

# Innovation factors for the development of sustainability policies that help the environment

Factores de la innovación para el desarrollo de políticas de sustentabilidad en los sectores productivos

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## Abstract

**Introduction:** Innovation is an element that provides entrepreneurs with competitive advantages in products and processes. **Objective:** To examine innovation factors to develop sustainability policies in productive sectors. **Methodology:** Qualitative with a deductive approach, applied in documentary research using innovation and sustainability as primary sources of information. **Results:** The findings reveal significant insights into technological development and innovation, identifying key factors for competitiveness and growth at both regional and national levels, further highlighting a close relationship between innovation and productive sectors. **Conclusion:** The analysis suggests that sustainability policies are closely linked to higher levels of productivity in organizations, thus emphasizing the importance of fostering innovation as a means to promote sustainability and improve competitiveness across different business contexts.

**Keywords:** Creativity; State policies; Diversification; Economic growth; Environment.

## Resumen

**Introducción:** La innovación es un elemento que ofrece a los empresarios ventajas competitivas en productos y procesos. **Objetivo:** Examinar los factores de la innovación para desarrollar políticas de sostenibilidad en los sectores productivos. **Metodología:** Cualitativa con un enfoque deductivo, que se aplicó en una investigación documental utilizando la innovación y la sostenibilidad como fuentes primarias de información. **Resultados:** Los resultados revelan hallazgos significativos sobre el desarrollo tecnológico e innovación, identificando factores clave para la competitividad y el crecimiento tanto a nivel regional como nacional, destacando, además, una estrecha relación entre la innovación y los sectores productivos. **Conclusiones:** El análisis sugiere que las políticas de sostenibilidad están estrechamente vinculadas con niveles más altos de productividad en las organizaciones, por lo que este estudio resalta la importancia de fomentar la innovación como un medio para promover la sostenibilidad y mejorar la competitividad en los diferentes ámbitos empresariales.

**Palabras clave:** Creatividad; Políticas estatales; Diversificación; Crecimiento económico; Medio ambiente.

Códigos JEL (Ciencias Económicas y Administrativas): O3, O35, Q01.



## Introduction

The approach focused on sustainable and sustainable growth of economic sectors is based on natural processes developed over millions of years, which should be applied in the production of goods and services in companies, as proposed by Alvial (2015). Nature is presented as an example of perfect, continuous and perpetual production, which satisfies needs in search of economic equilibrium and a significant reduction of the inequality gap.

The above emphasizes that people can drive growth by taking advantage of resources, proper waste management and creativity to reuse and invent new products, thus contributing to the transformation of society and the reduction of pollution on our planet.

The objective of this article is to present the factors that determine innovation as a fundamental axis for the design of sustainability policies for the productive sectors, which, under a current economic scene of globalization and greater international competition in local markets, leads to consider how these companies implement innovative activities and processes to their activities, as an opportunity for growth.

To achieve this purpose, first of all, a clear definition of innovation must be established and its main characteristics understood. Next, the factors of sustainable growth that are present in the dynamic environment will be taken into consideration. These factors include aspects related to environmental preservation, responsible use of natural resources and positive social impact.

Once the key elements have been identified, comprehensive policies that protect both the social and business environments will be developed. These policies should be designed to encourage sustainable practices in all areas of activity, promoting environmental responsibility, social equity and economic growth.

Finally, the results and discussions derived from the analysis will be presented. The importance of adopting sustainability policies will be emphasized, highlighting how these can generate significant levels of competitiveness in organizations. It is essential to underline that the incorporation of sustainable practices not only benefits the environment and society, but can also translate into a competitive advantage for companies, aligning them with the demands and expectations of consumers and government regulations.

## Theoretical framework

### *Definition of innovation and its main theories*

The key element of innovation is creativity, since creativity is understood as a habit of the human being.

The ability to generate new ideas (Esquivias Serrano, 2004; Ferrández Sanz, 2022; Landazury Villalba and Ferrer Manotas, 2016; Pérez Alonso-Geta, 2009), which, according to González Romo et al. (2007) and Terán-Bustamante and Colla de Robertis (2018), are the main input for the generation of innovation. However, other researchers argue that creativity is the ability of the human being to conceive new ideas, while innovation refers to the ability to implement them in another way, as expressed by Hernández Arteaga et al. (2015).

When expanding the idea of innovation, it is essential to look for historical references that allow an adequate development, conceptualization and appropriation of the different terms and variables to be observed. This will make it easier to carry out the research exercise in an effective and pertinent manner, and generate new knowledge that will contribute to regional growth and competitiveness.

