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## Chapter

# Toward the Adoption of a Framework for the Systemic Management of Innovation in SMEs: A Case from the Dairy Industry in Mexico

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## Abstract

It is widely acknowledged that small and medium-sized manufacturing enterprises (SMEs) are important in terms of enabling national and regional economies to form strong industrial sectors that provide jobs and generate value and welfare for society. The need for these companies to increase their competitiveness and become integrated into national and international production chains has also been acknowledged. In this sense, innovation, of any sort, is desirable for manufacturing SMEs, as this substantially improves their possibilities for growth and development. In any case, innovation is a complex process that must be properly managed, with a holistic vision that allows a full understanding of its implications and reduces the risks involved. This chapter applies systems thinking to innovation processes in manufacturing SMEs, with two main contributions: first, it proposes an innovation model for SMEs in the dairy sector, based on the systems approach theory; second, the case study of the model's implementation, through a framework for innovation management, in a Mexican SME in the dairy sector with an innovation project for its production processes.

**Keywords:** innovation, SMEs, innovation management, systems approach, dairy industry

## 1. Introduction

According to the 2019 economic censuses in Mexico, conducted by the National Institute of Statistics and Geography (INEGI), there are 4,800,157 economic units in the country dedicated to services, commerce, and manufacturing; of this total, 99.8%

are micro, small, and medium-sized enterprises<sup>1</sup> (MSMEs) [1]. The relevance of MSMEs can be seen from different perspectives: for their sizable contribution to the total number of companies in the country, their substantial contribution to the gross domestic product (GDP) and national value added, their high capacity to provide employment to the productive population, and their social impact by allowing the formation of social fabric in the communities where they operate, among others.

The censuses also revealed that in 2018, the manufacturing sector was the most important in terms of total gross production in Mexico, with 48.2% of the national total [1]. Mexico has a total of 579,828 manufacturing companies, of which 99.2% are MSMEs: 93.7% are deemed micro businesses, 4.2% small businesses, and 1.3% medium-sized businesses [1]. It is necessary to support the viability of these companies and boost their quality, productivity, and sustainability. For Mexican manufacturing MSMEs to achieve a development that responds to the current needs and pressures of the national and international environment, they must remain open to the possibility of including innovative activities in their competitive strategies, which will lead to overall innovation in terms of quality, productivity, and sustainability.

It is well known that innovation generates multiple benefits for manufacturing MSMEs, such as maintaining market positioning, entering new markets, diversifying the range of products, improving the ecological environment, creating flexibility, and improving working conditions, among others. However, the innovative performance of Mexican manufacturing MSMEs is deficient. In this regard, in the 2017 survey on Research and Technological Development (ESIDET) conducted by the INEGI, it is noted that, out of 50,261 companies surveyed, with less than 250 employees, between 2014 and 2016, only 5290 worked on at least one product innovation project (goods or services), that is, only slightly over 10% [2]. The food industry is particularly prominent within Mexico's manufacturing sector and is also the subsector with the most MSMEs: 201,080 economic units [3]. The relevance of this industry lies in its size, dynamism, number of jobs created, and its contribution to overall production and added value. In 2022, the food industry accounted for 4.0% of Mexico's GDP, up from 3.5% in 2019, a percentage that has been growing steadily year-on-year [4].

Despite this, most companies in the food industry do not engage in innovation activities. According to the most recent 2019 Economic Census data, only 12.6% of 3543 large food companies carried out innovation activities in 2018 [3]. For their part, the managers of large companies in Mexico's food industry acknowledge the importance of innovation as a fundamental pillar of their strategy to face the competitive environment; however, they identify internal and external difficulties in the processes to bring innovations to the market [5]. Given this scenario, there is an opportunity for companies in the food industry in Mexico, particularly SMEs, to increase their innovative performance, for which they need to develop effective innovation strategies based on knowledge of the organization and its environment.

This chapter develops a theoretical and instrumental stance to the adoption of the systems approach to innovation in manufacturing SMEs, in six sections: first, some of the strategies identified in recent decades regarding how SMEs face the problem of innovation are reviewed and the main factors that these companies must take into

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<sup>1</sup> In accordance with the "law for the development of competitiveness of micro, small and medium-sized companies", manufacturing companies with 0 to 10 employees are considered micro businesses, those with 11 to 50 employees are considered small businesses, and those with 51 to 250 employees are deemed to be medium-sized businesses.

account in order to carry out innovations are compiled in detail; second, the methodology used to carry out the documentary and field research for the study is described; third, using the aforementioned methodology, the systems approach is applied to define an innovation management system for SMEs in the dairy sector, with identifiable components—innovation capabilities, innovation activities and innovations—as well as an explicit purpose; fourth, a framework for the systemic management of innovation in SMEs in the dairy sector is described, divided into three phases—Analysis, Decisions and Actions—, which instrumentalize the proposed innovation management system; fifth, the case of the implementation of the framework for the systemic management of innovation in a Mexican SME that carries out an innovation in its manufacturing process to increase its competitiveness and access the international market is described; and sixth, the results obtained are analyzed and conclusions are drawn.

