

## Chapter 5

# Applied Innovation Methodology: A Proposal for a Dynamic Sustainable Environment for the Generation of Innovation and Knowledge Management Practices in SMEs



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### 5.1 Introduction

Over time people have evolved to create companies in order to produce goods and services to satisfy their needs. Historical development has shown that companies have adapted to changes in their environment and therefore to the changing needs of the people because these diversifications are generated by their expectation. There are various concepts of evolution, but it is considered interesting to take it into account as an internal mechanism to improve the transmission to living descendants. Given the complexity of the issues involved, multiple methods, procedures, and the mechanisms used, they are configured for each case according to the particular conditions (Bank Boston 1997). This line of thought is fully aligned with the Schumpeterian system which is based on a necessary symbiosis between economic, historical, political, social, and other elements related to the development of the capitalist system (Schumpeter 1934), as well other approaches that are conditioned by the analysis of the innovation concept, for example, the organizational knowledge creation (Nonaka 1994), the resource-based perspective (Peteraf 1993; Barney 2001), or the sustainability-driven approach (Teece 2007; Kiron et al. 2013).

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In this paper many conceptual works found in the literature dealing with the evolution of innovation were described (Tidd et al. 2005), as well as knowledge (Prahalad and Hamel 1995), ICT (information and communications technologies) (Prahalad and Hamel 1995), organizational capabilities, new organizational structures, human capital, absorptive capacity, and information society (Moore 1999). It has also been explained how these factors affect the adaptation of companies in a globally competitive environment (Fernández de Lucio et al. 1996), rapid technological change, and innovative approaches, achieving significant changes in the competitive and productive capacity of the company (Porter 2008).

After performing a literature review, this study searches to bridge the existing gap between corporate organizational structure and innovation (Barceló 1994) and other new concepts relating to creativity management (Davenport 1993). Therefore, a new model to allow companies to implement more effective, efficient, and competitive was proposed. Some authors like Escorsa and Valls (1997) argue that “the scope, flexibility and efficiency of the knowledge assimilation depends on the company’s organizational structure (functional, divisional or matrix).” Other authors explain that we must consider companies that have to hire subcontractors, freelancers, or consultants in order to acquire specific skills, creating a network of subcontractors, leading a generation of strategic alliances of individuals (that are not personally interconnected, but located globally). Perhaps these actors do not know each other personally, due to the fact that they could be located at various locations in the world. Co-working has the same need for this perspective and can also be considered as a network of subcontractors.

Thus, this work aims to deepen and strengthen the scope of knowledge management and its relationship with the innovative activities of the company. Specifically, the main feature of managing organizational knowledge has been analyzed, and the relationship between human behavior and innovative thinking, identified in relation to the specific correlation of business results. Moreover, other studies have been taken into account (Freeman 1987), which shows the importance of thinking and linking other perspectives to the organizational approach and the importance of increasing the balance in three different areas: the commercial and economic dimension, the demographic movements, and the new technological scenarios.

## 5.2 Theoretical Background

### 5.2.1 *Conceptual Framework: Flexibility, Organizational Design, and Knowledge Management*

According to Moore (1999), “companies must have the ability to adapt to new situations, without these changes they entail heavy penalties of time, cost, effort or performance, a concept which is known as flexibility. Flexibility is associated with the human capital that owns the company and the orientation adopted by certain

practices of human resource management in terms of job design and selection, training and development, performance evaluation and compensation.” Thus, flexibility is an important concept to take into account, if it is desired to implement an innovative environment within a company. However, some authors like Christensen and Raynor (2003) assume that organizational context influences the level and frequency of innovative behavior of the company, defining the innovative capacity concept as the ability to successfully implement new ideas. They measure this capacity in accordance with the mechanisms that favor the flow of innovative ideas, including organizational structure and management ideas.

The concepts of flexibility, organizational context, or structure were described, as well as its importance and relationship with the innovative capacity or innovation processes of a company. The glue that must link together these terms is the company’s knowledge. Following Nonaka and Takeuchi’s (1995) work, knowledge has been described as the information that has been subjectively contextualized, interpreted, and assimilated by an individual, group, or organization. Knowledge includes information but also competencies, skills, and abilities to process and interpret this information. The fundamental priority is to understand the nature of knowledge and how it is generated. Knowledge management is necessary to deal with the turbulence of the current business environment, giving the company a level of flexibility necessary for adaptation. Consequently, knowledge must be created, developed, transferred, and applied to products and/or services, and this process can be favored by the organizational culture, design, and human resources management practices.

