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THEORETICAL BASIS OF IMPLEMENTING "GREEN" INNOVATIONS

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Abstract. In recent years, increasing environmental concerns have meant that concepts such as sustainability and green innovation have gained particular importance. This theoretical overview can serve as an incentive for further research on the concept of green innovation and contribute to a clear and comprehensive view of this topic.

Key words: innovation, green innovation, radical innovation, value, sustainability, concept.

Introduction. The impact of human activities on the environment has become a growing global and societal concern. In recent years, carbon dioxide emissions from fossil fuels have reached record levels, with global average sea levels rising by 20 cm between 1900 and 2018, and heat waves, wildfires and air pollution have increased. In addition, concentrations of key greenhouse gases have continued to rise in recent years, and global average surface temperatures for 2017–2021 are among the warmest on record. In addition, the frequency and intensity of extreme weather and climate events have increased in all regions of the world. This has led to an increased need for governments to implement measures to reduce environmental damage [1].

However, addressing environmental issues is not only a matter of government policy, but organizations also play a very important role in reducing these issues. In fact, in today's business market, organizations must effectively respond to a two-pronged trend. On the one hand, organizations must achieve efficiency and market share through continuous innovation, which requires resources, capabilities and investments. On the other hand, organizations must achieve a certain level of ethical responsibility and harmony with the society in which they operate. Therefore, today's business is faced with the issue of finding a balance between competitive adaptation (innovation) and legal adjustment (sustainability and respect for the environment).

Green innovation is increasingly important for organizations today, as consumers increasingly demand measures from companies and institutions to coordinate this balance between production and environmental sustainability. The scientific literature shows that green innovation is currently considered a business strategy for achieving competitive advantage, as it helps to open up new markets or develop new products and applications in a sustainable and responsible manner. The importance of this type of innovation is that it allows companies to compete in the market using clean and efficient technologies and helps them adapt to new sustainable consumption patterns. In recent years, as the pressure to comply with environmental regulations and meet the environmental preferences of consumers has increased, green innovation has become a source of competitive advantage.

Literature review. Several researchers[2] have proposed a type of innovation that achieves the introduction of green innovations in the economy and reduces environmental damage while increasing business efficiency. This is an idea that encompasses the concept of green innovation. Green innovation is understood as the search, promotion and development of environmentally friendly products, services and processes that contain a certain degree of innovation. It consists of

new innovative ideas aimed at providing products or services that do not harm nature, do not respect the environment and are environmentally friendly in their conception, use and disposal.

The concept of green innovation is of particular interest in the scientific community. This interest has led to a proliferation of literature that attempts to understand the main implications of the concept in depth. This theoretical review provides a basis for the main principles, components, and propositions of green innovation. Thus, all researchers interested in understanding and studying green innovation will find in this work the necessary information to obtain the theoretical foundations of the concept and to adopt a conceptual knowledge base.

Innovation has long been considered an important tool for organizational competitiveness and success, and there is a large body of literature on the subject. The Oslo Manual [3] defines innovation as a concept or significant changes in the product, process, marketing, and organization of a company in order to improve results and efficiency. Innovation is a complex and creative process that involves the creation of a new product, process, or the introduction of a new method of organizational management.

Green innovation is an environmental strategy that involves changing production processes, which aims to reduce resource consumption, prevent pollution and implement an environmental management system in business operations. The definition of green innovation refers to products, processes or management practices that aim to reduce environmental impact. Green innovation also takes its philosophical roots from the theory of sustainable development, which refers to the relationship between an organization's activities and their impact on the natural environment [4]. The main focus of green innovation is on implementing a system that aims to reduce waste, prevent pollution and manage the environment.

It should be noted that the concept of green innovation inevitably leaves room for many different interpretations. Another problem is the use of different terminology. In addition to green innovation, the following terms are used in the literature to describe this concept: eco-innovation, sustainable innovation, sustainability-based innovation, green technologies, ecological innovations or ecological technologies [5]. They refer to goods, services, production processes or business models. The concept of “eco-innovation” first appeared in the literature in the book “Driving Eco-Innovation” in 1996. In the book “Advanced Discipline for Innovation and Sustainability” by Claude Fusler and Peter James, it can be seen that eco-innovation is defined as “new products and processes that provide customer and business value, but significantly reduce environmental impact” [6]. This concept is also understood as "all measures of relevant actors (firms, politicians, associations, unions, churches, private households) that develop, apply or introduce new ideas, actions, products and processes and contribute to reducing environmental burdens or achieving environmentally defined sustainability goals".