## 2. Strategies for innovation in SMEs

Innovation can be an objective or a means that helps organizations to achieve their competitive strategy. In any case, for most researchers on the subject, the innovation strategy should be aligned with the organization's competitive strategy to obtain the greatest benefits that innovation can provide [6]. For several decades, several studies have been conducted on the strategies adopted by SMEs and the variables that should be considered to innovate. Some of these are described below.

Three types of strategies can be identified, as shown in **Table 1** [7], based on the position that SMEs have in relation to their environment.

Similarly, according to the role played by demand, two types of strategies adopted by SMEs can be identified, as shown below in **Table 2** [8].

SMEs with proactive or demand-driven strategies are more likely to succeed and remain in the market than those with reactive or push strategies. Organizations with a proactive demand-driven strategy are the most innovative entrepreneurs regarding environmental issues. In any case, the environment and demand are not the only factors to consider when developing and adopting an innovation strategy.

In general, the innovation strategies of SMEs are informal and different from those of large companies [9]. In order to develop an explicit innovation strategy, SMEs should consider their organizational processes, market position, technological trajectory, the possibility of competence building [10], the sector of the economy in which they operate, their degree of technological diversification and division of labor [11],

Type of strategy	Role of the owner	Types of products
Reactive or cautious	Prefers to solve problems rather than anticipate them	Traditional goods, mature products
Intermediate or active	Adjusts to change, but remains cautious	Relatively simple, small-lot products
Proactive or innovative	Innovative and anticipates change	Complex, high-tech, or high-end products

Source: Adapted from OECD (1993). *Small and medium-sized enterprises: technology and competitiveness* (p. 25). Madrid, Spain: Mundi-Prensa Libros.

**Table 1.**  
*Types of strategies adopted by SMEs in response to their environment.*

Type of strategy	Origin	Characteristics
Supply and drive	Need for employment stemming from an oversupply of labor	Compete in markets with low barriers to entry, leading to an oversupply of products, price wars, and low profitability
Demand-driven	Need for self-fulfillment, search for independence	Makes the most of an advantageous and promising business idea

Source: Adapted from Altenburg, T. & Eckhardt, U. (2006). *Productivity enhancement and equitable development: challenges for SME development* (pp. 20–26). Vienna, Austria: UNIDO.

**Table 2.**  
*Types of demand-driven strategies adopted by SMEs.*

the business they are in, the market they serve, the innovations required, how attractive the innovation opportunities are, and the best-known innovation practices [12].

There are clearly several characteristics that MSMEs themselves must consider in order to develop and execute their own innovation strategy. In this regard, different authors describe a series of generic factors relating to the competitive position and innovation possibilities of this group of companies. The following is a list of some of the factors mentioned in scientific and academic texts which, in our opinion, should be considered when developing an innovation strategy for an SME.

#### **i. Operational strengths**

- A unity of command that enables the company to link administrative and operational functions [13].
- Speed in decision-making [8]
- Planning and organization are not capital-intensive [13]
- Greater control over salaries since there is only one decision-maker [8]
- Flexibility and adaptability in dynamic markets [8, 13, 14].
- Lower transportation costs due to proximity to customers [8]
- Production in small batches [8]
- It is possible to customize goods [8]
- Greater flexibility in adjusting costs downward [8]

#### **ii. Operational weaknesses**

- Nonspecialized and empirical management [13]
- Vicious circle of low labor productivity and low capacity for productive reinvestment [8, 13]
- Low level of personnel training [13]

- Low reinvestment of profits to improve production equipment and techniques [13]
- Vicious circle of low initial productivity and lack of knowledge transfer [8]
- Products are often of poor quality [13]
- Acting alone in the production process [8, 14]
- Lack of financial resources and insufficient access to financing [13]
- Few possibilities of merging with or absorbing other companies [13]

### **iii. Skills required for innovation**

- Continuous search for innovation and new business opportunities [8, 14]
- A degree of specialization that allows SMEs to improve their learning capacity [14].
- Flexibility and adaptation to the environment [14]
- Production with competitive quality at a national or international level [14]
- Modern logistics standards and concepts [8]
- Efficient organization of production and smooth coordination with the local system [14]
- Efficient relationship with the economic and institutional environment [9]
- Cooperation through vertical or horizontal networks or integrations [14]

### **iv. Opportunities for innovation**

- Production dedicated to satisfying niche market needs [8, 14]
- Production closely linked to customer service (installation and specific adaptation to customer needs) [8, 14]
- Production of specific goods and services that do not compete with mass-produced products or economies of scale [14]
- Working with large companies as suppliers, franchisees, or service providers [8]
- Integration with large companies and with demanding national and international markets [8]