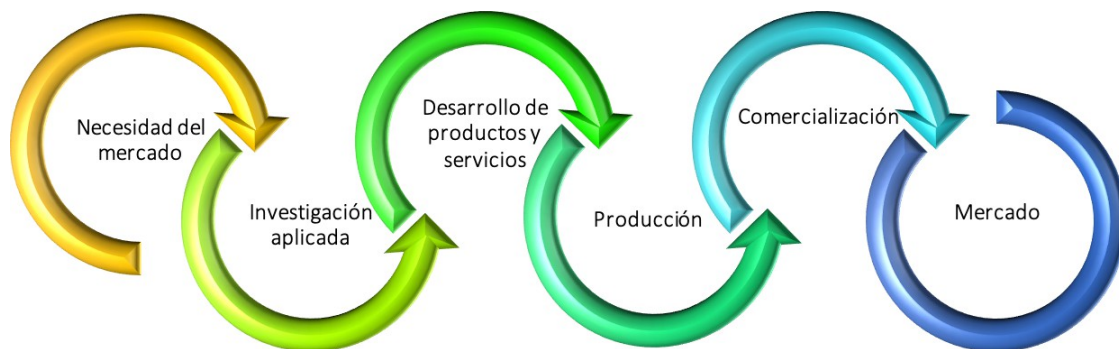
Innovation is presented as the main driving force behind competitiveness, development and growth, as proposed by Schumpeter (1939). Currently, the World Economic Forum (WEF) evaluates the degree of competitiveness by considering how innovation supports the 12 characteristics possessed by the most competitive countries (Buendía Rice, 2013). This makes it possible to objectively measure the effort and impact of the development of designs and processes, leading to production and economic benefits, as well as access to financing and the development of intellectual property.

Indeed, a company's competitiveness is determined by its presence in the relevant markets, closely linked to its level of productivity. In order to achieve high competitive levels, it is essential for the company to carry out research on this. These studies will make it possible to carry out a process of research and development of products and services suitable for their successful commercialization.

The above clarifications correspond to the innovation model shown in Figure 1.

**Figure 1**

*Linear model of the demand-driven innovation process (Market-Pull)*



Source: Own elaboration based on Barreto Fereira and Petit Torres (2017).

In essence, the fundamental purpose of innovation is to improve business performance, either by increasing the demand for products or by reducing the costs incurred, as established in the Oslo Manual (Organization for Economic Cooperation and Development [OECD] and Statistical Office of the European Union [Eurostat], 2005). To meet this challenge, innovative entrepreneurs seek to generate competitive advantages by offering the market new products or processes that make a difference.

When an innovation succeeds in increasing the productivity of a process, the company obtains a cost advantage by maintaining the same price as its competitors, which in turn allows it to obtain greater economic benefits (Buendía Rice, 2013; Sánchez Pintor, 2024). Moreover, according to the elasticity of market demand, the company can combine a lower price with a higher profit margin than its competitors, which gives it the possibility of gaining market share and further increasing its profits (OECD and Eurostat, 2005; Pérez Toledo, 2015).

Innovation involves the incorporation of a new or significantly improved element, whether it is a product (good or service), a process, a marketing approach or a form of organization, both in the company and in external relations (Horta et al., 2020; Navarro-Caballero et al., 2020; Pérez Toledo, 2015). According to the Oslo Manual (OECD and Eurostat, 2005), there are different types of innovation, which are summarized below:

- Technological: involves the incorporation of new technological advances in the creation and improvement of products and processes.
- Product: includes launching a good or service with new technological characteristics on the market.
- Process: includes the implementation of a new or significantly improved production or distribution process through the development of techniques, inputs or equipment.
- Organizational: refers to the implementation of new management and organizational processes, as well as improvements in existing processes.
- Market: involves the introduction of a new marketing method or improvements to existing ones, focusing on the product's image, brand, value promise, packaging and market positioning.
- Radical or disruptive: introduces a new product to the market with revolutionary changes in technology, economy or society, having a significant impact on the structure of the market in the long term.

Other authors consider that, in addition to the traditional types of innovation mentioned above, there is another important approach known as the "open innovation model", a term coined by Chesbrough (2003), cited in López Rodríguez and García Lorenzo (2010). This model is a paradigm and innovator in the management of innovation processes, which is the combination of ideas

and external technologies that interact with the internal ideas of the organization (Alvarez-Aros and Bernal-Torres, 2017).

