The Internet provides new ways to relate to customers, know their requirements, and identify market trends, as well as speed up and innovate marketing and commercialization processes, particularly in international markets. Additionally, ICTs solutions have eased identifying opportunities and threats in the business environment to support their decision-making process and outline their marketing strategies. These SMEs have developed digital marketing platforms to enhance their market performance. Nonetheless, they have not yet taken advantage of the potential digital tools for business intelligence, digital benchmarking, and networking-building to strengthen their capacity for innovation in products and processes.

This study also identified the role of internationalization in driving innovation for these firms. These SMEs derive the innovation activities as long as they are valued in the markets where they serve. As international orientation increases in the companies, they perform more innovative activities to satisfy customers' new requirements and the identified market trends. The decision to internationalize their operations is linked to innovation decisions which both finally trigger the investments made in this context.

This research provides a conceptual framework drawn from the case study, contributing to theory building within the body of knowledge regarding innovation and its relationship with firm orientations and externalities. This work presents a perspective on managing the relationships between innovation, entrepreneurial orientation, flexibility, internationalization, and externalities. This provides a pragmatic view of how SMEs should leverage their innovation capacity and flexibility regarding internationalization processes to remain competitive. Finally, policymakers need to develop mechanisms to promote SMEs investments on R&D efforts. Taxation policies and protecting intellectual property were identified as critical factors that hinder R&D activities.

This research encompasses some limitations. The analysis was limited to three SMEs from the chemical–pharmaceutical industries within a small economy. Although the context of this research is restricted, the case studies support previous findings and bring new considerations for theory building. Future research may expand the comprehension of the relationship between entrepreneurial orientation and flexibility in connection with innovation capacity. Further quantitative studies need to be conducted to generalize present findings.

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