- Building links with economic actors that do not experience scale constraints [9]
- Vertical or horizontal integration into business networks [14]
- Linkage to productive chains, mainly high value-added ones [14]
- Integration into industrial clusters that allow SMEs to join a stable production process and access technology transfer and high-quality standards [14]

#### **v. Sources of knowledge**

- Large companies as an important source of technology and know-how [8]
- Large companies exploring new markets and technological frontiers, creating opportunities for new products [8]
- The connection between the market and the tech community [11]
- The connection between different markets [11]
- Relationship with institutions that coordinate and empower the decisions of the different agents associated with the creation of knowledge in its different stages [11]:
  - Professionals and technicians produced by the education sector
  - Science and technology research agents
- Channels of dialog and interaction between the scientific and technological communities, between the technological and business communities, and between trade unions and companies [11]

#### **vi. Practices of innovative MSMEs**

- Incorporation of equipment, products, or organizational processes through technological import or acquisition [11]
- Incorporation of incremental innovations or technological developments [11]
- Adoption of technologies that have been successfully tested in other companies or countries [8]
- Promotion of innovations based on science, technology, and knowledge, especially those that lower the costs of factors of production [11]

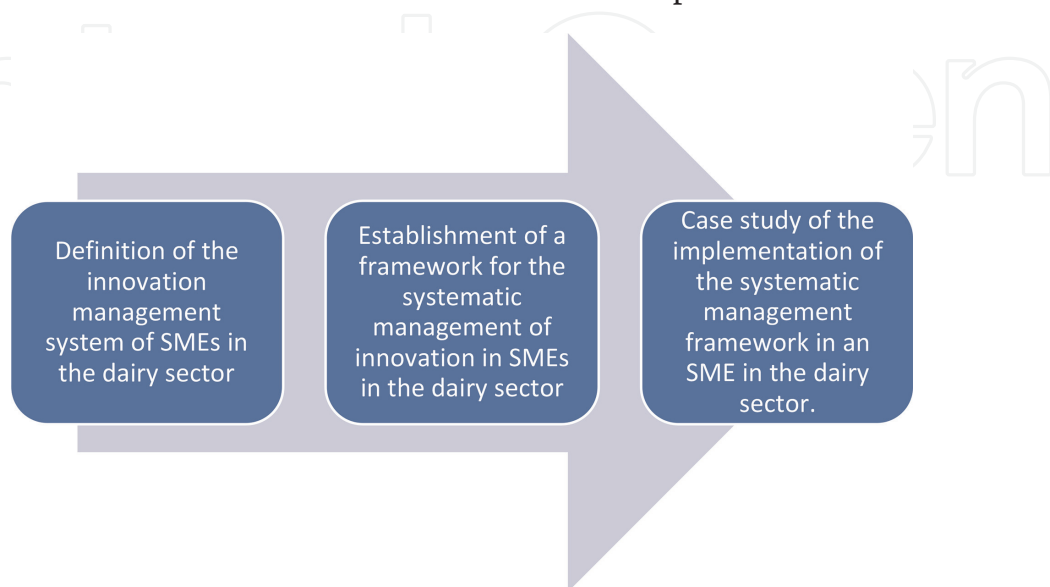
### vii. Threats to the development of innovations

- Large companies incorporating techniques such as the decentralization of decisions and intrapreneurship, including small-batch manufacturing [8]
- Problems in the economic environment, such as inflation and devaluation [13]
- Lack of access to technical assistance services [14]
- Breakdown of production chains [14]

## 3. Methodology

**Figure 1** graphically describes the methodology used in the study to establish an innovation management system for SMEs in the dairy sector and its instrumentalization through a framework for the systemic management of innovation in this type of company.

Churchman's classic system concept [15] is used as a basis to define the innovation management system, and a subsystem diagram is used to explain the relationships between the elements of the system and its environment. The systemic innovation management framework is based on Ackoff's [16] description of the management system and is structured in a sequence of three phases that constitute an innovation strategy: analysis, decisions and actions. Finally, the case study is based on field research conducted on the premises of a dairy sector SME located in the Mexican southeast over several months between 2018 and 2019; the field research was conducted through interviews guided by semi-structured questionnaires on the company premises, an action research intervention to implement the framework with the operators of the addressed innovation project, and, finally, by remotely monitoring the effectiveness of the implemented framework and the achievement of the expected results.



**Figure 1.**  
Methodology used in the study. Source: Own elaboration.



#### **4. A systemic view of innovation management in SMEs in the dairy sector**

It is generally recognized that innovation is a systemic, complex, and dynamic phenomenon, resulting from the evolution and changes of various agents, organizations, and institutions. Various authors have described the systemic nature of innovation in companies:

- “Innovation is not a single action, but a whole process made up of interrelated subprocesses. It is not just the conception of an idea, the invention of a new device, or the development of a new market. The innovation process is all these things appearing in an integrated way” [17].
- Innovation is systemic because it requires careful consideration of all aspects of a business to be successful [18].
- “Innovation is the result of complex systemic interactions involving MSMEs and large companies, universities, research centers, government agencies, and other social actors” [8].