According to Nonaka and Takeuchi (1995), “the distribution of knowledge in the organization is a central criterion in the organizational design and this knowledge resides primarily in people, and given the bounded rationality it is not possible to concentrate all the relevant knowledge for decision making in a single person. Information and knowledge are relevant in the decision process, so that when making the assignment of decision responsibilities between the members of an organization it is necessary to consider the nature of the relevant information, where and how it is produced, and the cost of transferring efficiently.” Knowledge management allows to analyze, to organize, and to implement the information in a business context in order to convert it into an intangible added value for the organization, allowing decision-making and corporate management to become easier.

### ***5.2.2 Innovation, Change Management, and Corporate Culture***

In words of Fernández de Lucio (1991), “innovation is often closely connected with a company founder’s vision and entrepreneurial spirit. Sometimes it is also driven by people who have a predisposition to change, the so-called masters of change. These individuals are not always great experts, and they are not necessarily more

creative than others. The truth is that they are more inclined to break free from traditional knowledge and deal with issues from a different angle, being considered more persistent in order to defend new projects more passionately. They know how to communicate their ideas and get key players within the organization to assist them in the process of formulating them. However, people alone cannot create a culture of innovation.” Other authors are focused on how open innovation is defined and the ways in which the construct is used in a variety of empirical research settings (Dahlander and Gann 2010).

In regard to corporate culture, successful companies know that it is an important competitive factor, though this concept may be rather difficult to assimilate by certain individuals within the company. It is important to highlight that it is relatively easy to imitate products, services, and processes, but corporate culture is unique and it persists over time, being a corporate tool that not every organization can create. Scott (1989) mentioned that “those companies whose employees are open to new ideas and are prepared to actively take part in technological change by being creative and showing initiative usually have greater potential for innovation. However, a corporate culture does not consist of people only. It is the systems, procedures and organizational structure which lead the individuals to interact in a certain way. Those companies managing highly complex projects, in which the high content of new features requires them to take advantage of all the specialist knowledge available, have had to turn to new organizational models. One of the main differences between traditional and strategic, process-based management is how responsibility is assumed and understood.” Scott (1989) continues arguing that “this often leads companies to abandon their horizontal structure with a fixed hierarchy, in favor of a matrix based structures with a positional hierarchy in which the same person can be in charge of a process that extends to a number of different areas. For this reason, the innovation process manager is a key player that needs the total trust and commitment of management. In small businesses this position is held by the top director.”

### **5.2.3 Innovation and SMEs**

Innovation has become a key process to achieve competitive advantages, and it must be conducted when efforts to improve it have reached their limit and are no longer sufficient to increase efficiency, so new ways are sought to develop processes, products, or services in order to make fundamental or substantive changes and advances. Innovation must be understood as a core resource which does not guarantee that competitiveness will be reached, but it is necessary to establish methodologies and strategies that lead to achieve this objective. The studies on the factors involved in the process of innovation, as well as opportunities in the different scenarios, provide insights into potential tools involving innovation as part of the system within the organization and therefore open up new options for competitiveness (Armenta et al. 2016).

If a focus on SMEs is considered, it must be said that several attempts have been made to build models of innovation for companies, but there are no documented empirical studies showing how SMEs have achieved and capitalized their experience and knowledge in terms of innovation. There can be found some studies relating to factors that determine innovation such as organizational creativity, entrepreneurship, intellectual capital, knowledge management, organizational management, business incubation, and continuous improvement, but they are isolated works that do not allow a model of innovation for small and medium enterprises to encourage their permanence and growth in the market (Parra et al. 2016). Thus, in reference to SMEs, innovation can be described as a complex technological, sociological, and economic process that involves large interactions, both within the company and between the company and its economic, technical, competitive, and social environment. Therefore, it cannot be expected to be a success or to be explained satisfactorily in terms of just one or two factors, but as a group of various factors, closely interrelated, which must work together to create and reinforce the kind of environment that facilitates the success of technological innovation. No single element is likely to be effective and, therefore, no management tool or technique will create and sustain an enabling environment for innovation (Armenta et al. 2016). Nowadays, an increasing number of SMEs are incorporating new information technologies and communications systems within their processes, so it can be expected that the level of innovation and creativity in these SMEs will be increased in the coming years; therefore, their level of performance will encounter positive changes, thereby obtaining additional resources to address financial problems (Guzman 2016).