The European Commission defines green innovation as “any form of innovation that aims to achieve significant and demonstrable progress towards the goal of sustainable development by reducing environmental impacts or by achieving a more efficient and responsible use of natural resources, including energy” [7]. In the literature, green innovation is defined, among others, as “innovations consisting of new or modified processes, practices, systems and products that benefit the environment and therefore contribute to environmental sustainability” [8]. Eco-innovation is also defined as “an innovation that reflects a clear focus on reducing the environmental impact of the concept, whether such impact is intended or not? And it is not limited to innovations in products, processes, marketing methods and organizational styles, but also includes innovations in social and institutional structures.

One of the most frequently cited definitions of eco-innovation is the one proposed by R. Kemp and P. Pearson, according to which green innovation should be understood as "the development, adoption, or exploitation of a product, production process, service, or service." "A management or business method that is new to an organization and that reduces environmental risks, pollution, and other negative impacts of resource use (including energy use) over its life cycle compared to related alternatives" [9]. This definition is often considered the most universal in the literature. Science has made many attempts to define the above term. The term "green innovation" or "eco-innovation" is not understood uniformly and is usually understood very broadly [10]. Summarizing the considerations on the concept of "green innovation", it should be noted that most definitions emphasize the need to take into account the novel nature of the planned activity, as well as environmental protection (reducing environmental impact). Significant green innovations "can be environmentally motivated, but can also arise as a side effect of other goals, such as compliance with regulations and standards, increased efficiency, reduced input costs (and therefore production costs)".

Analysis and results. The literature distinguishes two main types of innovation: radical innovation and incremental (increasing) innovation. Incremental innovation refers to the creation of value by introducing new improvements to an existing product or process.

Incremental innovation is characterized by a gradual change in a product, service, or process and achieving results in a short period of time. This innovation occurs when the market requires specific features or other production requirements of an existing product. This type of innovation in businesses is a common strategic practice that allows them to survive and continue to increase their profits.

In contrast, radical or disruptive innovation refers to the creation of a new product or service that was not previously known, that is, something that does not yet exist on the market. Such innovations require significant investment, dedication, time, research and development. Therefore, companies often choose incremental innovation over radical innovation. Table 1 summarizes the main conceptual differences between these two types of innovations.

Table 1

Distinguishing between radical and incremental innovations[1]

Radical innovation	Incremental innovation
New product or service offering	New product or service offering
High level of risk and uncertainty	Low risk and uncertainty
Applying new technologies	Minimal changes to existing technologies
Can lead to dramatic changes in the market, industry, or company	Can be easily adapted to the current market

Several studies and authors discuss the forms of innovation, but the most relevant theory in the business world is the Oslo Manual, developed by the Organization for Economic Co-operation and Development (OECD) in 2005. This manual distinguishes four forms of innovation: product innovation, process innovation, marketing innovation, and organizational innovation. This classification is valid for both industries and services, including public services.

First, product innovation is understood as the creation of new products or services or the improvement of existing products and services. As indicated in the Oslo Manual, product

[1] Author's development

innovation occurs when significant changes are made to the design, resulting in improved operation or user characteristics of the product. Product innovation is achieved through the use of knowledge or technology that is used to improve materials and components. However, the presence of some changes to the product can also be considered a marketing innovation.

Secondly, marketing innovation consists in the use of marketing methods not previously used by the organization, which entails appropriate changes in design, packaging, positioning, advertising, etc. This form of innovation is mainly aimed at increasing sales. The Oslo Manual indicates that this type of innovation involves the opening of new markets and also requires changes in the 4Ps (product, price, distribution and communication). According to the Oslo Manual, for the 4Ps to be considered an innovation, a product must have significant changes in design and packaging; in price, it must have equally significant changes in terms of demand and the options offered; in distribution, for example, when new sales channels are implemented, such as franchising; in advertising, when a change is made to the logo or customer relationship management is implemented.

Third, technological innovations are achieved through major changes in machinery or software to reduce unit costs of production or distribution and improve the quality, production, or distribution of new or improved products. For example, improvements in information and communication technologies are process innovations because they increase the efficiency and quality of auxiliary activities. Therefore, the main goal of process innovation is to reduce unit costs of production and increase productivity.

Fourth, organizational innovations are significant changes in the management, practices, and procedures of a company. This involves changes in the division of labor, strategy, or structure. In addition, innovations such as updating knowledge management and implementing systems for managing production, delivery, and quality control operations are also considered to be organizational innovations. Similarly, improvements in customer and supplier relationships are considered organizational innovations. It is interesting to identify and conceptualize these different forms of innovation in order to understand how companies can become eco-innovators using different organizational decisions, practices, and procedures. Thus, green innovation can encompass all four forms of innovation depending on the approach to its implementation. Furthermore, as mentioned above, a key component of green innovation is its contribution to sustainable development, as it seeks economic development that achieves ecological balance. In particular, green innovation is directly related to the ecological dimension of sustainability, as will be discussed in the next section.