Consequently, it is pertinent to approach the phenomenon of innovation in companies based on systems thinking. This perspective offers an alternative for the conformation of innovation models that, in a holistic manner, meet the needs of analysis of causes and synthesis of effects for decision-making in companies.

We can understand innovation in manufacturing SMEs as a social, concrete, dynamic, and open<sup>2</sup>, system, with origins outside or inside the company, which operates within the company and transcends to its environment, and whose innovations produced continuous feedback to the system as a whole. The system serves both internal customers (owners, managers, employees, and stakeholders) and external clients (consumers, suppliers, contractors, intermediaries, and competitors, among others). The following is a description of the elements of a proposed system for innovation in manufacturing SMEs engaged in the production of dairy products.

- a. *System objective*: To facilitate the management of innovation processes in dairy manufacturing SMEs, so that these companies can meet their strategic objectives and benefit their clients and consumers.
- b. *Performance assessment*: Increase the innovative potential of the SME so that it can carry out launches, changes, or significant improvements in product, process, organization, or marketing method, which represent a novelty for the company, for the Mexican market, or the international market.

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<sup>2</sup> Social system: System in which the parts and the whole are intentional.

Concrete system: At least two of its elements are objects.

Dynamic system: One to which events occur and change in time.

Open system: One that has a medium.

c. *Components:*

- Innovation capabilities: These are the dynamic capabilities, mainly based on knowledge, that enable the generation of innovative activities. They can be research and development (R&D), operations, marketing, or financial capabilities.
- Innovative activities: These are tasks and actions, resulting from the exploitation of innovation capabilities, which aim to generate innovations in any of its areas. They may stem from R&D or from other activities.
- Types of innovations: They are the concrete expression of innovative activities that culminate with the introduction of a new product or service in the market, or with the implementation of a new process, commercial, or organizational system.

d. *Environment:* The elements of the environment, which coproduce the innovation performance of manufacturing SMEs, but which are not under the control of the management of these companies. The main elements of the environment in the dairy sector are regulatory framework, competitive environment, consumption trends, available technologies, knowledge sources, and funding sources.

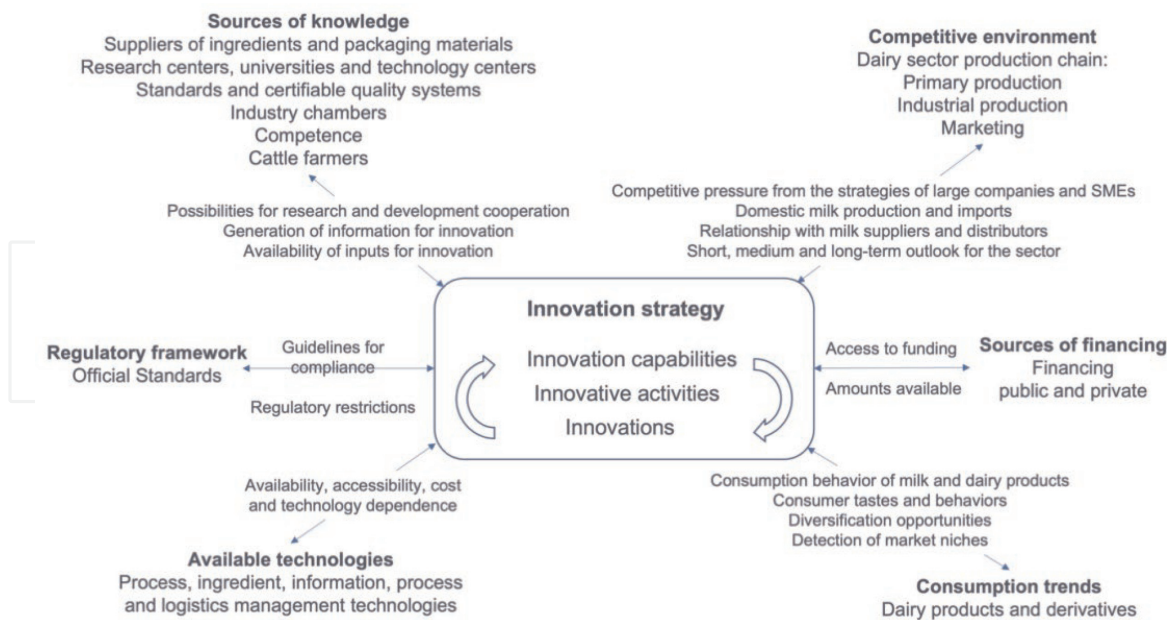
The elements of the system maintain specific relationships among themselves. Adequate promotion, orientation, and intensity of these relationships make it possible to achieve the system's objective. The administration of the system is carried out by the general management of each SME, which determines the allocation, amount, type, and use of financial, technological, human, and administrative resources, through the company's innovation strategy. The innovation strategy comprises the analysis, decisions, and actions that create, strengthen, and exploit innovation capabilities to achieve innovations.

