



Sonia Janneth Limas-Suárez 

Universidad Pedagógica y Tecnológica de Colombia, Tunja, Colombia.

Abstract

Objective: To analyze the current landscape of innovation in highly innovative Colombian companies, by means of a situational diagnosis that would facilitate the implementation of some actions to strengthen innovation in companies throughout the country. **Method:** For this research, the quantitative empirical descriptive method was used as a primary source to carry out the situational diagnosis; information was extracted from 74 surveys conducted among the managers of companies recognized by a ranking of the most innovative companies in Colombia, as well as other institutions that recognize them as companies that have produced significant innovation results. This study was complemented with secondary sources by reviewing documents of government, trade union, and sector entities (2017–2018) of innovation in the country. **Result:** In the internal and external diagnosis, it was found that Colombia has made slow progress in innovation and has also experienced setbacks, which is why there needs to be an increase in innovation in the business environment. This document aims to diagnose and recommend some initiatives to strengthen innovation in Colombian companies. **Conclusion:** The results indicate that strategic actions are needed to strengthen the capacity for innovation in companies, as well as an articulated commitment among those involved in the process, where collective action is devised, not only to improve innovation in companies but also to improve Colombia's position in terms of innovation.

Keywords: Innovation capacity, Organizational culture, Business diagnosis, Competitive strategy, Innovation management.

JEL classification: D20, L1, O31, O32, M14

Resumen

Objetivo: este estudio se centró en analizar el panorama actual de la innovación en las empresas colombianas altamente innovadoras a partir de un diagnóstico situacional que permitiera recomendar algunas acciones para el fortalecimiento de la innovación en las empresas del país. **Método:** para esta investigación, se utilizó el método descriptivo tipo empírico cuantitativo; como fuente primaria se tomó la información de 74 encuestas a gerentes de empresas reconocidas por el ranking de las empresas más innovadoras de Colombia y otras instituciones como empresas con altos resultados de innovación para realizar el diagnóstico situacional. Esta labor se complementó con fuentes secundarias mediante la revisión de tipo documental de entes gubernamentales, gremiales y sectoriales (2017-2018) de la innovación en el país.

Resultados: en el diagnóstico interno y externo se encontró que Colombia en innovación ha tenido un progreso lento y con retrocesos por lo que requiere aumentar las innovaciones en la atmósfera empresarial. Este documento gira alrededor del diagnóstico y la recomendación de alguna(s) acción(es) para el fortalecimiento de la innovación en las empresas colombianas. **Conclusiones:** los hallazgos encontrados señalan que se necesitan acciones estratégicas que permitan fortalecer la capacidad de innovación en las empresas, así como del compromiso articulado entre los actores del proceso, donde se desarrollen acciones en conjunto, que permitan no solo mejorar la innovación en las empresas, sino también, mejorar la posición de Colombia en materia de innovación.

Palabras clave: Capacidad de innovación, Cultura organizacional, Diagnóstico empresarial, Estrategia competitiva, Gestión de la innovación.

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Author of correspondence

sonia.limas@uptc.edu.co

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Introduction

Innovation represents a source of evolution, development, and growth in a country's economy, it meets the needs of the productive system through new knowledge, creating new products, new production processes and technologies, and new management processes, as well as new and improved companies, paving the way for increasing productivity, a key resource that generates greater business competitiveness and prosperity within a country's economy.

In Colombia, innovation is considered to be "a key factor for the sustainability and strengthening of the business fabric in competitive markets" (Drucker, 2004, p. 3; García, 2012). It is considered to be an important source of competitive advantage for companies. However, at present, the country invests very little in innovation and few companies develop innovation processes, which is reflected in the slow progress and, in some cases, in the regression of the country in terms of innovation (Banco Mundial, 2017; Consejo Privado de Competitividad, 2017; World Economic Forum, 2017). The problem, however, arises when despite the existence of reports on innovation in the country, there is no evidence of a study that delineates the current scenario of innovation in Colombian companies nor is there evidence of an empirical study that uses documentary secondary information sources from government, trade unions, and sector organizations for the 2017–2018 period for a collective analysis of innovation in Colombian companies, allowing a broad and detailed research perspective. In light of this situation, the following research question was posed: What is the current landscape of innovation in Colombian companies, and what measures can be recommended to strengthen innovation among the country's businesses?

Based on this question and because of the importance that companies place on innovating to become competitive (Díaz, 2019; Cadena, Pereira, and Pérez, 2019; Pérez, 2019), which translates into the economic and social progress of the country and, in turn, a competitive advantage over other countries (World Economic Forum, 2017), questions arose regarding regression of innovation in the country (Cornell University, INSEAD and WIPO, 2017) and this motivated the present study's development.

Thus, the main goal of this article has been to analyze the current landscape of innovation in Colombian companies. On the basis of this analysis, a diagnosis was established, and finally, a number of recommendations were made for the proper application of the measures to be taken for strengthening innovation among the country's businesses.

With regard to the study's limitations, it is important to mention the difficulty of consolidating the information in the companies studied because of the disclosure of information that is considered to be confidential as it is part of strategic management. However, with the information provided, this research could be developed further.