It is important to consider that, regardless of the type of innovation, the creative process in the generation of ideas is fundamental to promote it (González Romo et al., 2007; Ferrández Sanz, 2022; Haro Carrillo et al., 2017). The first step involves eliciting creative thinking, while the second step focuses on the implementation of the previous step in practice; therefore, the generation and application of this in innovation are processes in which education plays a significant role.

Thus arises the concept of educational innovation, which is based on the understanding that human beings are changeable and unpredictable, and require new strategies in the teaching and learning process, whose conception implies the renewal of educational methods to promote eco-technological innovation in search of sustainability. Educational innovation is based on research and political practice, which implies a combination of theoretical and applied knowledge to promote significant changes in the educational system, according to Gavito et al. (2017).

In addition, innovation is considered a source of sustainable development for emerging economies, as it drives new practices and behaviors in the economic units of production (Acosta-Tzin et al., 2023). In this context, technology and social capital play a fundamental role in the manufacturing sector of these economies by establishing the production function.

In various sectors of the economy, it is possible to observe the development of economic agents who, through information, trigger processes that promote the growth of production skills and reduce asymmetry in productive knowledge and information competition. This means that information and knowledge shared among economic actors facilitate the improvement of productive capabilities and make competition more equitable and dynamic.

The constraints present in developing countries, such as poor infrastructure, deficient government policies and multiple and diverse unmet market needs, have generated a constant loss of capital, resulting in a low competitiveness of the industry in the context of the accelerated global exchange process (Abdul and Jibir, 2017). For this reason, companies with financial and debt capacity consider investment in research, development and innovation (R&D&I) as an important item in their budget.

As a background and basis for study in the country, innovations in the organizations of Cartagena de Indias have been considered (Arraut Camargo, 2008). In this research, innovation is recognized as a stimulus for the growth of organizations and emphasis is placed on non-technological innovation as a key process of integration in managerial decision-making (Sotelo Barrios et al., 2022). This approach aims to modify or improve productivity in an efficient manner. Integration focuses on adapting flexibly to the diverse circumstances of a constantly changing environment, which enables the development of dynamic capabilities that facilitate innovation processes in organizations and ensure their effective development (Garzón Castrillón, 2015; Nagles García, 2014).

In general, unlike static capabilities, dynamic capabilities were recognized as forms of response to the environment, completing the trilogy of responses to the environment: strategy, structure and dynamic capabilities (Mendoza, 2013, p. 66). This precision on the dynamic nature connotes the process of dialectical logic, in which reflection is present in the trilogy of responses to the environment and every phenomenon has a cause and an effect.

It is worth noting that in the dynamic capabilities of a person there is some degree of resilience, a concept that, according to Carretero Bermejo (2010), responds to the disposition of an individual to face and resolve, in an adequate and integrated manner in his/her cultural environment, different situations of risk and adversity or traumatic situations for different reasons and in spite of this achieve a normalized situation, as a result of the interaction of different personal variables with environmental factors (Becoña Iglesias, 2006; Montoro Fernández, 2021).

According to the above, psychology, biology and economics are theoretical foundations of the school of dynamic capabilities of Roncancio (2011), cited in Garzón Castrillón (2015). The economic pillar of special interest points to the efficient application of organizational resources and transaction costs; from the perspective of psychology, the concepts of learning, its mechanisms and cognition play a significant role, they are processes that lead to the success of organizations through the generation of knowledge.

### ***Relationship between innovation and productive sectors***

To characterize a world economy, it is necessary to go back in time and recognize the facts and events that gave rise to what we know as globalization. This phenomenon marks a significant change in the history of humanity, as it has brought the world closer together through telecommunication connections, facilitating a free exchange of information, knowledge, goods and services (Bradford, 2017; Economic Commission for Latin America and the Caribbean [ECLAC], 2002). For this reason, closed economies find fewer and fewer borders in the various regions that make up the vast global territory. The emergence of free trade has enabled nations with the resources to interact with their environment to achieve greater economic autonomy and well-being. Consequently, the generation and transformation of raw materials supplied by the Earth have driven industrialization in some countries, while others have been constrained by the lack of monetary resources, labor training, or the absence of such resources in their geographical boundaries (Posada Martínez and Rodríguez Gaviria, 2022).

The development and growth of the economy as an engine of livelihood for people around the world is based on the tools of technological progress, and the Internet in particular has opened up a myriad of possibilities that drive a new economy. Among the most prominent trends are scientific change, access to information, and the modernization and development of specialized processes in industries (Safiullin et al., 2014). The Internet has been a key catalyst for economic and social progress across the globe, providing unprecedented opportunities for innovation and development.