**Figure 2** shows the relationships between the elements of the innovation system for SMEs in the dairy sector.

## 5. A framework for systemic innovation management in SMEs in the dairy industry

According to Ackoff [18], management systems should pursue an ideal target and increase their effectiveness under constant and changing conditions. Thus, the ideal target pursued by an innovation management system is the formation of an innovation strategy that is effective, efficient, and congruent with its competitive strategy and with innovation objectives that respond to its environment and capabilities. The author defines management as: "The control of a system with purpose by a part of that system" and describes three functions of management:

- Identifying opportunities outside and inside the company
- Making decisions consistent with the opportunities identified
- Maintaining and improving performance under stable and changing conditions



**Figure 2.** *Innovation system for SMEs in the dairy sector. Source: Own elaboration.*

Like any system, a management system is made up of several subsystems. Management starts with the observation of the organization and its environment, in order to abstract information of interest to decision-makers (information subsystem). Decision-makers process this information (decision-making subsystem) and issue instructions to the organization. The information requirement is a cycle that can be repeated several times and requires a record of the objectives and predefined conditions in order to compare what was planned and what was obtained, and thus identify the resulting differences or deviations. The identification of deviations generates changes in the information subsystem, in the decision-making subsystem, in the implementation of the instructions given to the organization, or in the recognition of unforeseen changes in the environment. Through these cycles, the company learns and adapts to the environment. In addition, a complete management system has a symptom analysis function, which assists control by generating and monitoring process performance indicators.

A framework to implement the previously described innovation management system in SMEs in the dairy sector is proposed, and divided into three phases that develop the innovation strategy: analysis, decisions, and actions. Each of these phases is described below.

### 5.1 Phase 1: analysis

Innovation management begins with the recognition of the company’s competitive strategy: mission, vision, and general objectives in the medium and long term. Then, once the company’s strategic foundations are clear, it is necessary to carry out an internal analysis of the company—components of the innovation system—and of the innovation environment—the system’s environment—these two steps are linked since the company operates in a competitive environment and not in isolation. For the internal analysis, the company’s operation must be known, and communication must be maintained with the functional areas of the organization, in order to evaluate the current and required innovation capabilities to carry out innovative activities. The

external analysis includes reviewing compliance with the current regulations, assessing the current conditions of the production chain and market consumption trends, consulting suppliers and other sources of knowledge to be aware of available and emerging technologies, as well as exploring the available sources of financing, their characteristics, and conditions. This series of analyses allows decision-makers to identify innovation opportunities and explore their scope, confirm trends, and determine gaps in their relationship with the environment. As a result, the company will be able to define the type of innovation it intends to achieve and set its objectives.

## **5.2 Phase 2: decisions**

Once the innovation objectives have been defined, the innovative activities involved can be identified to propose them in the form of projects and analyze them in three stages: management of innovative activities and innovations, financial management for innovation, and management of innovation capabilities.

### *Management of innovative activities and innovations*

For each innovation project, it is necessary to determine the objective of the project and its scope, the timeframe required to complete it, the profit increase or cost reduction expected from the innovation, the internal and external factors that promote and hold back innovation, and the innovation capabilities involved.

### *Financial management for innovation*

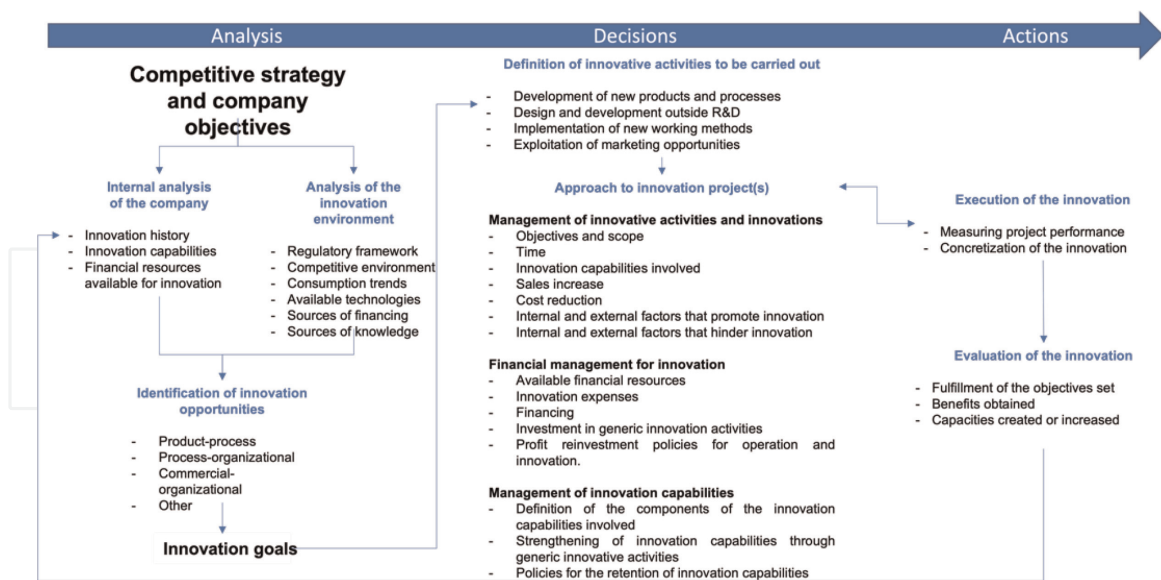
It should respond to the needs of the projects established and the financial resources required to execute them. The following should be identified: the resources available for innovation, both the company's own and those available through financing or government support; the policies for reinvesting profits and allocating resources to innovation; and, in particular, the budget and use of resources for generic innovative activities, since these are the ones that make it possible to increase innovation capabilities.