The first section of this article outlines its theoretical foundation and introduces the background information found in government, trade union, and sectoral studies that have been the subject of analysis and discussion in the academic field. This is followed by the research method, the results, and a discussion of the study findings. After that, some actions are recommended to strengthen innovation among businesses and finally, conclusions are drawn with regard to the need to strengthen innovation capacity, as well as the articulated commitment of those involved in the innovation process, where collective interventions are developed with a view to enhance the development of business innovation.

Theoretical Foundation

In this article, the concept of innovation has been approached from a business perspective because it is usually complex and diverse and dependent on the context of analysis. Authors like [Schumpeter \(1996\)](#) define it as “a new idea that is brought to the market, which has industrial and market potential” ([Montoya, 2004, p. 211](#)). [Drucker \(2004\)](#) points out that “innovation is the means by which entrepreneurs create new wealth-creating resources or endow existing ones with greater wealth-creating potential” (p. 3). Moreover, [Porter \(1991; 2001\)](#) states that it is a process that is part of a company’s strategic and competitive context, aiming at achieving competitive advantage through its incorporation and implementation. [Garzón and Ibarra \(2013, p. 49\)](#) and [Hamel \(1996\)](#) mention this by stating that it also allows them to generate greater differential value in the positioning of new and existing products in the market ([Salazar, Malagón, and Lino, 2018](#)).

Moreover, [García \(2012\)](#) and [Limas \(2018\)](#) argue that innovation today constitutes an absolute need among companies for survival. If businesses do not invest in innovation, they put their future at risk. The [Organization for Economic Co-operation and Development \(OCDE, 2005\)](#) in its Oslo Manual, which is one of the most widely used on the matter, states that “innovation refers to the introduction of a new or improved product and/or process; a new production, marketing and organization methods of company practices; a new market, or new supplies of raw materials” ([Moraleda, 2004; Fontalvo et al., 2013, p. 2](#)).

The common thread found in the aforementioned definitions is the value of innovation for organizations because not only does it constitute a need but its implementation also allows companies to survive, grow, and strengthen through the same competitive advantage, which is the analysis perspective of this study. It is present in the introduction of new or improved products, processes, or management models through product, process, and model management and/or marketing innovation.

Additionally, authors like [Schnarch \(2009\)](#), [Kotler and Armstrong \(2008\)](#) state that product innovation occurs in the following situations: when completely new products are obtained in the market as substitutes for existing products (product improvements, features modifications, repositioning of existing products in new markets, cost reduction with cheaper products, new products based on competition); introduction of new product lines (novelties or product versions); and, finally, in the extension of existing lines (radical innovations).

As for the classification of innovation, [Freeman \(1998\)](#) divides it into incremental and radical innovation according to the level of originality and novelty, arguing that incremental innovation is subject to improvements in any existing products and processes where all company elements are important. Meanwhile, he points out that radical innovation occurs when there are completely new products or processes and where the company’s R&D department usually plays a key role, since innovating requires newly acquired knowledge. Thus, [Schumpeter \(1978\)](#) emphasizes “the importance of radical innovations, especially those that are capable of bringing about revolutionary change and decisive transformation for society and the economy in general” (p. 74).

Moreover, in terms of government, trade union, and sector studies during the 2017–2018 period, the following references were found, which were the subject-matter of analysis in this article. At the international level, the study from the [Banco Mundial \(2017\)](#), shows the expenditure in research and development (GDP %) of countries and economies worldwide, providing a reference of the percentage of the GDP spent on research and development in Colombia, compared to other Latin American economies as well as worldwide.

Similarly, the study carried out jointly by the World Intellectual Property Organization (WIPO), the INSEAD Business School and Cornell University ([Cornell University, INSEAD and WIPO, 2017](#)) shows the Global Innovation Index, an indicator that provides the results of economies around the world in terms of their innovation. This enables the analysis of Colombia's position in terms of innovation compared to other economies.

The World Economic Forum ([World Economic Forum, 2017](#)) publishes the report and the indicator related to the Global Competitiveness Index-GCI of a country, which makes it possible to identify the indicator of Colombia's situation related to innovation.

At the national level, the main obstacles faced by Colombian companies are identified in the report from the [Consejo Privado de Competitividad \(2017\)](#), entitled the National Competitiveness Report, and it suggests some recommendations regarding the situation of companies in terms of innovation.

The report from the [Asociación Nacional de Empresarios de Colombia \(ANDI, 2018\)](#) provides the Balance Sheet for 2017 and Perspectives for 2018, where it analyzes competitiveness based on indicators, a reference that summarizes Colombia's position based on the Global Competitiveness Index-GCI.

The report from the [Departamento Administrativo Nacional de Estadística \(DANE, 2016\)](#), based on the Survey of Technological Development and Innovation in the Services and Commerce Sectors 2014–2015, represents the sectors with the highest representation in innovation processes in the country, the level of importance generated in business performance, and the main obstacles in Colombian companies in terms of innovation. This report makes it possible to analyze business innovation.