In another way, the collaborative activities undertaken by organizations, mainly SMEs, with companies and public and private institutions not only generate greater innovation activities but also create the necessary conditions and best practices for the adoption and implementation of innovation. Cooperation should be considered by managers of SMEs not only as a business strategy, but rather as an activity of everyday life in companies, which will be implemented in all departments or functional areas of the organization, so that it will be feasible to achieve the benefits generated by these collaborative activities. If organizations, especially SMEs, want to adopt or increase their innovation activities, then it will be necessary for managers of SMEs to seek the implementation of innovation activities, with other companies and public and private organizations. Through collaboration with other organizations, there is a distinct probability that SMEs will obtain a higher level of innovation. Therefore, cooperation will be implemented in companies before innovation activities, because in this way the human, technical, and financial resources available to organizations will have improved results and an impact in the innovation level of SMEs (Lopez-Torres et al. 2016). SMEs should create a work environment within the organization that promotes and encourages the collaboration of workers and employees, so that the staff is motivated to participate in collaboration activities through teamwork, which could be supported by external staff. In addition, companies also have to implement this collaborative system with their customers and suppliers in the decision-making of the organization. Otherwise, SMEs can

find it difficult to defend a position of power in relation to customer satisfaction, production levels, and marketing tasks in reference to their products and services commitments. Thus, collaborative activities with its customers and suppliers will be essential to significantly improve their level of innovation (Lopez-Torres et al. 2016). The creation of collaborative networks between corporate universities, customers, and SMEs could be another mechanism of value creation according to Alonso-Gonzalez et al. (2017b).

Innovation is a competitive factor whose strategic value has been questioned by some experts through the literature review. However, getting a profitable exploitation of innovation is a difficult and complicated task. This complexity turns out to be even greater when the case of start-up companies is analyzed. Innovation involves risk out of a comfort zone, and this decision involves a lot of uncertainty, for individuals and organizations that wish to undertake this task. Therefore, it is important that from an early stage these start-ups develop a capacity to absorb knowledge as a distinct ability to explore new opportunities (products, services, companies) and entrepreneurial orientation focused on the market, for the successful exploitation of such knowledge (production and marketing of new products and services). Conditions, absorption capacity and entrepreneurial orientation, are essential to receive profit from the effort that targets innovation (Díaz et al. 2015).

#### ***5.2.4 Innovation and Entrepreneurship in Profit and Nonprofit Organizations***

In today's economy focused on a world in the process of postmodernity, mankind has the need to look for opportunities that generate added value and economic benefits and accelerate the life cycles of other enterprises, as a survival factor of their organizations in our current competitive climate. This phenomenon of entrepreneurship and creation of organizations has been an engine of development in social and economic processes, which have brought humanity to an evolution. One of these developments has been the technological invention, economic growth, and new forms of production as a result of this business development. This whole process of change has had different stages, from the modes of production, feudalism, capitalism, and the industrial revolution toward a knowledge economy and new products, services, and process developments brought to our current modernity (Ballestas 2016).

It is remarkable to highlight the correlations between entrepreneurship and economic development. For example, in the study performed by De Oliveira and Cardoso (2015), it can be observed specifically the relationship between economic and social development and the level of entrepreneurial activity in the world. The authors established two research hypotheses and estimated four econometric models. The first hypothesis expected a negative relationship between entrepreneurship and economic, social, and competitiveness development of a country. The hypothesis

was confirmed, meeting previous studies and showing that countries with high rates of entrepreneurship do not necessarily obtain social economic development. These interesting results suggest that there is an opportunity for countries to establish conditions and structures for the enhancement of entrepreneurship and consequently promote higher levels of economic and social growth, as well as an increase in competitiveness.

It is important for entrepreneurs to seek and provide interesting and modern alternatives related to innovation in order to generate new ways to compete and be profitable in our current highly demanding market; develop new products, dynamic services, and optimized processes; and provide a competitive advantage to allow them to consolidate in the market (Roman 2016). There is a relationship between social entrepreneurship and social innovation. From the point of view of the entrepreneur, it must be highlighted that the role of innovation is a way to achieve social goals. Thus, according to this idea the entrepreneur should aim to create profit but also to generate social value. It is necessary to show how the use of innovative practices is able to break with existing paradigms, and these practices can make businesses as a benchmark for society and for other companies. The situation would not be uncommon to public institutions, which should modify their regulations and adapt to the new economic and social reality around them. This way, a social change would not only be achieved but also a new conception of the entrepreneur concept (Alonso et al. 2015). In this line of thought, some studies can be found, for example, the one performed by Molina-Betancur and Polanco-López de Mesa (2015), exploring the possibilities of how public institutions could encourage the development of science, technology, innovation, and entrepreneurship through the theoretical relationship between government and sustainability. Another study which follows this line of thought is one performed by Alonso-Gonzalez et al. (2017a), describing collaborative initiatives within universities and a population at risk of social exclusion.