### *Managing innovation capabilities*

This depends on three main factors: the allocation of an adequate budget so that the capabilities can be increased sufficiently to unleash the innovative activities within the established timeframe; the personnel's ability to learn by doing; and the retention of the innovation capabilities over the project's lifespan. In order to identify and quantify innovation capabilities, the required skills or specific innovative activities should be listed and rated to determine their specific weight in relation to the objectives and established timeframe for the innovation.

## **5.3 Phase 3: actions**

The execution of the innovation should be measured according to the parameters defined during the decision-making process, to review the progress of innovation projects, implement corrective actions, and, if necessary, modify the innovation objectives. Emerging dynamics not foreseen, but identified during the execution of the project, can be addressed by the management, resulting in decision-making. The evaluation of the fulfillment of the innovation, of the benefits obtained, and of the capacities created or boosted, generates important information that will add to the history of the innovations, and in case of success, will increase the financial resources available for innovation. By reviewing and refining innovation objectives, the company will be implementing its innovation strategy.



**Figure 3.** Framework for the systemic management of innovation in SMEs in the dairy sector. Source: Own elaboration.

For the innovation strategy to be effective, it must create and strengthen the innovation capabilities that allow the realization of efficient innovative activities, leading to innovations. Therefore, the policies derived from the innovation strategy imply alignment with the company’s competitive strategy, an accurate analysis of the environment and the organization, the appropriate selection of innovation projects, the identification and management of control variables (internal and external factors), the management of sufficient resources for innovation projects, an understanding of the importance of maintaining and increasing the company’s innovation capabilities, and an evaluation of completed innovation projects, which closes the learning cycle.

Figure 3 shows the deployment of the three phases described above, sequentially in the form of a closed loop corresponding to the feedback of the system.

## 6. Implementation of the systemic management framework for innovation: case of an SME in the dairy industry in Mexico

This section explains the implementation of the stages of the framework for the systemic management of innovation in a medium-sized dairy products company in southeastern Mexico. The implementation of the framework is based on an innovation project that entails a new way of operating the manufacturing process with a direct impact on the product and the market, which represents a novelty in the region. The company has 65 employees and manufactures four types of products. The company’s current market is mainly in southeastern Mexico; its main clients are supermarkets, convenience stores, hotels, and restaurants, and they plan to enter the northern part of the country and export to the United States.

The first stage of the implementation was developed at the company’s facilities through an interview with the general director (system administrator), which was guided by a semi-structured questionnaire and audio recorded. During the interview, the terms and guidelines for carrying out the research within the organization were established and the information from the questionnaire was collected. The second

stage was also carried out at the company's facilities, in several action research-type work sessions with those involved in the innovation project (decision-makers). In these sessions, the management framework was explained, and the decision-making stage was covered, using a format to structure the innovation project in the terms foreseen by the management framework itself and with the active participation of all those involved. The third stage consisted of remote monitoring of the actions carried out in the innovation project indicated in the management framework, through communication with the general manager and the operational staff.

The information from the interview with the general manager is shown in **Table 3**, which is organized according to the categories of the management framework.