Finally, the report prepared by the National Business Association of Colombia (ANDI, for the Spanish acronym) and journal *Revista Dinero* (*Revista Dinero, 2017*), on the first Ranking of Business Innovation in Colombia 2016–2017, compares the state of innovation in companies and their operation based on three elements—conditions, capabilities, and results in innovation—to learn about the position of Colombian companies as per the rankings and the main findings on business innovation in the country.

Method

The research design was based on the quantitative empirical method to analyze the current state of innovation in Colombian businesses through the diagnosis of the situation, identifying strengths and weaknesses, as well as opportunities and threats. The empirical or applied method was chosen because it was sought to establish the diagnosis of innovation in Colombian companies and based on this be able to recommend some actions that best apply to strengthen innovation in the country's companies. The quantitative method was chosen because data were collected, handled, and studied numerically, using data statistical analysis in Excel.

For data collection, a questionnaire was used, consisting of 10 questions scored on a Likert-type scale. This was applied to 74 organizations recognized by the Ranking of the Most Innovative Companies in Colombia and by other institutions that recognized them as companies that had high innovation results, using the probabilistic sampling method, simple random sampling type. To determine instrument reliability, a pilot sample of 20 was taken, and the Cronbach's alpha method was applied. The result was 0.83, which indicates that the instrument is highly reliable. Finally, to process and organize the results, we used an information collection matrix in Excel. This matrix organized and classified the information obtained from the situational diagnosis.

Results

This section presents the study results, which provides a situational diagnosis of innovation in Colombian businesses. The results are based on the identification of the strengths and weaknesses, as well as the opportunities and threats, of innovation in Colombian companies, through an internal and external analysis. In the internal diagnosis, the analysis was complemented by a documentary review of government, trade union, and sectoral entities on innovation in the country during the 2017–2018 period based on the results of a survey of managers of companies recognized as innovative organizations.

The external diagnosis was made on the basis of the aforementioned documentary review, focusing on innovation as a need for companies, where implementation allows them to survive, grow, and consolidate, achieving this through the same competitive advantage. The situational diagnosis helps identify some strategic actions that allow not only innovation to improve in companies but also enhance the position of Colombia in terms of innovation.

Situational diagnosis of innovation in Colombian companies

Innovation has become essential in the business environment because it allows companies to survive, transform, and grow in the market, thus making it a key factor for organizational competitiveness. Moreover, it generates competitive advantage by offering greater value to the market by introducing new and improved products. It also occurs during innovating processes or management models because it helps improve operation by producing the product in the required level to remain in highly competitive markets.

Moreover, innovation not only influences business competitiveness but also the country's competitiveness and its progress compared to other countries. Furthermore, it influences Colombia's position in terms of innovation compared to other economies, where the country reports slow progress and, in some cases, regression with regard to innovation ([Cornell University, INSEAD and WIPO, 2017](#); [World Economic Forum, 2017](#)). It is in this context that the situational diagnosis of innovation in Colombian companies is addressed; several authors consider it an important tool for reflection and decision making. This starts with a diagnosis of internal and external factors ([Wheelen and Hunger 2013, p. 5](#); [David 2013, p. 5](#); [Gallardo 2012, p. 23](#); [Palacios 2010, p. 6](#); [Garrido 2006, p. 18](#)).

Internal Diagnosis

The internal diagnosis corresponds to the analysis carried out within the organizations on the basis of their capacity for innovation, which "constitutes another resource of the company, along with its financial, commercial, and operational capacity, and must be managed with rigor and efficiency" ([González, et al.. 2014](#); [Robayo, 2016](#)) and from which comes the identification of positive aspects that should not only be maintained but whose strengths should be re-enhanced; furthermore, weaknesses that do not contribute to the development of innovation in companies should be minimized, so that they become advantages in improving organizations ([Prieto, 2012](#)).

Therefore, the survey results were presented to the managers of companies recognized as innovative by the [Ranking de las empresas más innovadoras de Colombia \(2017\)](#) and by other institutions, who were asked about their ability to innovate and their performance in this field. As a result, the managers rated it as a strength ([Table 1](#)).

Table 1. *Assessment of internal factors in innovation capacity*

Innovation Capacity Key Internal Factors	M a n a g e m e n t e v a l u a t i o n	Ranking
Management commitment to innovation	3.49	Minor strength
Strategic planning around innovation	3.19	Minor strength
Planning for the introduction and development of new products	3.19	Minor strength
Encouraging innovation in other areas of the organization	3.01	Minor strength
Technological development knowledge and application in innovation	3.27	Minor strength
Knowledge of customer needs and trends	3.18	Minor strength
Guidance, monitoring, and control processes and tools	3.59	Minor strength
Availability of the innovation department or area in the company	3.00	Minor strength
Benchmarking in the innovation of new products and substitutes	3.19	Minor strength
Training in innovation techniques and methods	3.14	Minor strength

Evaluation	
Significant weakness	1
Minor Weakness	2
Minor strength	3
Major strength	4

Source: Prepared by the author (2020).

