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A systematic literature review and bibliometric analysis of eco-innovation on financial performance: Identifying barriers and drivers

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Abstract

Eco-innovation strategies are essential elements for companies developing core competencies in the circular economy model. The academic world has begun to study the knowledge of these business decisions, and there is incipient literature on the subject. In this context, this paper aims to contribute to the current knowledge on the impact of eco-innovation strategies on corporate performance by exposing and synthesizing the distinct positions found in the literature. For this purpose, a systematic and bibliometric review of 81 articles related to the economic impact of eco-innovation on firm performance, as well as the barriers and drivers of these strategies, was carried out. After analyzing the several types of eco-innovation, our results show that although previous empirical evidence suggests the existence of a positive effect, it is not generalizable due to the existence of several factors that may condition the impact of eco-innovation on corporate performance and its implementation. This study delves into the current academic literature on eco-innovation and firm performance, determining that both size and the environment in which a company is framed constitute a series of conditioning factors that may clarify why there is no consensus in the academic literature in this regard. In addition, this work encourages future lines of research with the aim of shedding light on this field of knowledge.

KEYWORDS
bibliometric analysis, circular economy, eco-innovation, financial performance, firm performance, green innovation, systematic literature review

1 | INTRODUCTION

Industrialization has brought not only great advances but also serious environmental problems (Hizarci-Payne et al., 2020; Nandi et al., 2021; Wang et al., 2021). Since its onset, a linear production model has been in place in which resources have seemed infinite and can be obtained at low cost (Leder et al., 2020). In this model, natural resources enter at one end of the production process and emerge at the other in the form of economic products (George et al., 2015). Concern for the environment and the future of the next generations is growing (Leder et al., 2020; Zhong et al., 2022). The business world and society in general are increasingly aware that our planet has

Abbreviations: CE, circular economy; CSR, corporate social responsibility.

limited resources and that we are pushing the Earth to its limits (Nandi et al., 2021). As a result, consumer preferences and pressure groups are changing (Nowicki et al., 2021), leading to a search for balanced economic growth accompanied by sustainable practices (Tang et al., 2017).

This concern for the environment is not limited to advanced economies but is widespread. In Asian countries such as China, environmental concerns have become one of the government's main priorities (Leder et al., 2020). Moreover, in recent years, there has been an increase in the number of academic papers published on sustainability (Çimen, 2021) reflecting the emerging interest in this topic in academia. In this context, the concept of "eco-innovation" emerges, defined as a set of techniques, processes, systems, and products that reduce or avoid harmful impacts on the environment (Vence & Pereira, 2018).

In the area of business, a key issue is the relationship between eco-innovation and business performance. Much has been studied recently on this topic and on the impact that eco-innovation can have on business performance. However, the previous studies on this topic have not been conclusive, so it is necessary to delve deeper into the several factors that influence companies' applications of sustainable strategies and the impact they have on their performance.

Specifically, these previous studies have presented discrepancies in terms of the effect that green innovations or eco-innovations have on business performance. On the one hand, we find authors who claim that companies that apply sustainable strategies will improve aspects such as their reputation or customer satisfaction (Liao, 2018), in addition to achieving a significant reduction in costs and, therefore, an improvement in business results (Marín-Vinuesa et al., 2018). On the other hand, we find authors who claim that eco-innovation does not always have a positive impact, since the high initial investment or the high degree of turnover per worker could lead to poorer business performance (Aibar-Guzmán & Frías-Aceituno, 2021). In addition to the above, despite not improving business profitability, some authors claim that organizations that implement eco-innovation strategies will be better valued by investors, which will lead to an increase in their market value (García-Sánchez et al., 2019).

The analysis of this article establishes eco-innovation as the main topic, which is of relevance due to the growing concern for sustainability and environmental responsibility in companies. To understand the relationship between eco-innovation and business performance, it is essential to establish a knowledge framework that helps researchers understand the direction of the literature, as well as being of great use to business leaders who wish to apply environmental innovation strategies within their organizations. The establishment of this knowledge framework will provide relevant information to understand the lack of consensus among authors and thus explain the different factors that condition the impact of eco-innovation on business performance, as well as identifying literature gaps, generating new research lines, and transferring their application to practice.

In this context, the aim of this paper is to establish a contextual framework, based on a bibliometric and bibliographic review, to guide researchers in the creation of a theoretical framework and the identification of possible lines of research. After explaining the various positions that have been found in the systematic literature review, we reflect on the possible reasons why this is the case.

To achieve the establishment of a solid knowledge framework, it is necessary to answer a series of pre-established research questions. Considering that the main objective of this study is to analyze the impact of eco-innovation on business performance, the first research question is:

RQ1. How do eco-innovation strategies impact firm performance?