Analysis stage	
Competitive strategy and company objectives	<ul style="list-style-type: none"> <li>• Mission: To transform raw materials from the region maximizing added value and reaching international markets.</li> <li>• Vision: To generate value for the community, employees, and shareholders, and drive a change in the way of working in the region.</li> <li>• Objectives</li> <li>• Maximize added value, selling products at the best price</li> <li>• Position products in premium or “triple A” markets in Mexico</li> <li>• Make inroads into the US market</li> </ul>
Analysis of the innovation environment	<ul style="list-style-type: none"> <li>• Regulatory framework: The importance of compliance with regulations, particularly those related to product safety and quality, is being taken into account.</li> <li>• Competitive environment: Strategies are being sought to improve the quality and safety of milk as a raw material, through negotiations with farmers. The company is also seeking ways to retain human capital in the company.</li> <li>• Consumer trends: The company is aligning its efforts to grow and maximize the added value of milk through products made from free-range milk, with quality and safety.</li> <li>• Available technologies: The vision is to increase the automation of the operation, but there is no formal process for detecting and selecting suppliers.</li> <li>• Sources of knowledge: There is no formal process for detecting sources of knowledge, although there is a consultancy planned for the development of processes and new products.</li> <li>• Sources of financing: Several sources of support and financing are known. There are metrics and processes for requesting and managing resources for innovation.</li> </ul>
Internal analysis of the company	<p>The company has carried out process-organizational innovations, such as:</p> <ul style="list-style-type: none"> <li>• Implementation of the milk pasteurization process</li> <li>• Establishment of platform tests on receipt of the product</li> <li>• Establishment of statistical process control</li> </ul> <p>The company has operational and financial capabilities to carry out process and organizational innovations.</p> <p>The company has limited financial resources to carry out innovations; however, it has the financial capacity to seek and manage support and loans to carry out innovation projects.</p>
Identification of innovation opportunities	<p>There is currently no formal process for detecting innovation opportunities. Some opportunities for innovation and process improvement have been detected through statistical process control and customer quality requirements.</p> <p>The innovation project underway is related to food safety and process control. It is a process and organizational innovation.</p>

<b>Analysis stage</b>	
Innovation objectives	Implement an innocuousness project, a certification in the quality area due to the need to reach other markets, be able to export, comply with FDA requirements, increase the profit margin, and improve the company's working conditions.

*Source: Own elaboration.*

**Table 3.**  
*Analysis stage of the implementation case of the systemic innovation management framework for SMEs in the dairy sector.*

The information gathered in the action research session with those involved in the innovation project is shown in **Table 4**.

Finally, in the actions stage, regular communication was maintained for several months with the general manager and the personnel involved in the project, to

<b>Decision stage</b>	
Innovative activities to be carried out	Implementation of a new work method
Approach of the innovation project	Participants: Production manager, food safety manager, plant manager, and collection manager
<b>Management of innovative activities and innovations</b>	
Objective	To meet national and FDA regulatory requirements for milk products through Safety Quality Food (SQF) certification.
Scope	From receipt of raw materials (milk and dry products), production process (standardization to packaging), process safety management, purchasing, and distribution. Sales, collection, and accounting activities are outside the scope.
Time	18 months
Innovation capabilities involved	Production and finance
Expected increase in sales	5% contribution margin increase
Cost reduction	Included in the contribution margin increase
Internal and external factors that promote innovation	<ul style="list-style-type: none"> <li>• Production area is prepared for changes in production plan and changes in demand (flexibility)</li> <li>• Strong culture of good manufacturing practices</li> <li>• High demand for pasture-based products</li> <li>• Good service from some suppliers</li> </ul>
Internal and external factors that promote innovation	<ul style="list-style-type: none"> <li>• Low level of knowledge in the company regarding the SQF standard</li> <li>• Suppliers in the region (dairy farmers) with a low level of knowledge of safety standards</li> <li>• The company lacks financial solvency</li> <li>• Operators and professionals in the region with a low level of expertise and experience in the food industry</li> </ul>
<b>Financial management of the innovation</b>	
Financial resources available for the project	No additional resources beyond the company's normal operations are planned.
Financing or financial support required	There is a budget for a positive pressure system in the process area.

Investment in generic innovative activities	The budget is available for certification training.
Innovation expenses	Accessories of financing or government support
Innovation capability management	
Components of innovation capabilities involved	<p>Operations (90%) four people:</p> <ul style="list-style-type: none"> <li>• Ability to audit SQF (Food Safety) certification points.</li> <li>• Ability to budget expenses for infrastructure conditions, materials, and equipment for compliance with SQF points.</li> <li>• Ability to train staff and implement the safety and quality culture.</li> <li>• Ability to manage audit action plans.</li> </ul> <p>Financial (10%) one person:</p> <ul style="list-style-type: none"> <li>• Ability to manage financial resources (have the resource when needed, with funded credit or support or own budget).</li> </ul>
Strengthening innovation capabilities through generic innovative activities	Training to know and follow SQF certification points
Retention policies for innovation capabilities	<p>Retention of talent in the company through an agreement to give 6 months' notice (management), 3 months' notice (managers), and 1 month notice (operators).</p> <p>A strategy is implemented to achieve a balanced workload.</p>

Source: Own elaboration.