The results of Table 1 show the rating of the internal factors: the first column corresponds to the average rating assigned to each factor by the managers, and the second column represents the classification of the rating obtained per factor (a rating of 1.00–1.99 means significant weakness, a rating of 2.00–2.99 means minor weakness, a rating of 3.00–3.99 means minor strength, and a rating of 4.00 means significant strength). As a result, the strengths to be maintained and re-enhanced in companies are as follows:

- The management's commitment to innovation shall be a priority and shall lead the process in the company to make the offer more sophisticated.
- Strategic planning around innovation where the management model should be oriented towards innovation culture to generate competitive advantage
- Planning for the introduction and development of new products; carrying out the innovative process in each of its phases to ensure successful and profitable processes
- Promoting innovation in the other parts of the organization led by top management not only identifies and develops the creative and innovative capacity of employees but also combines efforts to develop the innovative process effectively.
- Technological development and the use of knowledge in innovation favors the progress of methods, tools,

procedures, and practices, as well as the combination of resources and skills in productive processes, thus promoting greater efficiency in performance (Donovan, 1996; Bravo, et al., 2017).

- Knowledge of customer needs and trends allows to deliver the desired product to the target market and thus achieve better market acceptance and success (Limas et al., 2019).
- The implementation of processes and tools for guidance, monitoring, and control to ensure the desired results in the innovation process
- The availability of the innovation department in the company is essential to plan and develop innovation activities. Further, it boosts the generation of innovative ideas based on identified needs.
- Benchmarking in the innovation of new products and substitutes is oriented toward the generation of ideas for improvement or incursion of new products to increase competitiveness.
- Training in innovation techniques and methods is strategic to strengthen creative and innovative performance with greater efficiency in the process itself and in the company.

A documentary review was made of the reports in relation to the Global Innovation Index 2017 (Cornell University, INSEAD and WIPO, 2017); the Global Competitiveness Index (GCI) 2017–2018 (World Economic Forum, 2017); the report from ANDI (2018), the Survey of Technological Development and Innovation in the Services and Trade Sectors 2014–2015 (DANE, 2016); and, finally, the report from the First Ranking of Business Innovation in Colombia 2016–2017 (Revista Dinero, 2017). In the analysis of the same, other key factors related to innovation capacity were identified, which are included in the diagnosis of the situation of companies in Colombia, after a process of organizing and classifying them based on internal and external analysis.

The following are the results obtained with regard to internal diagnosis (Table 2), in which two columns can be seen: the first one corresponds to the factor identified as relevant in the companies regarding the innovation capacity; it is classified as a strength or weakness according to performance in the organizations after analyzing the report studied. The second column corresponds to the source, understood as being the document/report in which the internal factor is identified.

Table 2. Internal diagnosis of innovation in Colombian companies

	INNOVATION CAPACITY
STRENGTHS	BASELINE REPORT
1. Innovation culture as corporate strategy	Report from the National Business Association of Colombia (ANDI) Survey of Technological Development and Innovation in the Services and Commerce Sectors 2014–2015 Report from the First Ranking of Business Innovation in Colombia 2016–2017.
2. Highly qualified human capital	Report from the ANDI
3. Application for new patents	Global Competitiveness Index, 2017–2018 (World Bank) Report from the ANDI Survey on Technological Development and Innovation in the Services and Trade Sectors, 2014–2015

4. New products according to the current needs of consumers and/or customers	Global Competitiveness Index, 2017–2018 Report from the ANDI Survey of Technological Development and Innovation in the Services and Commerce Sectors, 2014–2015 Report from the First Ranking of Business Innovation in Colombia, 2016–2017
WEAKNESSES	REFERENCE REPORT
1. Innovation in new products or new business models (radical innovation or incremental)	Report from the ANDI Survey of Technological Development and Innovation in the Services and Commerce Sectors, 2014–2015 Report from the First Ranking of Business Innovation in Colombia, 2016–2017
2. Organizational culture and work environment around innovation	Report from the ANDI
3. Financing and scarcity of own resources in innovative processes	Survey of Technological Development and Innovation in the Services and Trade Sectors, 2014–2015 Global Competitiveness Index, 2017–2018
4. Incomplete processes in innovations	Report from the ANDI Survey of Technological Development and Innovation in the Services and Commerce Sectors, 2014–2015
5. Prototypes without co-authorship of consumers and/or customers	Report from the ANDI Survey of Technological Development and Innovation in the Services and Commerce Sectors, 2014–2015
6. Profitability of innovation	Report from the ANDI Survey of Technological Development and Innovation in the Services and Commerce Sectors, 2014–2015
7. Imitation by third parties	Report from the ANDI

Note: Prepared by the author based on reference reports mentioned in Table 2 (2020).

In terms of the strengths, the following internal factors were identified: the implementation of a culture of innovation as a business strategy ([Consejo Privado de Competitividad, 2017](#); [DANE, 2016](#); [Revista Dinero, 2017](#)); the use of highly qualified human capital ([ANDI, 2018](#)); the increase in the number of new patent applications ([ANDI, 2018](#); [Consejo Privado de Competitividad, 2017](#); [DANE, 2016](#)); and, finally, the introduction of new products according to the current needs of consumers and/or customers ([ANDI, 2018](#); [Consejo Privado de Competitividad, 2017](#); [Revista Dinero, 2017](#); [DANE, 2016](#)). These aforementioned strengths should be maintained and re-enhanced in companies, in addition to those already mentioned at the beginning.