On the other hand, numerous studies can be found in academic literature that claim that not all companies have the same facilities when it comes to implementing environmental innovations, since it will depend on a series of factors (Doran & Ryan, 2012; Rexhäuser & Rammer, 2013; Xue et al., 2012). Therefore, the following research question is proposed:

RQ2. What are the barriers and drivers for companies to implement eco-innovation?

To complete the knowledge framework and obtain a complete view of the impact of eco-innovation on business performance, it is necessary to establish which factors can explain why, within those companies that implement eco-innovation strategies, some experience a positive impact and why others experience a negative impact. To this end, we establish the third research question:

RQ3. Are there any factors that condition the impact of eco-innovation on firm performance?

Although there are numerous studies that analyze the impact of eco-innovation on firm performance through a systematic literature review process, they are not conclusive, since they focus on answering this question without considering a series of external factors that can condition this impact. This work differs from previous studies by establishing a series of factors that could explain the lack of consensus in the literature and delving into the different barriers and drivers that serve to contextualize these conditioning factors, thus complementing the existing literature. However, a differentiating aspect of the present work is the methodology used to explain the impact of eco-innovation on firm performance, since it combines a systematic literature analysis with a bibliometric analysis, which allows us to obtain a broader view of the current situation of the academic literature in this field of research.

Thus, this study contributes to the existing literature on the impact of eco-innovation on business performance, as it summarizes the distinct positions in this research field, providing additional information on the conditioning factors of this impact resulting from bibliographic and bibliometric analysis. Moreover, this study provides useful information to both managerial and society in general to understand the barriers and drivers of implementing environmental innovations and show what is the possible impact of applying this type of

innovation. These implications are explained in greater depth in the conclusions section.

To achieve the above results, this paper is structured as follows: In the following section, the research field and its relevance are contextualized, followed by the methodological design of our bibliometric and bibliographic review. In this sense, it is essential to identify the sources and keywords of this field of research, the key factors to address the main topics that have been developed throughout the period under study, and the main authors and journals interested in the subject. Thirdly, a systematic review of the literature is conducted to determine the drivers of and barriers to the implementation of eco-innovation, as well as its effect on corporate performance. Finally, the main conclusions, as well as the policy and managerial implications, are drawn. In addition, the limitations of the research and the future research directions are presented, which allow the researchers to identify the current picture of the field and the research gaps.

2 | BACKGROUND AND JUSTIFICATION OF THE WORK

2.1 | Towards circular economy (CE)

To alleviate global warming and the consequences of the linear economic model, companies are pursuing greener business strategies in which they conduct their activities under environmental approaches in their organization, planning, and production stage (Hizarci-Payne et al., 2020) to cope with different emerging environmental challenges and resource depletion (Abu Seman et al., 2019).

Companies are assuming greater responsibility through corporate social responsibility (CSR) strategies (Pan et al., 2020), making necessary the emergence of an alternative to the unidirectional model: the CE, which aims, broadly speaking, to make society and the economy grow in a sustainable way (Aminoff & Pihlajamaa, 2020). Morseletto (2020) defines CE as "an economic model aimed at the efficient use of resources through waste minimization, long-term value retention, reduction of primary resources and closed loops of products, product parts and materials within the limits of environmental protection and socio-economic benefits" (p. 1). However, Prieto-Sandoval et al. (2018) and Kirchherr et al. (2017) have compiled various definitions of this concept, such as those of Peters et al. (2007) and Geng and Doberstein (2008), who focus mainly on the closing material loops, or Park et al. (2010), who refer to new technologies that enable environmental modernization. In addition, Kirchherr et al. (2017) compile the definitions of Stahel (2016) and the Ellen MacArthur Foundation (2012), who define CE as, respectively, a model that would change economic logic and as an industrial system whose goal is the elimination of waste.

In addition to defining CE, it is important to establish a set of objectives that such an economic model pursues. Following Morseletto (2020), we can establish the 10 main objectives of CE: reject, rethink, reduce, reuse, repair, renew, remanufacture, reconvert, recycle, and recover. Following the above, the author groups these objectives into three main strategies: useful application of materials, extending the useful life of products and parts, and the use and manufacture of smarter products.

However, setting these objectives is not enough to achieve the transformation to an effective CE, as this requires careful decision-making and scheduling of activities (Morseletto, 2020). There are few examples of circular businesses that have been successful in their economic development, mainly due to barriers such as technological complexity and lack of innovation (Aminoff & Pihlajamaa, 2020). Despite this, the number of countries that have taken steps to encourage the implementation of a CE has grown in recent years (George et al., 2015). Among other countries, China has opted for this alternative to the conventional model to develop its economic activity, considering it a vital strategy to develop in the most sustainable way possible.