Molina and Velilla (2016) found in another study strong correlation for the importance of innovation in entrepreneurship, describing that business analysis should consider such variables relating to innovation, which have often been underused. Moreover, the results of their work suggest a business channel driven by innovation and furthermore due to synergy among individuals, similar to the intergenerational effects. From the point of view of economic policy, entrepreneurship is currently a work activity that is being encouraged by economic, social, and political institutions. It is mandatory to identify the most important factors that engage individuals, facilitating the work of guiding these incentive policies and improving their effectiveness and efficiency.

The role of higher education institutions is also an important consideration, describing them as catalysts of entrepreneurship, innovation, and growth for economic development, especially in developing countries, in reference to the studies conducted by Alonso-Gonzalez et al. (2016) and Alonso-Gonzalez et al. (2017a, b, c). These institutions could be seen as innovation generators and large technology centers that could enhance innovation, creativity, and entrepreneurship within society, as well as technological development. Some of the products and services associated

with the infrastructures are project incubators, qualified training in various areas for students in business entrepreneurship, research of academic projects focused on the student community and the general public, technological development, promotion of technological transfer to the business market, management and generation of business knowledge in training students who graduate through the creation of these specialized centers, and start-ups or business creation initiatives (Sinisterra 2016).

For this social entrepreneurship through higher education institutions, emphasis must be placed on the promotion of knowledge and Internet applications, as well as directives, accounting and technical competitiveness, managerial autonomy and risk management, acceptance of error and decision-making in SMEs, copyright and intellectual property concepts, commercial exploitation, and transfer technology. For infrastructure in relation to innovation and entrepreneurship, the importance of university institutions must be highlighted (quantity and quality of these centers), as well as the acquisition of research tools, techniques and business consolidation incubators, and technology-based and service centers for entrepreneurs. On the issue of entrepreneurial characteristics for innovation, the following attributes should be included: initiative, leadership, problem solving, and acceptance to change. For entrepreneurship discipline, these include the following: independence, risk, problem solving, communication, courage, self-control, and creativity. For both innovation and entrepreneurship, the attention should be focused on the following features to promote them transversely: the learning of creativity, problem solving, management risk, the use of ICT, the development of knowledge networks, self-learning and lifelong learning with a research and scientific approach, as well as the creation of institutional or corporate bonds (Herrera and Álvarez 2015). It is important to outline the burden of learning in this innovation and entrepreneurship dimension, which is perfectly aligned with the work of Crossan et al. (1999) concerning the organizational learning framework.

## 5.3 Methodology

### 5.3.1 *Innovation and Entrepreneurship in Profit and Nonprofit Organizations*

Once the review of the present literature has been highlighted in the current paper, and derived from the model proposed by Terre-i-Ohme (2002) from his document *Guide for Managing Innovation: Part 1, Diagnosis*, a model called Applied Innovation Methodology will be proposed as a tool to develop innovation and entrepreneurship in profit and nonprofit organizations and especially in SMEs. This methodology consists of six different phases which are conceptualization, development, applied innovation, optimization, development, and sustainability. These stages will be described in the following sections.



### ***5.3.2 Conceptualization: Setting a New Proposal of the Applied Innovation Methodology***

Through the Applied Innovation Methodology, the required human resources were established, as well as the technical processes and the methodological environment necessary to encourage the fulfillment of new concepts in order to guarantee success in the process. Therefore, the following issues are the beneficial results of this methodology:

- Creation of distance between the business and its competitors
- Anticipation to future competition moves and counterstrikes
- Creation or consolidation of new market places
- Increase in the existing area of business potential
- Generation of new business models and ideas

### ***5.3.3 Development: Qualitative Definition***

It is proposed that the Applied Innovation Methodology is the leader in the innovation process of an SME and consequently stabilizing the specifications, requirements, and processes in order to transform an idea into a tangible result. At this stage it is important to introduce the task that is performed by the so-called Innovation Team. This team in any SMEs consists of a group of experienced professionals in various fields such as design, engineering, logistics, production, finance, and marketing. The tasks of the so-called Innovation Team in the area of development need to be focused on the definition of the qualitative aspects of the product, specifying processes to optimize resources while looking to capitalize opportunities offered by the target market. The most important tasks that the Innovation Team must manage are the following:

- **Implementation:** in this process, technologies, industrial processes, and commercial requirements of costs, product launch, and presentation are defined. All these factors reflect strategic and technical values defined in the previous phase, allowing for the evolution, validation, and solidification of tangible elements throughout the process of a product or service.
- **Strategic planning:** the actual complexity of the production processes and the importance of factors like globalization and delocalization of companies and industrial processes require a correct planning of the “What, How, Where and How.” A correct definition of the necessary processes to physically implement and launch a new product must establish the required frame to define new business opportunities.
- **Commercial tools:** the innovation process needs a team that actively helps the client to expose all product values to the user and collaborates with the sales force to maximize the development of tools that correctly transmit the approaches

developed in new products. The Applied Innovation Methodology has developed different commercial tools to specify all the factors that allow us to extract the value of all concepts.

### ***5.3.4 Applied Innovation: Performing Change and Growth Under Control***

Innovation should not be implemented in isolation, because of its high correlation within the specific needs of markets and the environment and other strong relationships related to the company's sector, products, and knowledge, as well as its limitations. The Applied Innovation Methodology aligns the client's knowledge with the strategic vision of the company, creating a new approach toward the knowledge management of the organization. Based on this existing knowledge, the Applied Innovation Methodology allows the Innovation Team project to define a new competitive scenario within the company for the client and the market.

Any company has a different and variable knowledge life cycle with its own expiration date. Besides, as the market changes, evolves, and modifies its needs and requirements, businesses often cannot develop the capacity and flexibility to adapt. The Applied Innovation Methodology overcomes this trend giving it another approach and initiating a process which identifies new opportunities and competitive positions within a market, generating new business opportunities. This new and innovative approach is not always produced at the same stage, nor does it produces changes in the same way in every situation. Therefore, the innovation levels can be established depending on the needs of an organization:

- Strategic level: business strategy modification or adaptation
- Product range level: new business units or new products and services ranges
- Products conceptualization: new products and services functions or solutions
- Product attributes: new product presentations and new products and services external perceptions

### ***5.3.5 Optimization: Improving the Profitability of the Product***

Before the final version of the product is defined, it is necessary to perform a study of the elements which influences in the development process in order to achieve two essential objectives:

- Reduce final costs: contributing to innovative and constructive solutions and new materials, rationalizing the product range and always bearing in mind the technological availability and output capacities, or the optimization of commercial references.

- Improve competitiveness: the relationship between commercial diversity and technological platforms will determine the concept, form, investments, and final product price. A correct relation between both, which is defined in the first state of the project, will be vital to achieve its aims.

The optimization initiatives developed using the Applied Innovation Methodology create new feasible commercial initiatives according to the identified needs of the market, maximizing on its way different economic factors related to the product and making an impact in different areas in the final configuration of the product or service: design, logistics, production, quality control, marketing, and sales. These lines of optimization that should be taken into account are the following ones:

- Definition of platforms and modules: creating little infrastructure which then permits the maximization of the number of references that adapt to the needs of the client, minimizing the final cost of the product
- Alternative technologies: identifying materials and technology that reduce the final cost while maintaining or improving attributes of the product
- Product ranges: proposing an optimal point between commercial range (product references), needs of the market, and development in the function of commercial references

It is important to highlight that there are two key factors to take into account in this optimization process: to always maintain a relationship between value and cost from the market needs' point of view and to propose the best technical solutions from the product value's point of view, taking into account the materials and production processes, the suppliers efficiency and availability, as well as the Innovation Team expertise.

### ***5.3.6 Development: Materializing Ideas in Products and Solutions***

The Applied Innovation Methodology combines both engineering and design dimensions with a strategic vision, enhancing decision-making at the various strategic areas within an organization. This strategic vision allows the Innovation Team of the SME to define unique competitive elements that are extremely difficult to copy or implement by the competition, allowing the creation of unique competitive concepts and proposals, designing and creating resources which will add knowledge and added value to the different areas of the company, as well as to the final customer or target market. The combination and alignment of these two different ways of understanding the product result in a knowledge increase without a loss of value proposal. However, it is difficult to strike this balance and for the competition to replicate this new value proposal in the target market and this is the main strength

that the Applied Innovation Methodology achieves, transforming these ideas into business opportunities for the customers in the following ways:

- Highlighting the attributes oriented to the final user's needs with an attractive design
- Optimizing for any product its functional values, material specifications or requirements, technological functionality, or mechanics efficiency
- Adapting or modifying the manufacturing process to meet specific customers' needs relating to design, ergonomics, or product performance

In every stage within the development process, there is a validation exam set up by a multidisciplinary team which evaluates if the product is achieving the specifications required by the client. Therefore, the Applied Innovation Methodology establishes the link between the strategic objectives, differential values, and value proposal and commercial initiatives before the launch of the product, with cost, quality, and time frame defined by the market.