As for the weaknesses, these were classified as per the following factors: low generation of innovation in new products or new business models (radical or incremental innovation), when these are most beneficial to companies (ANDI, 2018; Revista Dinero, 2017; DANE, 2016); no approach to organizational culture and work environment around innovation (ANDI, 2018); poor funding and resources for innovation processes (DANE, 2016; Consejo Privado de Competitividad, 2017); incomplete processes in innovation (fear of failure); the intrusion of prototypes without co-authorship of consumers and/or customers; low profitability of innovation (ANDI, 2018; DANE, 2016); and, finally, the ease of imitation by third parties (DANE, 2016). These weaknesses must be balanced in order for them to evolve and become strengths for companies.

External Diagnostics

External diagnosis is the analysis carried out in companies based on the influence of external agents to identify opportunities and threats regarding the environment in which they operate (Varela, 2014); “most of the forces that bring about change in organizations come from the external environment” (Daft, 1998; Febles and Oreja, 2008) because it is composed of factors that determine the trend towards innovation in companies, which are deemed opportunities and may also be considered as threats. However, to achieve a better position in the future (Limas, 2018), one should choose to counteract threats and achieve greater advantage from opportunities.

The following are the results obtained in relation to the external diagnosis after document review (Table 3), where two columns can be seen. The first one corresponds to the external factor identified as key in the companies in terms of innovation and is classified as an opportunity or threat according to the analysis of the report. The second column corresponds to the source, understood to be the document/report in which the key external factor is identified.

Table 3. *External diagnosis of innovation in Colombian companies.*

OPPORTUNITIES	REFERENCE REPORT
1. The Spin Off Law (to promote the creation of new technology-based companies)	Report from the National Business Association of Colombia (ANDI) Report on the First Ranking of Business Innovation in Colombia, 2016–2017
2. Digital technologies	Report from Private Competitiveness Council (ANDI) Report from the First Ranking of Business Innovation in Colombia, 2016–2017
3. Strategic alliances between companies and Startups	Report from Private Competitiveness Council (ANDI) Report from the First Ranking of Business Innovation in Colombia, 2016–2017
4. Alliance between ANDI, governors' offices, and Ministries (formerly called “Colciencias”) for an innovation project	Report from Private Competitiveness Council (ANDI) Report from the First Ranking of Business Innovation in Colombia, 2016–2017

5. National Royalties System for innovation projects	Global Competitiveness Index, 2017–2018 (World Bank)
6. Public calls for proposals in innovation	Report from Private Competitiveness Council (ANDI) Report from the First Ranking of Business Innovation in Colombia, 2016–2017
7. Markets to be explored	Survey of Technological Development and Innovation in the Services and Trade sectors, 2014–2015
8. Trend in the demand for goods and Services	Survey of Technological Development and Innovation in the Services and Trade sectors, 2014–2015
THREATS	REFERENCE REPORT
1. Decreasing trend in innovation and slow progress	Global Innovation Index, 2017 Global Competitiveness Index, 2017–2018
2. Investment in Science, Technology and Innovation (ST&I) of GDP	Global Innovation Index, 2017 Global Competitiveness Index, 2017–2018 (World Bank)
3. Innovation behavior vs. other economies in Latin America and worldwide	Global Innovation Index, 2017
4. Few companies develop processes of innovation	Global Competitiveness Index, 2017–2018 Report from the National Businessmen’s Association of Colombia (ANDI)
5. Regulatory compliance	Survey of Technological Development and Innovation in the Services and Trade Sectors, 2014–2015
6. Granting of new patents	Report of the First Ranking of Business Innovation in Colombia 2016–2017
7. Limited information on markets and appropriate technology	Survey of Technological Development and Innovation in the Services and Trade Sectors, 2014–2015
8. Lack of knowledge of support agencies	Survey of Technological Development and Innovation in the Services and Trade Sectors, 2014–2015
9. Research in Universities and transferring it to the productive apparatus	Global Innovation Index, 2017 Global Competitiveness Index, 2017–2018
10. Unified Science, Technology and Innovation Policy ST&I Innovation	National Competitiveness Report, 2017–2018
11. General budget of the nation for STI	Global Competitiveness Index, 2017–2018
12. External financing	Survey of Technological Development and Innovation in the Services and Trade Sectors, 2014–2015

Note: Compiled by author based on reference reports mentioned in Table 3 (2020).

In terms of opportunities, these are classified as follows: the Spin-Off Law corresponds to a new type of organizations created from the accumulated knowledge of academia and research for knowledge transfer (Méndez, et al., 2015; Bravo, Benavides, Wagner and Londoño, 2019). The law encourages the creation of new technology-based companies, where digital technologies represent a great opportunity to improve productivity and develop innovations within the framework of the fourth industrial revolution; strategic alliances between companies and startups are becoming increasingly important for faster innovation and incorporation of new technologies; government partnerships for innovation projects to strengthen the innovation system (Revista Dinero, 2017); the allocation of resources from the national royalty system to innovation projects (World Economic Forum, 2017); public calls for innovation (ANDI, 2018; Revista Dinero, 2017); the innovations in new markets to be explored; and, finally, the trend of demand for innovations in goods and services to strengthen supply (DANE, 2016). These opportunities determine the favorability and development of innovation in firms.