Green innovation has become one of the most important strategic tools for effective sustainable development. In the past, it was not necessary to invest in environmental protection activities, but strict environmental regulations and widespread environmental practices have changed the rules of competition. This has led to the expansion of methods and processes related to environmental sustainability, such as green innovation. Moreover, given the growing awareness of consumers about sustainability in recent years, many companies have used the green agenda as a tool to achieve a business model based on green innovation. Thus, green innovation practices are a logical response to the demands of a customer who is willing to pay more for sustainable products and who expects increasingly responsible products and services from firms. In fact, previous studies [11] show that green innovation initiatives contribute to improving company performance and competitiveness, as green innovation practices increase product value and create competitive advantages by exploiting environmental differentiation.

As mentioned above, the literature shows that innovation is the sum of "design + product". Accordingly, green innovation can be defined as the sum of "eco-design + eco-production", since GI involves the application of innovation in technologies that include the development of ecological products or processes, energy conservation, pollution prevention and ecological product design. Similarly, Wang et al. [12] define green innovation as innovations that aim to achieve sustainable development and conservation of natural resources by developing green products and services. In the same vein, some authors [13] define green innovation as the development of sustainable products and processes by using or adopting environmentally friendly raw materials in the production or design process. This process also includes the application of the principle of eco-design or eco-production. That is, the environment is taken into account from the moment the idea for a product or process is conceived, and not only at the end of its useful life. Accordingly, while green innovation has mainly focused on production processes, some companies have extended this trend by redesigning not only production, but also all their processes, including distribution channels and after-sales services. Green innovation is therefore an innovation that is integrated into the entire business cycle, that is, the design, production, delivery and end use of commercial products, and mainly ensures environmental sustainability.

Green innovation can be measured like any other type of innovation. However, its important component of environmental performance makes it difficult to fully assess the efforts, as it requires measuring different innovative factors (social, economic and environmental) radically and incrementally throughout the innovation process. Therefore, specific indicators are needed to measure green innovation, and several international institutions have chosen to use indicators or leading systems to measure eco-innovation, which are presented below (Table 2). It should be noted that these indicators are the most widely used, although different ones can be found.

Table 2

Green innovation indicators used by various institutions[2]

Indicators	Organization	Application
Innobarometer Indicator Group	IUCN European Commission	Environmental Innovation Status
Sustainable Development Indicators (SDI)	Eurostat	Development R + D + i, Environment
Living Planet Index and Ecological Footprint Corporate Social Responsibility	WWF Global Reporting Initiative	Environmental organizations
ISO 26000 Standardization Standards	International Standardization Organization	Organizations and public organizations
Millennium Development Goals Indicator Group	United Nations	Environment, human development

As can be seen from Table 2, different indicators have different scopes and levels of analysis. This clearly shows that there is a need for common indicators that can be systematically used to

[2] Bleischwitz R., Bahn-Walkowiak B., Irrek W., Schepelmann P., Schmidt-Bleek F., Giljum S., Lutter S., Bohunovski L., Hinterberger F., Hawkins E. Eco-innovation-putting the EU on the path to a resource and energy efficient economy. In Wuppertal Spezial: No. 38; Wuppertal Institut für Klima: Wuppertal, Germany, 2009.

measure green innovation or eco-innovation efforts. Therefore, it shows us that there are several reliable scales for measuring green innovation. In particular, validated scales, including specific indicators for measuring green innovation efforts. In this area, there is a lack of measurement uniformity, a lack of consistent statistical data, and the need to overcome methodological shortcomings by designing performance-based indicators, an additional problem is that green innovation is not yet counted separately.

It is worth noting that the European Union has been funding specific areas to address the challenges of measuring green innovation for years. For example, Kemp and Pearson[14] highlight different measurement methods such as survey analysis, patent analysis, and digital and documentary source analysis. Furthermore, the IETT examines the strengths and weaknesses of existing indicators and methodologies and provides guidance for future improvements in green innovation measurement. Therefore, we can conclude that while some indicators exist for measuring green innovation, there is a need to develop more realistic scales that can be applied to different geographical areas and levels of analysis.

Conclusion. This study is intended to serve as a basis for further discussion of green innovation. Thus, the theoretical framework developed here can stimulate further exploration of this concept. Although green innovation is a key concept for environmental protection and securing the future of the planet, there is still a long way to go in this area. We hope that the conceptual framework explored in this study can serve as a guide for a better understanding of the concept and generate greater scholarly interest. Future research could focus on further deciphering the background of green innovation. For example, human resource management can play a key role in this regard by stimulating green innovation processes. Although some progress has been made in addressing this role, there is still a long way to go. Furthermore, to ensure the importance of green innovation, more research is needed to empirically demonstrate its impact on variables such as company performance or competitiveness. Another pressing question is the role of organizational culture in shaping green innovation, including what specific employee behaviors are needed to encourage it. We hope that the ideas summarized in this study will inspire further exploration of these and other issues that affect the concept of green innovation, ultimately leading to a more sustainable economy.

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