2.2 | The relationship between eco-innovation and CE

In addition to the effort that must be made by all nations in the world, the change from a linear to a CE requires numerous agents to work hard to achieve changes in the different stages of the productive process and in various relevant sectors, thus achieving the transition to a sustainable economy (Durán-Romero et al., 2020). In this context, we find a key concept that makes the transition from a linear to a circular model possible and that we will analyze below: eco-innovation.

The transformation from a linear to a circular model requires innovations to make this change possible. CE requires innovations in production, consumption, and policymaking (Prieto-Sandoval et al., 2018). For this reason, companies are increasingly investing in new processes aimed at detecting and reducing environmental problems (Hojnik et al., 2018). This type of innovation is called "environmental innovation" or "eco-innovation"—a concept that emphasizes innovation and sustainability and was introduced in the third industrial revolution and extended during the fourth industrial revolution (Johl & Toha, 2021).

Eco-innovation is a key strategy for linking sustainable development with the CE (Liu et al., 2019), emphasizing activities that are essential for companies to move towards environmental sustainability (Durán-Romero & Urraca-Ruiz, 2015; Maldonado-Guzmán et al., 2021). However, it should be noted that eco-innovation is a multidimensional concept whose implementation and development can be complex (Smol et al., 2017; Urbaniec & Gerstlberger, 2011).

In this sense, strategies aimed at the development of eco-innovations are in a process of continuous development and revision (Buttol et al., 2011). These strategies have been studied throughout the academic literature as one of the fundamental elements in the development of new and more competitive technologies, as well as in the development of different business models (de Jesus et al., 2018; Maldonado-Guzmán et al., 2021).

Eco-innovations not only reduce polluting practices but, according to several authors, can also translate into high economic

performance (Aldieri et al., 2019). This is why the adoption of these practices by both consumers and companies is growing notably (Hojnik et al., 2018), driven by proposals such as the Eco-innovation Plan or the Kyoto Protocol (Bitencourt et al., 2020).

To properly understand this concept, it is necessary to define what eco-innovation is, what types of eco-innovations exist according to the literature, the drivers of eco-innovation, and how it affects business performance. Below, we present the methodological development to conduct the bibliometric study and the analysis of the literature on the above concepts.

3 | METHODOLOGY

3.1 | Data collection

To synthesize existing knowledge on the determinants of eco-innovation and its impact on corporate performance and to establish research gaps, a systematic literature review was designed. A systematic literature review can be defined as a literature review process whose objective is, using basic and reproductive methods, to identify, evaluate, and summarize primary studies related to a particular topic (Cerchione & Esposito, 2016). This review method is useful for compiling research efforts on emerging topics to identify challenges for future studies (Potrich et al., 2019). For this purpose, this work was structured in the following phases: (i) definition of the research question, (ii) selected databases, (iii) identification of keywords, (iv) selection of included articles, and (v) data extraction and evaluation.

i. Before conducting the literature review, the status of the analyzed research field was examined (Turzo et al., 2022). To this end, the most repeated keywords were noted to establish the search equation to be used later for the review. Once the current situation of the research field was analyzed, it was observed that there were gaps in terms of the impact of eco-innovation on business results. In this sense, this work was motivated by the need to answer the following questions: How do eco-innovation strategies impact business performance? What are the barriers and drivers for companies to implement eco-innovation? Are there any factors that condition the impact of eco-innovation on firm performance? Once the research questions were established, inclusion criteria for articles in the review process were developed. This consisted of including those works that answered these questions and excluding those that, although they included the keywords defined in step (iii), were not relevant in answering the research questions posed.
ii. To answer these questions, we used Scopus and Web of Science (WOS) as the databases to search for scientific articles related to the CE, eco-innovation, and business performance as the main topics. We selected these databases as they are two of the most widely used in the scientific field due to the substantial number of journals that can be found through them and the quality of the results that can be obtained from them.
iii. To find the articles required to carry out this work and considering the most recurring keywords obtained from the analysis step, we entered a series of search equations in the search engine of each database, that is, a set of keywords that we must use to find the documents that will be useful to us for carrying out the research. This step in the review process is important because the proper definition of search terms will allow us to find studies that are relevant to our research (Enciso-Alfaro & García-Sánchez, 2022). Between Scopus and WOS, a total of six search equations were used; their main keywords were "circular economy," "eco-innovation," "eco-design," and "firm performance."
iv. By entering the same search equations, we found more results in WOS, where we found a greater number of articles useful for this work. To avoid duplicates, we linked the six equations using the "OR" function of WOS and Scopus, with which we obtained a total of 1277 and 232 results, respectively.