The specialization of the labor force has generated an accelerated integration and cooperation of

countries in search of wealth, productivity growth in turn leads to great economic inequality, in view of the economic gap between developed and underdeveloped countries, which in recent decades has resulted in a high rate of poverty around the world. For this reason, developed economies are characterized by high investments in technology and qualification of their workers and does not allow investment to reach the countries that need to be trained for international competition, in other words, this characteristic results from what the company knows how to do and how it should do it; according to Aguilar and Yepes (2006), it avoids falling into routine to prevent the generation of stagnation in the competitive strategic development.

On the other hand, the subprime crisis in 2008 helped developing countries to emerge from poverty, since the expectations of investors in markets that were not affected by the crisis, or at least to a lesser extent, encouraged the discovery of potential markets, such as Brazil, Russia, India, China and South Africa (BRICS), among others. However, the research of a few people interested in investing in countries other than the global economic hotspots generated a herd effect in which the characteristic traits of an individual and his or her positivist behavior in the face of an investment attracts people to the point of ignoring the fundamental reason for the investment (Duarte Duarte et al., 2016).

According to Urquiola Sanchez et al. (2017), linking both business management and public policies, under the same conduct of uncertainty and information propagation (De la Rosa, 1999), which helps the economy to generate trends in competition, negotiation, trade and technological innovation, are key factors in the success of the strategic map through science and technological innovation.

Likewise, since the emergence of environmental development thinking in ancient cultures, people have been concerned about the balance of the environment. After the Industrial Revolution, the sense of environmental conservation was lost and the new industries led to a progressive deterioration of the ozone layer, which caused a climate increase and resulted in the thawing of the poles (López Gamero et al., 2008).

Consequently, in the 1980s, when the effects of climate change were perceived due to the impact of pollution generated by industries, the United Nations World Commission on Environment and Development generated a series of policies to strengthen economic growth under the protectionist premises of the environment, the working environment and human rights, which sought to compromise the use of resources with environmental restructuring and preservation.

### **Sustainability policies that increase productivity**

The development of the economy with a naturalist perspective has caused a great leap in the sustainable and sustainable process in the world heritage, it has allowed industries to technify their production with the minimum levels of emission of harmful gases for the planet, in the same way.

production is more efficient and opportunity costs are reduced to the best option. In short, the cost-benefit ratio pays off with high quality standards in both production and operation and management of companies that adhere to environmental care policies.

It is important to mention that the adjective "sustainable" means "that which feeds us, that which allows us to live, that which is profitable for our growth and persistence" (Pamplona, 2000, p. 47). This precision has a connotation with relevance, in the sense that organizations should direct their efforts towards the development of useful projects that generate social, economic and environmental benefits in the community (Polanco et al., 2016).

However, the adoption of this environmental behavior is a privilege for some companies located in developing markets, as they determine the investment to improve their production when this same money could be invested in obtaining new customers or expanding their brand, which means that the opportunity cost for those companies is high (Sawyer, 2011). The needs of supply and demand include market integration, so the implementation for a balanced competition would cost more than the implementation in a company of the same sector in a developed country.

For this reason, new thinking arises around socially responsible policies, in which the transformation of products and waste revolutionizes theories of deep implementation costs and promotes high levels of efficiency around the generation of wealth based on the premise of knowledge accumulated over millions of years to assimilate productive processes generated by the environment (Banrepcultural, 2011).

As a result, diversification, innovation and the development of sustainability policies are encouraged in order to reduce the risks associated with the environment and humanity. According to Pamplona (2000) and Rábano Pérez (2022), they motivate the governmental institutions of each country to promote instruments within the industry that allow entrepreneurs to formalize socially responsible policies and strengthen development strategies within the global market (Chumaceiro Hernández and Hernández de Velazco, 2016; Espiau Idoiaga, 2017).

While a public policy refers to the presence of collective objectives considered necessary or desirable, together with the means and actions managed, at least partially, by a government institution or organization. Its purpose is to direct the behavior of individual or collective actors to modify a situation perceived as unsatisfactory or problematic (Tassara, 2014).

In other words, a public policy aims to address problematic situations in social, economic and environmental areas, in which the State acts as a driver of development. This process involves the implementation of actions at all levels and the participation of the community. In addition, the OECD is fundamental when promoting public policies that improve the economic and social well-being of a country's citizens, as Semana points out ("Qué es la OCDE, el club en el que Colombia fue admitida", 2018).