The following factors are classified as threats: the country's regression and slow progress in innovation (Cornell University, INSEAD and WIPO, 2017; World Economic Forum, 2017); investment in science, technology, and innovation (ST&I) and spending on research and development as a percentage of GDP for Colombia compared to other Latin American economies and globally (Cornell University, INSEAD and WIPO, 2017; World Economic Forum, 2017; Banco Mundial, 2017); innovation performance in comparison to other economies (Cornell University, INSEAD and WIPO, 2017); the number of companies that develop innovation processes (World Economic Forum, 2017; ANDI, 2018); difficulty in complying with regulations, rules, and standards (DANE, 2016); the ratio of new patent grants to ongoing applications and registrations (Revista Dinero, 2017); scarce information on markets and appropriate technology; lack of awareness of innovation support agencies in companies (DANE, 2016); research in universities should be transferred to the productive system and usually this does not occur (Cornell University, INSEAD and WIPO, 2017; World Economic Forum, 2017); the nonexistence of a unified STI policy and inconsistent efforts by stakeholders; the reduction of the country's total budget for STI and the resultant low investment for innovation (Díaz and Reinoso, 2019; Consejo Privado de Competitividad, 2017); and, finally, the difficulties in accessing external financing for innovation (DANE, 2016). These threats hinder and negatively affect the development of innovation in the country.

Thus, the current landscape of innovation in the country's companies is outlined, after carrying out the situational diagnosis of innovation in Colombian companies based on both external and internal analysis, identifying opportunities and threats through the external diagnosis, as well as strengths and weaknesses from the internal diagnosis, as summarized in Table 4.

Table 4. *Landscape of innovation in Colombian companies.*

INTERNAL ANALYSIS	
STRENGTHS	WEAKNESSES
<ol style="list-style-type: none"> 1. Innovation culture as a business strategy 2. Highly qualified human capital 3. Application for new patents 4. New products according to the current needs of consumers and/or customers 5. Management commitment to innovation 6. Strategic planning around innovation 7. Planning for the introduction and development of new products 8. Encouraging innovation in other areas of the organization 9. Technological development knowledge and application in innovation 10. Knowledge of customer needs and trends 11. Guidance, monitoring, and control processes and tools 12. Availability of the innovation department or area in the company 13. Benchmarking in the innovation of new products and substitutes 14. Training in innovation techniques and methods 	<ol style="list-style-type: none"> 1. Innovation in new products or new business models (radical or incremental innovation) 2. Organizational culture and work environment around innovation 3. Financing and scarcity of own resources in innovation processes 4. Incomplete processes in innovations 5. Prototypes without consumer and/or customer co-authorship 6. Profitability of innovation 7. Imitation by third parties
EXTERNAL ANALYSIS	
OPPORTUNITIES	THREATS
<ol style="list-style-type: none"> 1. The Spin Off Law (to promote the creation of new technology-based companies) 2. Digital technologies 3. Strategic alliances between companies and startups 4. Alliance between the ANDI, governors, and the Minciencias (Ministry of Science) for innovation project 5. National Royalties System for specific innovation projects 6. Public conventions for innovation 7. Markets to explore 8. Trend in the demand for goods and services 	<ol style="list-style-type: none"> 1. Regression and slow progress innovation 2. Investment in Science, Technology and Innovation (ST&I) as a GDP percentage 3. Innovation performance compared to other economies in Latin America and worldwide 4. Few companies develop innovation processes 5. Regulatory compliance 6. Granting of new patents 7. Limited information on markets and appropriate technology 8. Lack of knowledge of support agencies 9. Research by universities and its transfer to the productive apparatus 10. Unified STI policy 11. General budget of the nation for STI 12. External financing

Source. Compiled by author (2020).

Finally, based on the internal and external analysis reflecting the panorama of innovation in Colombian companies, the following strategic actions are recommended (Table 5 and 6).

Table 5. *Strategic actions according to internal diagnosis of innovation in Colombian companies.*

KEY INTERNAL FACTOR	EVALUATION	
1. Management's commitment toward innovation	Strength	As a strategy for growth and business positioning, focus management on a culture of innovation throughout the organization to create competitive advantage
2. Innovation culture as a business strategy	Strength	
3. Promotion of innovation in other areas of the organization	Strength	
4. Organizational culture and work environment around innovation	Weakness	
5. Highly qualified human capital	Strength	To have highly qualified talent (in terms of knowledge and experience) through continuous training so as to develop innovation competencies
6. Training in techniques and methods of innovation	Strength	
7. Application for new patents	Strength	Ensure compliance with requirements to obtain new patent registrations
8. Knowledge of needs and customer trends	Strength	Conduct market research, market studies, and a marketing plan to identify consumer needs and wants; identify market opportunities (customers and new market segments); and define courses of action to achieve the desired product and reduce the risk of new product failure in the marketplace
9. New products according to needs of current consumers and/or customers	Strength	
10. Prototypes without co-authorship by consumers and/or customers	Weakness	
11. Strategic planning around innovation	Strength	Perform strategic planning and set goals with innovation at the center of strategic development
12. Planning in the introduction and development of new products	Strength	Plan the development of new innovations to improve the performance and competitiveness of the organization
13. Technological development, knowledge, and application in innovation	Strength	Venturing into technological development for use in new innovations