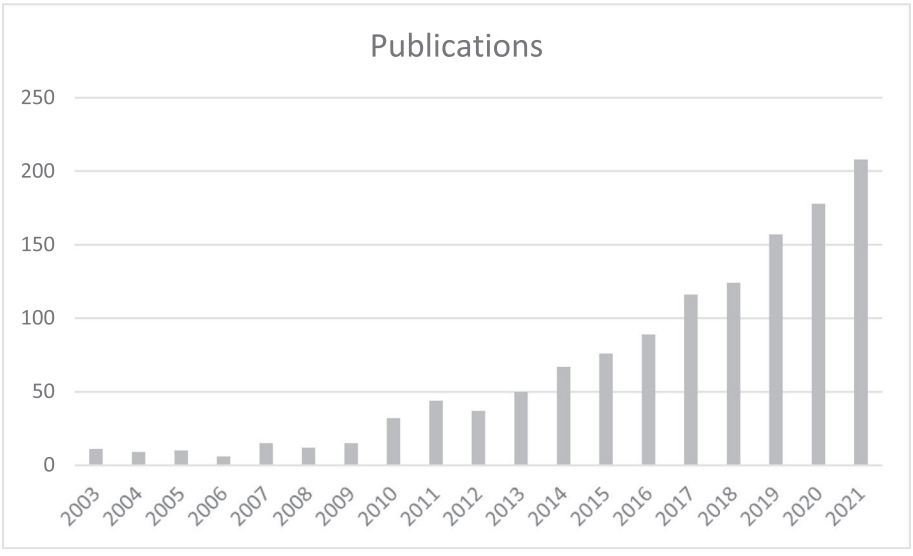

FIGURE 1 Evolution of publications in WOS.

Thanks to the tools offered by WOS, it was possible to gather useful information to be able to filter the search results. For example, we found that of the 1277 results obtained in this database, 83.79% were articles (1070). In addition, we were able to observe that the largest number of publications related to this topic began being published in 2010 and, from 2013, this number did not stop growing until the end of 2021 (see Figure 1).

In addition to the above, we note that 98% of the documents that appear in the results after entering our search equations were published in English.

Thanks to this information, we were able to establish filters to narrow down the results obtained, so we filtered by:

- Document type: articles
- Year of publication: 2010–2021
- Language: English
- Knowledge area: business

Once the results were filtered, we went from obtaining 1277 documents to 712 in WOS and from 232 to 82 in Scopus. The number of papers found in the first round of research was systematically reduced by a series of selection criteria (Abbate, Centobelli, Cerchione, Oropallo, & Riccio, 2023). During the literature review process, articles whose titles and abstracts suggested the inclusion of the keywords used in the search equation but were not related to the objectives established in the present study were excluded. Subsequently, a thorough reading of the selected articles was conducted, and those that did not substantially address the main objectives or research questions posed were excluded, considering them irrelevant for the present systematic review.

Firstly, of the 794 articles extracted from the previous process, a total of 713 were discarded once we determined that none of them met the objectives pursued by this study. Secondly, the titles of the papers derived from the previous process were carefully read, and 112 articles were excluded. Thirdly, and following Pittaway et al. (2004), 601 were excluded after we read the abstract. Finally, 81 articles were selected for further reading and analysis (see Figure 2).

In addition to the systematic review process, the snowball method (Abbate, Centobelli, Cerchione, Oropallo, & Riccio, 2023; Chen et al., 2020; Greenhalgh & Peacock, 2005) was used to include other studies that were not considered in the review process but that were considered relevant to contextualize this work, as well as to reinforce the methodological part.

v. With the articles obtained, a process of data extraction and analysis was conducted using the bibliometric analysis described in the following section.

3.2 | Bibliometric analysis

Bibliometric analysis is a mathematical and statistical method that allows displaying the current state and evolution of a field of