In this context, the factors that drive productivity through public policies for sustainability include a country's economic structure, its business base (such as the number of MSMEs), its geography and availability of resources, its infrastructure, its level of socio-economic development, the general conditions of competitiveness (such as macroeconomic conditions, regulations and markets), and the institutional environment (such as the educational system and the scientific and technological knowledge base). These elements play significant roles in fostering innovation, as established by the OECD (2012).

## Methodology

The purpose of this article is to examine the factors of innovation for the development of sustainability policies in the productive sectors. The approach of the article is based on the qualitative method, which allows interpreting the information object of knowledge, since qualitative plans focus on deepening and understanding the phenomena from the perspective of the participants or subjects involved in the study. Instead of seeking numerical or statistical measurements, as in quantitative approaches, the qualitative approach seeks to capture the experiences, perceptions, meanings and contexts surrounding the phenomenon under study (Hernández Sampieri et al., 2014). This qualitative approach "methodologically involves adopting an investigative attitude that seeks knowledge and understanding of a phenomenon" (Báez and Pérez de Tudela, 2014, p. 28).

It is worth considering that the article is in line with the deductive method that takes place in a process of co- nociation, which begins with the observation of general phenomena, which is equivalent to establishing the premises or general principles. From these, it is sought to point out the particular truths contained explicitly in the general situation (Prieto Castellanos, 2017). Thus, deduction is based on the application of logical rules to infer or deduce specific conclusions from the general assumptions. In this case, the article takes the observed truths and uses them to draw particular con- clusions specific to the situation or context analyzed (Méndez Álvarez, 2007).

Within this methodological framework, the article is based on a first level of knowledge based on documentary sources. For this purpose, documentary research was applied following the approach proposed by Gabriel-Ortega (2017), whose purpose is to familiarize researchers with the phenomenon studied through the bibliographic review of secondary sources of information related to innovation and sustainability.

## Results

Innovation is the main pillar of productivity and competitiveness, which drives the development and growth of a nation or social group through value-added product and process designs for economic or commercial benefits, as well as access to finance in the

development of intellectual property. Currently, the WEF highlights the importance of these factors related to the competitiveness of countries, evaluated through the Global Competitiveness Index (GCI), which measures a country's capacity to generate economic development opportunities for its citizens and how they drive social progress and the development agenda (Córdoba Jacinto and Blandón Neira, 2023).

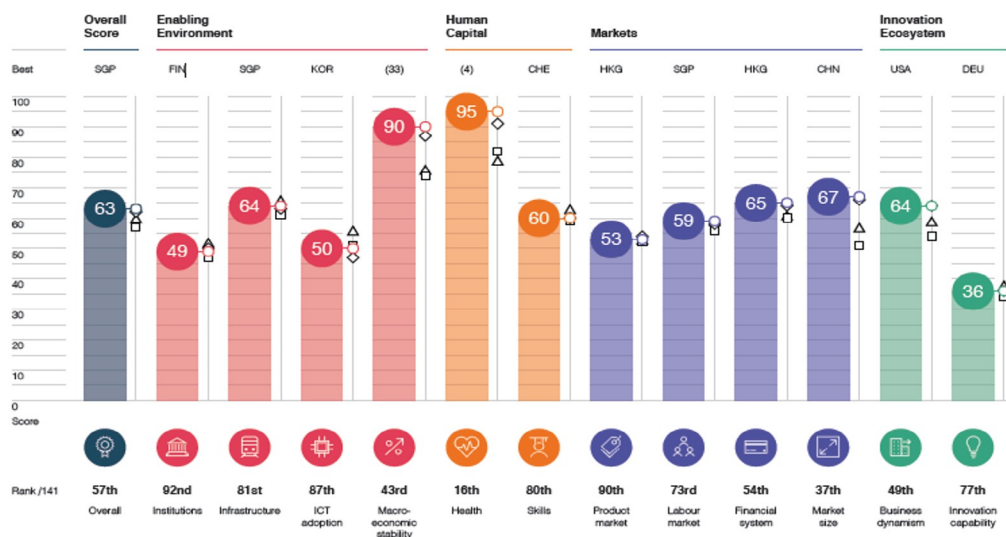
**Table 1.**  
*The 12 pillars of competitiveness*

| Enabling Environment                                             | Markets               |
|------------------------------------------------------------------|-----------------------|
| 1. Institutions                                                  | 7. Goods market       |
| 2. Infrastructure                                                | 8. Labor market       |
| 3. Adoption of information and communication technologies (ICTs) | 9. Financial market   |
| 4. Macroeconomic stability                                       | 10. Market size       |
| Human capital                                                    | Innovation ecosystem  |
| 5. Health <sup>11</sup>                                          | . Business dynamism   |
| 6. Skills <sup>12</sup>                                          | . Innovation capacity |

Source: Private Competitiveness Council (CPC, 2020).