14. Availability of the innovation department or area in the company	Strength	Plan and develop innovation activities to enhance innovation in all areas of the company
15. Guiding processes and tools, monitoring and control	Strength	Guide the process and monitor and control the development of innovation to ensure the successful completion of the process
16. Incomplete processes in innovation	Weakness	
17. Benchmarking in the innovation of new products and substitutes	Strength	Perform benchmarking in the introduction of new innovations to ensure best practices in innovation
18. Innovation in new products or new business models (radical or incremental innovation)	Weakness	Venture into the innovation of new products or business models (radical or incremental innovation) to differentiate the offering and generate greater competitive advantage
19. Financing and lack of own resources in the process of innovation	Weakness	Access to public financing (calls for proposals or competitions), entrepreneurship funds, private equity and entrepreneurship funds, special financing through cooperatives, associativity, and strategic alliances within the sector to attract other resources to support innovation. Increasing the percentage of own resources for innovation
20. Profitability of innovation	Weakness	Conduct the financial study of the innovation project to analyze its feasibility in terms of profitability. Calculate the rate of return on investment and other financial indicators. Reducing costs, with support from research centers or agreements with universities for innovation and feasibility projects or participation in public calls for proposals

21. Imitation by third parties	Weakness	Protect the brand and obtain patent licenses to avoid illegitimate use by third parties. Obtain differential positioning advantage to occupy the first place in the market
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Source: Prepared by the author (2020)

Strategic actions according to external diagnosis of innovation in Colombian companies Table 6.

KEY EXTERNAL FACTOR	ASSESSMENT	STRATEGIC ACTION
1. The Spin Off Law (for the promotion of the creation of new technology-based companies)	Opportunity	Make use of the regulations and other legal frameworks for innovation in the country to the benefit of the business community. Understand the benefits of articulating companies and academic institutions through the Spin-off law.
2. Digital technologies	Opportunity	Invest in technology to generate competitive advantage Using ICT as a business strategy
3. Strategic alliances among companies and startups	Opportunity	Be aware of and have access to programs and projects for the promotion, protection, strengthening, and development of innovation by the government through entities at the national level (MinTIC, Minciencias, National Planning Department [DNP] Governors' Offices, others) as well as international institutions
4. Alliance between the ANDI, governors, and the Minciencias, for innovation project	Opportunity	
5. Public calls for proposals in innovation	Opportunity	
6. National Royalties System for specific innovation projects	Opportunity	
7. Markets to explore	Opportunity	Begin importing and exporting products (radical and incremental innovation) based on economic and market analysis, identifying competitive advantages
8. Limited information on markets and appropriate technology	Weakness	
9. Trend in the demand for goods and Services	Opportunity	

10. Regression and slow progress in innovations	Weakness	Make use of the most appropriate means and resources to boost innovation culture in companies
11. Few companies develop innovation processes	Weakness	Advice, follow-up, and support in innovation processes Identify causes of failure and request support in government and educational entities or from the sector for advice and support as appropriate
12. Investment in Science, Technology, and Innovation (ST&I) as a GDP percentage	Weakness	Manage access to state programs and projects to strengthen innovation in the country to meet the needs of demand beyond the expectations of the state to improve innovation indicators compared to other economies, stimulating greater investment in this strategic area for the country and businesses
13. General national budget for STI	Weakness	
14. Innovation performance compared to other economies in Latin America and the world	Weakness	
15. External financing	Weakness	Access to public financing (calls for proposals or tenders), venture funds, private equity and venture funds, special financing through cooperatives, associativity, and strategic alliances between the sector
16. Compliance with regulations	Weakness	Request training and advice on government regulations, make use of it, and incorporate it as a competitive strategy
17. Granting of new patents	Weakness	Request advice and guidance for the processing of patents from the Superintendence of Industry and Commerce (SIC) to expedite the registration and granting process. Make use of the Inventor Assistance Program (PAI) to facilitate the processing of patents and other programs leading towards this goal
18. Lack of knowledge of support agencies	Weakness	Search for different ways to consult local, regional, national and international organizations; associations; and specialized networks to support innovation

19. Research by universities and conveying it to the productive system	Weakness	Encourage the development of new innovations with the support of academic institutions to convey knowledge to companies through collaborative research. Participate in calls for research projects carried out by universities through the business–academia alliance to improve productivity and competitiveness in companies
20. Unified STI policy	Weakness	Coordinate activities of the innovation process, articulating the work with the academic world (universities/research institutes), the company (innovative project), and the government (programs and plans for the promotion of innovation)

Source: Prepared by the author (2020).

The actions proposed in this study are a contribution to the development of innovation. Their applicability is left to the companies to consider for shaping each organization as a driver of change, transformation, and empowerment.