### ***5.3.7 Sustainability: Taking into Account Responsibility and Ethics***

Sustainability can be defined as a mix of social benefits for mankind, economy, and environment in order to improve the present and future quality of life. The Applied Innovation Methodology takes into account this concept in its development and production process of its products and services, aligning this with its objective of developing competitive advantages in the markets. These three different dimensions of the sustainability concept are interconnected and the Applied Innovation Methodology's points to minimize every harmful effect and encourage positive outputs on each of the following:

- **Environment:** the environment has a direct effect on quality of life and social wellness, and the natural resources it offers provide the substance from which business is created and a sustainable economy works. The implementation and enforcement of international standards and legislation now recognize the need for business actions and product improvements in an environmentally friendly way (EU producer responsibility legislation, IPP (Integrated Product Policy), ISO 14000, eco-labeling, etc.).
- **Society:** businesses are beginning to be held accountable for their actions in terms of the welfare of employees and citizens. International regulations, audits, reports, and evaluations are becoming commonplace, which have implications in products and services (Corporate Social Responsibility, Dow Jones Sustainability Index, Global Compact, Global Reporting Initiative, etc.).
- **Economy:** as a bottom line, it is essential that responsible and environmentally improved products remain competitive. In the marketplace, a win-win situation occurs when environmental and economic savings are achieved through one ini-

tiative, as, for example, the search of efficiency and optimization. Furthermore, product responsibility has direct positive effects on financial results, and in some cases certification is a requirement in the market (Forest Stewardship Council certification in furniture, ISO 14000 standard for suppliers, etc.).

The focus of the Applied Innovation Methodology, considering these different dimensions of the sustainability concept, is to increase the added value all along the entire life cycle of products and services, describing this process through the following stages:

1. Specification of materials: minimization of quantity of materials and rational application of recycled, recyclable, biodegradable, and renewable materials
2. Efficiency in manufacture: specification of the manufacturing process to generate the least amount of possible waste and optimization of the number of processes and energy used in each stage
3. Optimization in distribution: improvement of packaging and rationalization of the logistics and transport to avoid inefficiencies.
4. Use: evaluation and reduction of consumables and energy use throughout the worthwhile life of the product
5. End of life: consideration of waste materials generated throughout the products' life and definition of the process of recycling or reuse of products at end of their useful life

## 5.4 Conclusions and Future Research

As Drucker (1998) asks rhetorically “How can managers plan, let alone trust a process which, in essence, depends so much on creativity, inspiration and luck? [...] Although some innovations are the result of a flash of genius, most of them, especially the most successful ones, are born out of a conscious and deliberate search for innovation opportunities that can only be found on rare occasions.”

Innovation requires a merged vision and a multidisciplinary knowledge, and nowadays innovation processes have become a competitive advantage in an increasingly global economy, which cannot compete on the basis of reduced margins. A joint vision for all involved activities enables organizations to conceptualize and position their products or services in the markets. This is performed in a proper way beyond the opportunity costs of engineering. In our current competitive environment, new elements should be introduced to increase the balance in three different areas: the commercial and economic dimension, the demographic movements, and the new technological scenarios. Innovation is not an isolated issue, depending on the analysis, understanding, and satisfaction of needs for every client according to the environment, sector, products, and knowledge management. In this order of alignments, the process of conceptualization and the conception of an idea into a concept or prototype and then into a product or service with the required specifications are defined by the whole development process.

In the proposed Applied Innovation Methodology, an alternative source of detection and generation of new business opportunities has been described, facilitating the competitiveness of organizations based on the creation of new competitive spaces, using optimization to create a commercial range of rational product costs, consistent with consumer needs, maximizing the profitability. It has been identified in the model the importance of the selection of a key partner in order to reach the quality levels required and optimizing the product cost. Therefore, the Innovation Team should employ time and effort in this selection process of key partners, based on specifications and requirements of the project in order to fulfill the goals, and having considerable impact on the final product configuration in different areas such as design, logistics, production, quality control, marketing, and purchasing.