**Table 4.**  
 Decision stage of the case of implementation of the systemic innovation management framework for SMEs in the dairy sector.

monitor progress and results in accordance with the systemic management framework for innovation and to gather the information generated. During this stage, the opportunities identified to improve the performance of the innovation project were:

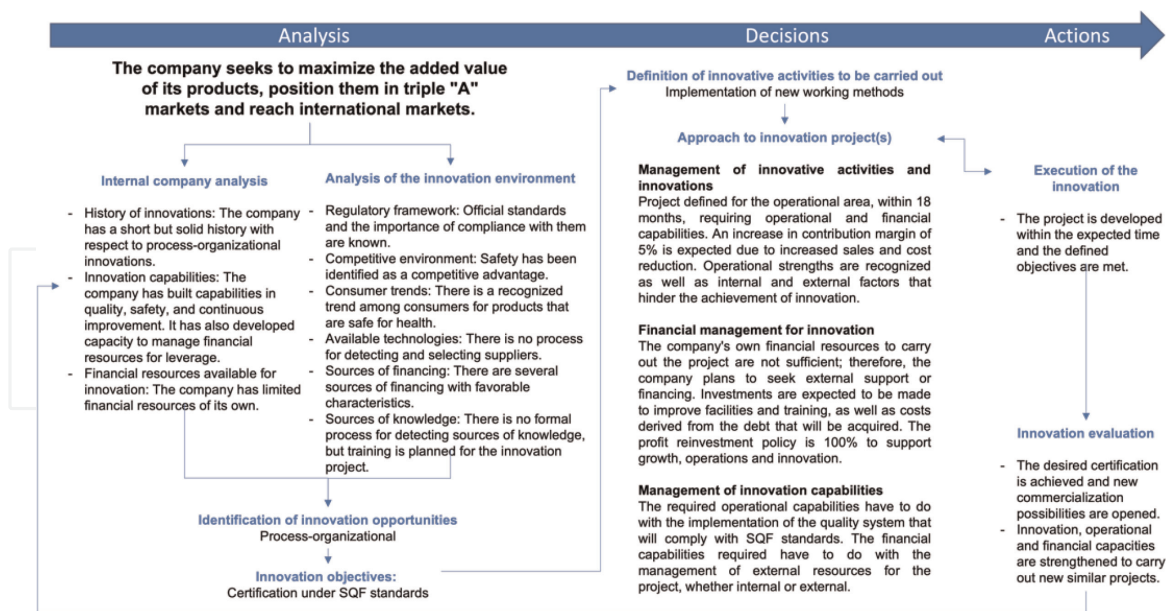
- Development of agreements with suppliers to comply with regulations regarding the quality and safety of the milk yielded.
- Establishment of actions to avoid the loss of innovation capabilities due to personnel turnover.
- Monitoring the progress of project deliverables and improving negotiation skills to obtain external financing.

Innovation in the company's manufacturing process was achieved in a timely manner, and operations and financial innovation capabilities were built and strengthened. **Figure 4** schematically illustrates the results of the implementation of the framework for the systemic management of the company's innovation project.

## 7. Discussion and conclusions

This chapter developed a definition of the innovation management system for SMEs in a specific and relevant sector, the dairy sector, based on identifiable and





**Figure 4.** Implementation of the framework for the systemic management of innovation in SMEs in the dairy sector. Source: Own elaboration.

operational components: innovation capabilities, innovation activities, and innovations. The system defined shows the generic elements and the relationships present, in order to understand innovation not only as the sum of its parts but as a complex and manageable whole. The innovation management system for SMEs in the dairy sector is instrumented through a framework for the systemic management of innovation in these companies in three phases: analysis, decisions, and actions. This sequence sets in motion the company's innovation strategy, which allows moving from theory to practice for the benefit of organizations seeking a concrete procedure to formalize their innovations with a broad understanding of the phenomenon.

In the case study developed in this chapter, it is observed that the implementation of the framework facilitated the alignment of innovation objectives with the company's competitive strategy and objectives, the establishment of the innovation project in a detailed and organized manner, the definition of innovative activities, the observation of the relationship between financial management and the management of innovation capabilities, and the participation of the different organizational levels. It also highlighted emerging problems in the innovation project in order to solve them in a timely manner, which could undoubtedly be of value for all types of organizations.

In summary, the established systemic management framework for innovation in SMEs in the dairy sector makes it possible to propose innovative projects aligned with the company's competitive strategy, carry out an analysis of the environment from a systemic point of view, and adequately identify innovation opportunities and propose feasible innovation objectives that lead to an increase in the value perceived by customers and consumers, in order to make the innovation a reality. Although this chapter presents a study with areas of opportunity, it can be considered as a first relevant approach both for the elements of the model considered as well as for the systemic approach used.

Finally, the authors of this chapter see different opportunities for future studies, which include testing the model in a simulated manner in different scenarios, as well

as implementing it in an organization with technological innovation projects. In addition, this model could be adapted to understand whether innovation with a systemic approach is applicable to large companies. This opens the possibility of further exploring the adoption of innovative approaches based on specific capabilities and thus encouraging organizations to develop these types of capabilities.

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