Discussion

Innovation is the source of economic and competitive development in the country, which is achieved through the introduction and development of innovation in the business environment. To such end, it is necessary to specify the role played by each of those involved in the innovation process. On the one hand, it is up to companies to transform knowledge into wealth through the successful development of innovations and, on the other hand, it is up to “the government to guarantee favorable environmental conditions for innovation and to correct the systemic and market failures inherent in the innovation process that prevent Colombia from reaching its full potential” (Bitrán, Benavente, and Maggi, 2011, p. 1). Thus, it is proposed that the paradigm in companies be changed and for innovation to be considered as an investment and not as an expense, as stated by the managerial leaders of these processes; to stimulate and increase private investment in innovation processes through a strategic and value-generating panorama; and to take advantage of mechanisms led by government agencies to support innovation. The government, in addition, should allocate more of the general national budget to Science, Technology and Innovation (ST&I), as well as monitor public investment in STI at the national and departmental levels to determine the impact of investing in business innovation.

Similarly, university institutions, through research centers, have an important role to play in the promotion of innovation in companies. By carrying out ST&I research processes together with academia, costs are reduced (they can sometimes be free of charge) and high-quality innovation feasibility studies are obtained. Through universities, the innovative performance of companies is improved by the transfer of knowledge generated as a source of information. This leads to the development of innovations that improve the competitive position of

companies (Vélez, Afcha, and Bustamante, 2019) through company–university alliances with the help of inter-institutional agreements while supporting the other actors in the innovation process to articulate efforts and results.

Some action paths for the promotion and development of innovation in the country are guided toward investment in research and development (R&D) to generate and produce new knowledge that will allow the following:

- The number of business initiatives that respond to the region’s needs to increase through products with greater added value
- The right solutions in companies to be selected in view of sectorial and social problems such as health, education, agriculture, etc.
- The conveyance of knowledge from educational centers to the business sector to generate initiatives leading to the scientific and technological development of the country
- The productive apparatus to be modernized by introducing new products, applications, and better forms of operation and management in the companies
- The promotion and stimulation of innovation processes in companies to generate competitive advantage
- The strengthening of new creations: patents, the registration of designs and schemes in companies and within the country
- Venturing into new ideas, products, and projects in response to customer needs and trends, generating an organizational culture around innovation by companies.

Conclusion

This study has allowed the analysis of the current scenario of innovation in Colombian companies through a situational diagnosis, and based upon this, recommendations were made for some actions to strengthen innovation in the country’s companies. Thus, as per Colombian executives, innovation has become an essential element for companies’ sustainability and market competitiveness.

The studies used for the analysis show that there is little investment in innovation in Colombia and that few companies develop innovation processes, which is reflected in the slow progress made by the country and in the fact that Colombia is lagging behind in this field in some cases. For this reason, the country must develop innovation processes that allow not only the improvement of the competitiveness of the business fabric but also the improvement of the country’s position. Therefore, to face global challenges, companies have to compete at the highest level in the market; thus, they must venture into new innovations responding to the needs and lifestyles of today’s consumers, strengthen business strategies, and provide the best product offer to serve markets and generate value.

In view of this concept, in the internal diagnosis carried out in organizations based on their innovation capacity, strengths were identified that should not only be maintained but re-enhanced and are focused on maintaining innovation culture as a business strategy; having highly qualified human capital; increasing the application for new patents; generating new products according to the current needs of consumers and/or customers; the strong commitment of management toward innovation; innovation-oriented strategic planning;

management of the introduction and development of new products; promotion of innovation in other areas of the organization; technological development and use of knowledge in innovation; knowledge of customer needs and trends; processes and tools for guiding, monitoring, and controlling innovation processes; having an innovation department in the company; benchmarking in the innovation of new products and substitutes; and finally, training in innovation techniques and methods.

However, weaknesses have been identified, and these need to be minimized. These include incomplete innovation processes, innovation focused on processes and not on new products or business models, organizational culture and the work environment not being focused on innovation, little funding and a lack of own resources for innovation, prototype design without consumer/customer co-authorship, low profitability of innovation, and the ease of imitation by third parties. The recommended actions are aimed at strengthening innovative actions based on management, resources (human and financial), and processes.

Moreover, the external diagnosis helps identify the opportunities that determine a company's trend towards innovation. These are focused on strategic alliances between companies and startups for knowledge conveyance, government alliances for innovation projects, the Spin-off law, public calls for innovation projects, digital technology to improve productivity and new innovations, the royalty system for innovation projects, and the trend in demand for innovation in goods and services to strengthen supply.

However, it is necessary to choose for a greater exploitation of opportunities to counteract the threats identified in relation to the country's regression trend in terms of innovation. Colombia invests very little, and few companies develop innovation processes. This is reflected in the slow progress in this strategic area, to which we need to add the difficulty in complying with regulations, the lack of a unified STI policy, the concentration of knowledge in universities through research centers but which are not conveyed to the business sector, the small overall national budget for STI, and the lack of external financing for innovation. The recommended actions aim to specify the role of each innovation actor, the government, business, and academia (universities), based on reciprocity.

Achieving the expected levels of innovation in the country requires a commitment articulated between the government, the private sector, and academia (universities-research centers), in which joint actions are developed, innovation policies are strengthened in the country and within Colombian companies, and not only enable the development of innovation processes in the business fabric but also improve Colombia's position in terms of innovation.

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