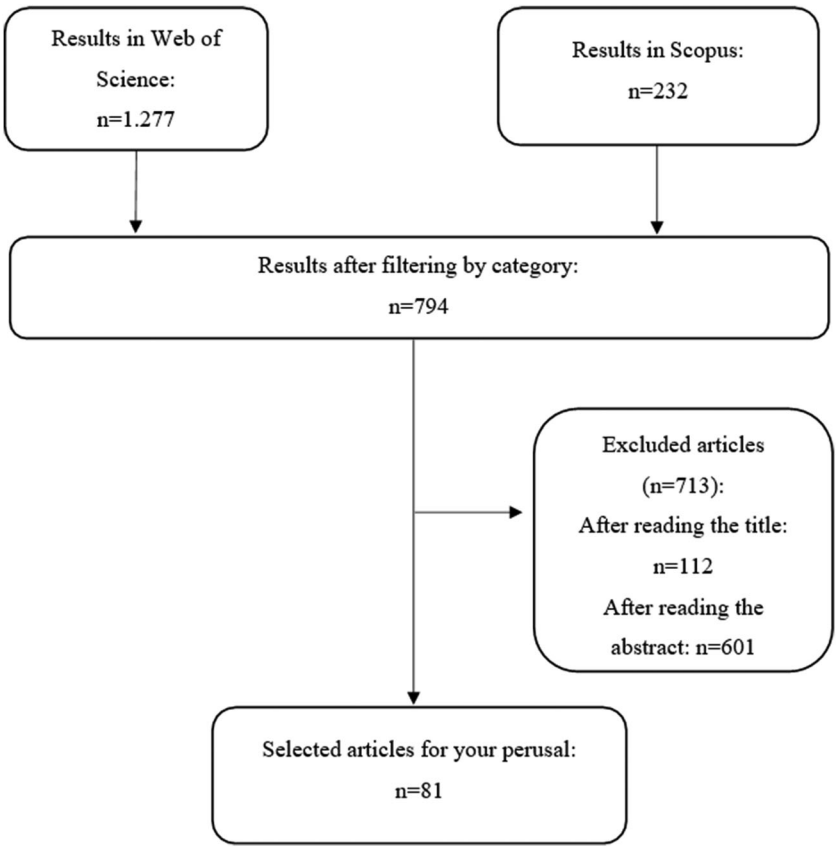

FIGURE 2 Item selection process.

knowledge (Abejón & Garea, 2015). In this sense, bibliometric analysis has gained popularity in various fields of study in recent years (Donthu et al., 2021; Turzo et al., 2022). This analysis can provide a broader view of relevant literature and enable a more complete understanding of the most relevant studies, which is particularly useful in rapidly evolving research fields such as eco-innovation. In addition, bibliometric analysis is useful for determining emerging trends in research collaboration efforts, or in article and journal performance, among others (Campobasso & Boscia, 2022; Donthu et al., 2021).

Once the base of articles needed to study current knowledge was defined, the VOSviewer software, a program developed to build and visualize graphic maps (Van Eck & Waltman, 2010), was selected to conduct the bibliometric analysis to identify bibliometric networks in the field of eco-innovation and business performance. These networks can be determined for researchers, journals, and

TABLE 1 Ranking of authors with the most publications according to WOS.

Order	Author	No. of publications	% out of 81 articles
1	Scarpellini S	8	9.877%
2	Portillo-Tarragona P	5	6.173%
3	Valero-Gil J	4	4.938%
4	Marín-Vinuesa LM	3	3.704%
5	Moneva JM	3	3.704%
6	Aranda-Usón A	2	2.469%
7	Carrillo-Hermosilla J	2	2.469%
8	Gallego-Álvarez I	2	2.469%
9	García-Sánchez IM	2	2.469%
10	Hojnik J	2	2.469%