In Colombia, a better performance in competitiveness stands out in 2018 compared to the previous year, as it raised its score in 10 of the 12 pillars measured by the index, where health, macroeconomic stability, infrastructure and size stand out.

**Figure 2.**  
*GCR in Colombia*



Source: CPC (2020).

The results obtained are attributed to governmental management which, through the National Competitiveness and Innovation System (SNCI), has managed to coordinate the efforts of public and private entities to improve the factors that impact the country's competitiveness, as indicated by the CPC (2020).

In Colombia, there is a notable imbalance between the needs of the productive sector and the availability of human resources, characterized by a shortage of skilled workers and technical specialists, contrasting with an excess of professionals with low performance. For this reason, the priority of the education system is to focus on the skills demanded by the labor market, according to ECLAC (2014).

In addition to the aforementioned situation, there is a deficit in Colombia's innovation system. This is evidenced by the fact that gross expenditure on research and development (R&D) represents only 0.29% of gross domestic product (GDP), compared to 1.15% in Brazil and 0.33% in Chile (World Bank [WB], 2024).

Other innovation indicators, such as patent registration and scientific publications per capita, place Colombia below neighboring countries such as Argentina and Chile, as explained by the OECD (2014). But despite these limitations, Colombia has grown economically in the last decade, demonstrating resilience in the face of the global financial crisis, thanks to the momentum of sectors such as oil and mining, foreign direct investment in raw materials and broad-based, as indicated by the OECD (2018).

## Discussion

Creativity is vital in the innovation processes of products, market processes, technological and organizational processes, since through the creative process ideas are generated and implemented, but their effectiveness will depend on teaching-learning processes through educational innovation (Garzón Castrillón, 2015).

According to these considerations, educational innovation and all the forms of innovation analyzed have an impact on technological and economic development, especially in the productive sectors. This innovation is an important factor for competitiveness in terms of lowering tariff and non-tariff barriers, and for growth through a competitive advantage that allows specialization and the strengthening of production through economies of scale. Furthermore, the capacity for resilience in the face of future crises and processes of change adverse to the need to obtain additional resources and returns to their economic activity.

The processes of integration of objectives, strategies and technologies with the market, which aim to grow and develop the company's economic activity, determine the innovative capacity and solidify the company's positioning and competitiveness in the regional and international market.

## Conclusions

Creativity is a fundamental pillar in the innovation process, being the main fuel that feeds the generation of ideas and their subsequent implementation to enhance innovative capacity. This capacity not only drives the development and growth of nations and regions, but also strengthens the competitiveness of the productive sector.

Likewise, the market orientation of innovation gives companies a significant competitive advantage, leading to greater profits over their competitors. Although there are various forms of innovation, as detailed in the Oslo Manual (OECD and Eurostat, 2005), educational innovation emerges as a critical factor in this scenario. Thus, in emerging economies, innovation is emerging as a driver of sustainable development, with technology and social capital being fundamental pillars in the process, in addition to dynamic capabilities, in their effective application of organizational resources, leading to optimal economic, social and environmental benefits.

On the other hand, businesses, as the main drivers of dynamism in innovation systems, work closely with universities and research institutes to strengthen the innovation eco-system, since, in this globalized context, the specialization of the labor force and economic openness pose challenges and opportunities, while exacerbating the disparities between developed and developing countries.

From the economic point of view, progressive industrial thinking and the ecological and socially responsible perspective outline two contrasting approaches in the search for improving production at a global level, with minimal environmental impacts, given that, in order to meet the challenge of sustainability, it is crucial that scientists, politicians, businessmen and communities collaborate closely.

In accordance with the above, the State should promote diversification, innovation and sustainability policies to mitigate environmental and social risks, encouraging democratic life and ecological awareness, since from the naturist approach this has catalyzed significant advances in sustainable development, promoting the technification of industry with minimal emissions of harmful gases.

Given that the GCR is a fundamental barometer for evaluating the capacity of countries to generate opportunities for economic development and social progress, Colombia has improved its competitive performance, standing out in areas such as health, macroeconomic stability, infrastructure and size, thanks to government management and the coordination of efforts through the SNCI.

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