The Applied Innovation Methodology defined in the current work is a framework which helps to define the various methodologies, strategies, processes, and design costs and produce and market a product within its specifications and requirements. To perform this model, some external and private clients were consulted throughout the entire process in order to establish the best optimized route and therefore bring any product from the identified customers' needs to the target market with proper quality standards within a specified time frame.

## References

- Alonso, D., González, N., & Nieto, M. (2015). Emprendimiento social vs innovación social. *Cuadernos Aragoneses de Economía*, 24(1), 119–140.
- Alonso-Gonzalez, A., Diaz-Morales, A., & Peris-Ortiz, M. (2016). Enhancement of entrepreneurship in Colombian universities: Competence approach plus personalized advice (CAPPA) model. In M. Peris-Ortiz, J. A. Gómez, F. Vélez-Torres, & C. Rueda-Armengot (Eds.), *Education tools for entrepreneurship* (pp. 101–112). Springer International Publishing, Switzerland. ISBN: 978-3-319-24655-0.
- Alonso-Gonzalez, A., Palacios-Chacon, L. A., Rueda-Armengot, C., & Peris-Ortiz, M. (2017a). Collaborative networks between Colombian universities and population at risk of social exclusion: The Sergio Arboleda University experience. In M. Peris-Ortiz, F. Teulon, & D. Bonet-Fernandez (Eds.), *Social entrepreneurship in non-profit and profit activities: Theoretical and empirical landscape* (pp. 65–72). Springer International Publishing, Switzerland. ISBN: 978-3-319-50850-4.
- Alonso-Gonzalez, A., Peris-Ortiz, M., & Mauri-Castello, J. (2017b). Collaborative networks between corporate universities, customers, and SMEs: Integrating strategy towards value creation. In M. Peris-Ortiz & J. J. Ferreira (Eds.), *Cooperative and networking strategies in small business* (pp. 197–205). Springer International Publishing, Switzerland. ISBN: 978-3-319-44509-0.
- Alonso-Gonzalez, A., Plata-Rugeles, D., Peris-Ortiz, M., & Rueda-Armengot, C. (2017c). Entrepreneurial initiatives in Colombian universities: The innovation, entrepreneurship and Business Center of Sergio Arboleda University. In M. Peris-Ortiz, J. A. Gómez, J. M. Merigó-Lindahl, & C. Rueda-Armengot (Eds.), *Entrepreneurial universities* (pp. 151–163). Springer International Publishing, Switzerland. ISBN: 978-3-319-47949-1.
- Armenta, J. R. C., Arango, O. M., & Gress, E. S. H. (2016). Medición de la innovación en las pymes mediante la aplicación de métodos multicriterio (electre y AHP). *Mercados y Negocios*, 14(2), 169–185.