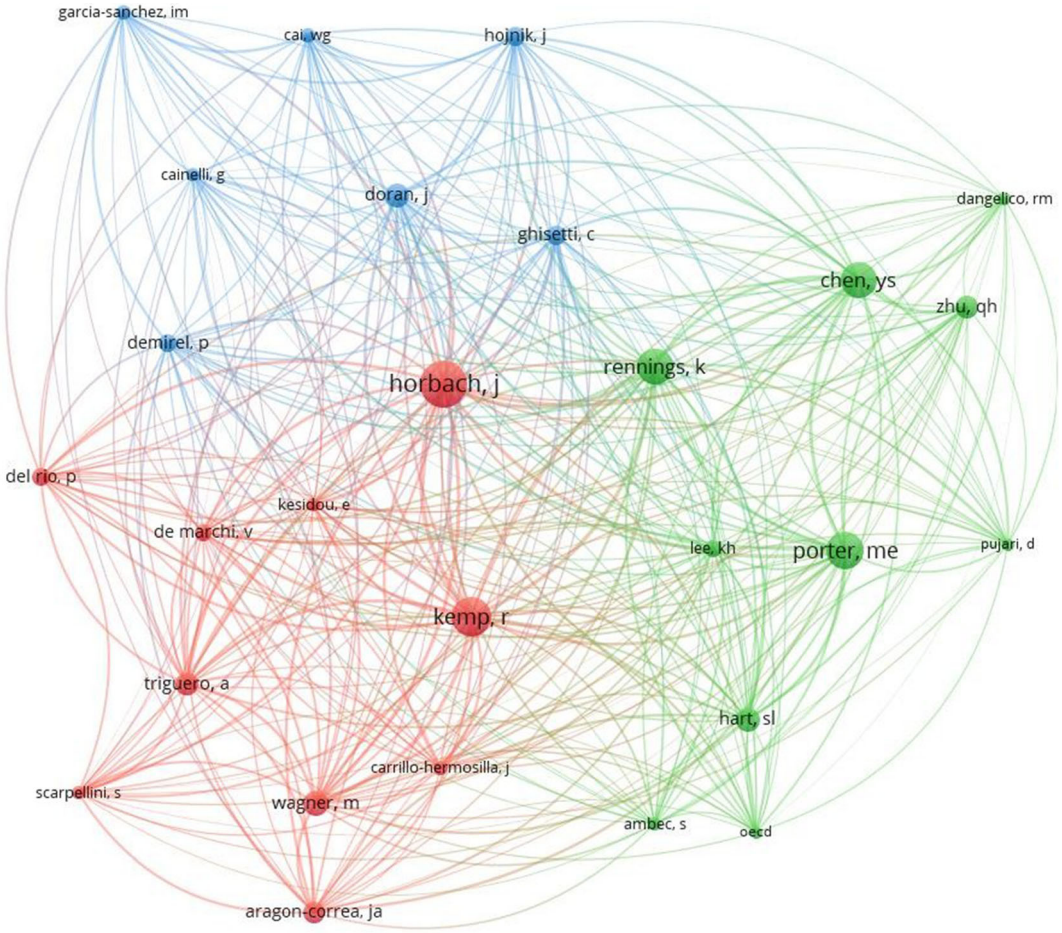

FIGURE 3 Map of co-citations between authors created with VOSviewer.

publications. They can be created by considering each of them individually, or built on citation, co-citation, and co-authorship relationships and bibliographic linkage (Ding & Yang, 2020). Additionally, the text mining functionality allows identification and visualization of the co-occurrence networks of the main terms extracted from the analyzed scientific articles.

TABLE 2 Ranking of journals according to WOS.

Order	Journal	No. of publications
1	Journal of Cleaner Production	24
2	Business Strategy and the Environment	13
3	Sustainability	8
4	Cogent Business & Management	7
5	Journal of Business Research	3
6	Resources, Conservation and Recycling	3
7	Administrative Sciences	2
8	Corporate Social Responsibility and Environmental Management	2
9	Journal of Engineering and Technology Management	2
10	Current Opinion in Environmental Science & Health	1

Regarding the researchers, Table 1 shows that the three most active authors are, in this order, Scarpellini, Portillo-Tarragona, and Valero-Gil, all of whom have published 10 or more articles on eco-innovation and corporate performance. Professor Scarpellini's eight articles represent 9.8% of the current knowledge on this topic measured by number of publications in relation to the 81 articles selected for further analysis, while Professors Portillo-Tarragona and Valero-Gil have authored five and four articles, respectively.

The map in Figure 3 shows how the different authors are related according to the co-citation that occurs between each of them. Co-citation analysis is a method that examines the frequency of citations of two or more documents (Small, 1973). If two documents appear together in the reference list of a third publication, they are considered as co-cited (Farrukh et al., 2020). The co-citation analysis is used to investigate the thematic similarities between publications within a specific research field, as well as to study how the literature is structured through the cited publications (Farrukh et al., 2020; Khanra et al., 2022; Rao & Shukla, 2022).

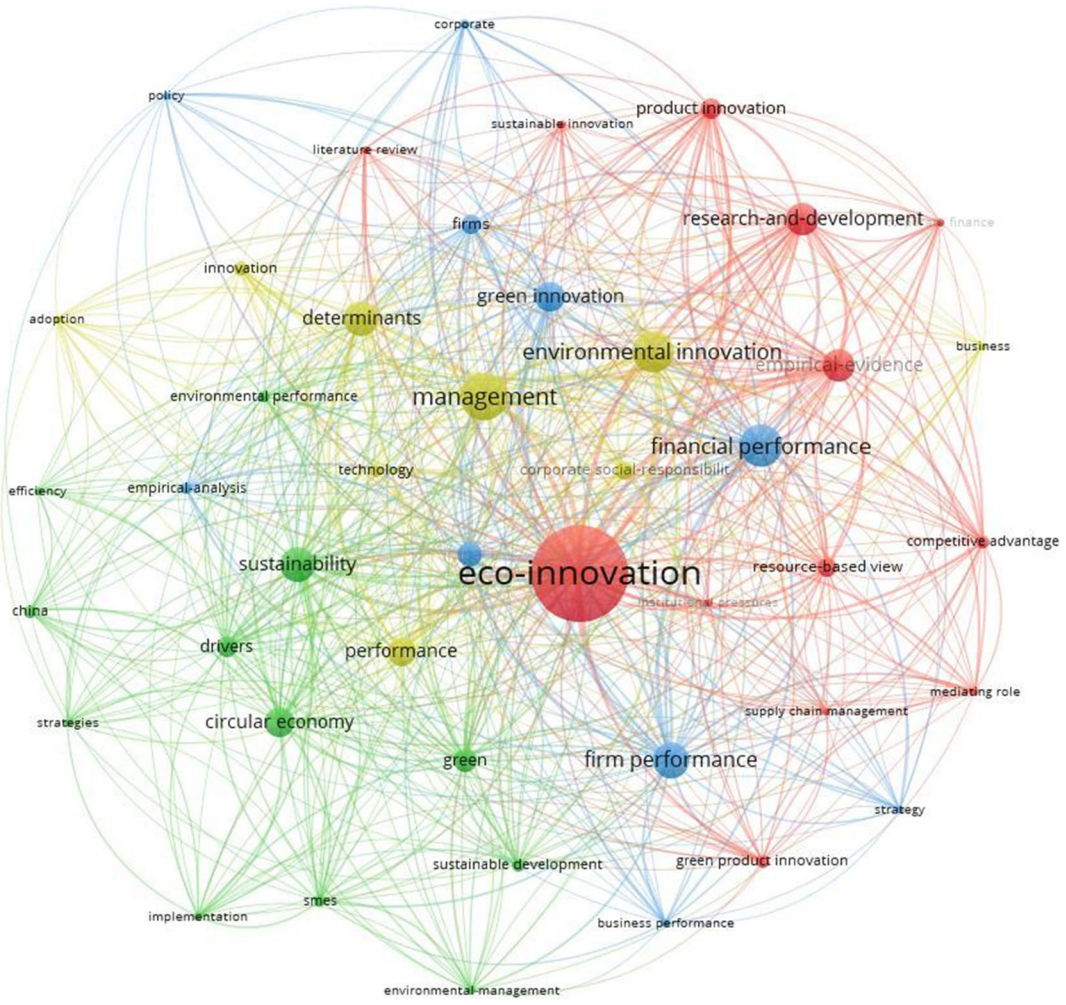

FIGURE 4 Map of keyword nodes created with VOSviewer.

Setting a minimum threshold of 20 citations per author, it was found that out of the 3834 authors resulting from the sample, 28 met the threshold. Thus, a total of three clusters were obtained, which are represented in Figure 3 in red (11 items), green (10 items), and blue (seven items), with Jens Horbach, René Kemp, and Klaus Rennings standing out with 75, 63, and 57 citations, respectively. This map was made, once again, based on the 81 articles selected for analysis.

In relation to the journals in which the most content related to our main topic is published, Table 2 summarizes the total frequencies for the total number of articles published. The most representative journal is the *Journal of Cleaner Production*, published by Elsevier, one of the world's leading scientific publishers, which has been in business since 1880. This journal published 29.6% of the articles identified regarding eco-innovation and corporate performance.

To analyze the keywords of the research in question, we used VOSviewer's concurrence analysis to identify the number of times that each word appears in an article. The analysis of keywords is essential to describe the content and themes of the analyzed documents (Rao & Shukla, 2022). Through this analysis, the degree of co-occurrence of keywords and research domain concepts can be determined (Khanra et al., 2020).

Then, after establishing a threshold of five (the word must appear at least five times), it is found that, out of the 493 keywords that appear in the sample, 44 meet the threshold established previously. Thus, a total of four clusters were obtained, which are represented in Figure 4 in red (13 items), green (12 items), blue (10 items), and yellow (nine items).

The analysis of the clusters derived from this bibliometric analysis is useful for establishing the main topics and the most relevant research areas of the analyzed studies (Marzi et al., 2021) (Table 3).

As can be seen, the most relevant keyword in this analysis is "eco-innovation," followed by "management" and "financial performance." Among the next seven, we find synonyms used to talk about eco-innovation such as "green innovation" and "environmental innovation," as well as keywords whose relevance has been highlighted throughout the work, such as "firm performance" and "sustainability."

In addition, Table 4 shows the strength of the connection between the keywords, where, once again, "eco-innovation" stands out. Thus, looking at Figure 4, the map allows us to visualize the most important nodes, which are larger, the connection between the terms,

TABLE 3 Clusters obtained from the bibliometric analysis of keywords using VOSviewer.

Cluster	Items	Keywords	Co-occurrence	Topic
Red (Cluster 1)	13	Eco-innovation	58	Research on the development of eco-innovation strategies.
		Empirical evidence	20	
		Research and development	20	
Green (Cluster 2)	12	Sustainability	21	Transition towards a sustainable and circular economy.
		Circular economy	18	
		Green	14	
Blue (Cluster 3)	10	Financial performance	26	Impact of eco-innovation strategies on firm performance.
		Firm performance	22	
		Green innovation	18	
Yellow (Cluster 4)	9	Management	29	Strategic management of eco-innovation and identification of barriers and drivers.
		Environmental innovation	25	
		Determinants	21	

TABLE 4 Co-occurrence of keywords with VOSviewer.