- Ballestas, C. L. (2016). Aspectos de innovación schumpeteriano: el emprendimiento, el perfil del empresario en el contexto social. *Dictamen Libre*, 1(17), 73–80.
- Bank Boston. (1997). *MIT: The impact of innovation*, Bank Boston Economics Department Special Report. Boston, Bank Boston.
- Barceló, M. (1994). Innovación tecnológica en la industria: Una perspectiva española. *Llibres dels Quaderns de Tecnologia*, Beta E. Editorial.
- Barney, J. B. (2001). Is the resource-based “view” a useful perspective for strategic management research? Yes. *Academy of Management Review*, 26(1), 41–56.
- Christensen, C. M., & Raynor, M. E. (2003). *The innovator's solution*. Boston: Harvard Business School Press.
- Crossan, M. M., Lane, H. W., & White, R. E. (1999). An organizational learning framework: From intuition to institution. *Academy of Management Review*, 24(3), 522–537.
- Dahlander, L., & Gann, D. M. (2010). How open is innovation? *Research Policy*, 39(6), 699–709.
- Davenport, T. H. (1993). *Process innovation*. Boston: Harvard Business School Press 10-11, 50-55.
- De Oliveira, I. G. S., & Cardoso, S. P. (2015). Emprendimiento y sus implicaciones para la innovación y el desarrollo: un análisis multivariante con los indicadores socioeconómicos. *Globalización, Competitividad y Gobernabilidad de Georgetown/Universia*, 9(2):43–60.
- Díaz, Y., Guerrero, M., & Peña, I. (2015). Innovation driven productivity through corporate entrepreneurship/Productividad de la innovación a través del emprendimiento corporativo. *Universia Business Review*, 15(3), 33–47.
- Drucker, P. F. (1998). The discipline of innovation. *Harvard Business Review*, 76(6), 149–157.
- Escorsa, P., & Valls, J. (1997). Manual de Gestión e Innovación Tecnológica en la Empresa, Ed. Centro Interuniversitario de Desarrollo CINDA, Colección Ciencia y Tecnología n° 41, Santiago de Chile, 22–24, 29–30.
- Fernández de Lucio, I. (1991). Industria: innovación y tecnología. In J. Honrubia, J. M. Bernabé, A. Ortí, & J. A. Tomás (Eds.), *La Comunidad Valenciana en l'Europa Unida Innovació i Tecnologia* (Vol. VIII). Valencia: Generalitat Valenciana.
- Fernández de Lucio, I., Conesa, F., Garea, M., Castro, E., Gutiérrez, A., & Bodegas, M. A. (1996). *Estructuras de interfaz en el sistema español de innovación. Su papel en la difusión de tecnología*. Centro de Transferencia de Tecnología. Universidad Politécnica de Valencia.
- Freeman, C. (1987). *Technology and economic performance: Lessons from Japan* (pp. 4–25). London: Pinter.
- Guzman, G. M. (2016). La influencia de las TIC y la innovación en el rendimiento de las pymes de Aguascalientes: una evidencia empírica. *Mercados y Negocios*, 12(1), 15–33.
- Herrera, M. M., & Álvarez, J. G. C. (2015). Características para promover el emprendimiento y la innovación. Marco general para la formación en las universidades. UPIICSA. *Investigación Interdisciplinaria*, 1(2), 32–45.
- Kiron, D., Kruschwitz, N., Reeves, M., & Goh, E. (2013). The benefits of sustainability-driven innovation. *MIT Sloan Management Review*, 54(2), 69.
- Lopez-Torres, G. C., Guzmán, G. M., Castro, S. Y. P., & Ramírez, R. G. (2016). Colaboración y actividades de innovación en Pymes. *Contaduría y Administración*, 61(3), 568–581.
- Molina, J. A., & Vellilla, J. (2016). *La innovación como determinante para el emprendimiento* [Innovation as determinant of entrepreneurship] (No. 71471). 1–27. University Library of Munich, Germany.
- Molina-Betancur, C. M., & Polanco-López de Mesa, J. A. (2015). Un desafío de sostenibilidad: el nuevo distrito metropolitano de ciencia, tecnología, innovación y emprendimiento del valle del Aburrá en Colombia. *Estudios Geográficos*, 76(279), 579–607.
- Moore, G. (1999). *Inside the tornado: Marketing strategies from Silicon Valley's cutting edge* (Revised ed.). New York: Harper Collins Publishers.
- Nonaka, I. (1994). A dynamic theory of organizational knowledge creation. *Organization Science*, 5(1), 14–37.
- Nonaka, I., & Takeuchi, H. (1995). *The knowledge-creating company: How Japanese companies create the dynamics of innovation*. New York: Oxford University Press.

- Parra, M. E. L., Navarro, N. E. G., & Torres, M. D. C. V. (2016). Modelo de Innovación para las PYMES a partir de la práctica guiada. *Global de Negocios*, 4(7), 27–39.
- Peteraf, M. A. (1993). The cornerstones of competitive advantage: A resource-based view. *Strategic Management Journal*, 14(3), 179–191.
- Porter, M. E. (2008). *On competition*. Harvard Business Press, Boston, USA.
- Prahalad, C. K., & Hamel, G. (1995). *Compitiendo por el futuro*. Barcelona: Ariel.
- Roman, L. M. (2016). Empresas con base tecnológica e innovación: Emprendimiento rentable. *APLIMATEC*, 6(1), 1–5.
- Schumpeter, J. (1934). *The theory of economic development*. Cambridge, MA: Harvard University Press.
- Scott, B. R. (1989). Competitiveness: Self help for a worsening problem. *Harvard Business Reviews*, 67(4), 115–121.
- Sinisterra, O. O. L. (2016). Centers innovation, technological development and entrepreneurship: Case of the Universidad de Panamá. *Hamutay*, 2(2), 40–49.
- Teece, D. J. (2007). Explicating dynamic capabilities: The nature and microfoundations of (sustainable) enterprise performance. *Strategic Management Journal*, 28(13), 1319–1350.
- Terre-i-Ohme, E. (2002). *Guide for managing innovation: Part 1, diagnosis*. Generalitat de Catalunya, CIDEM, Spain.
- Tidd, J., Bessant, J., & Pavitt, K. (2005). *Managing innovation: Integrating technological, managerial organizational change*. New York: Wiley.