Order	Keyword	Co-occurrence	Total bond strength
1	Eco-innovation	58	378
2	Management	29	193
3	Financial performance	26	180
4	Environmental innovation	25	169
5	Firm performance	22	154
6	Determinants	21	143
7	Sustainability	21	127
8	Empirical evidence	20	150
9	Research and development	20	144
10	Green innovation	18	134

FIGURE 5 Choropleth map by number of publications.

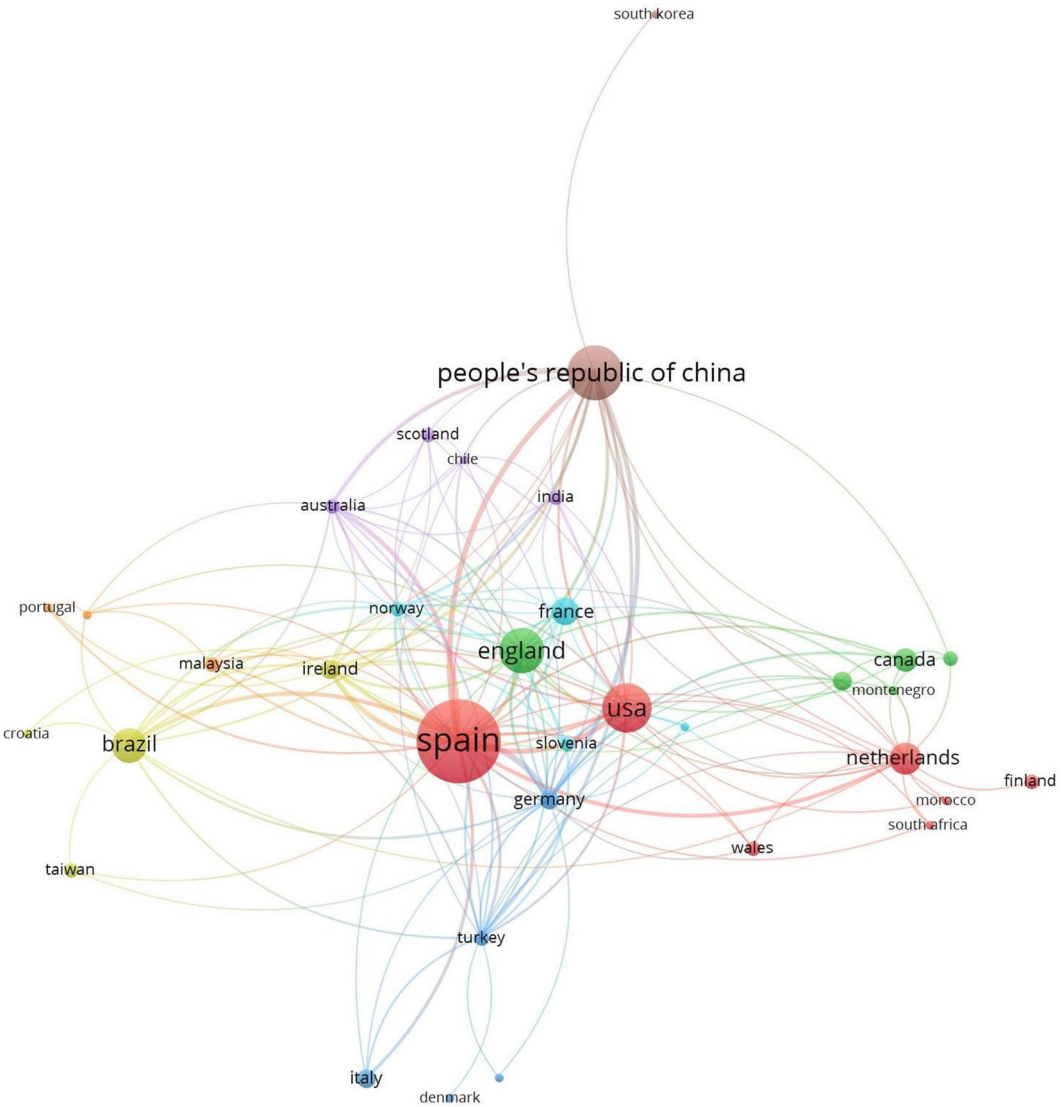

FIGURE 6 Country citation map created with VOSviewer.

identified by color, and the proximity between them. These aspects reflect the frequency with which a specific keyword or topic has appeared (Campobasso & Boscia, 2022).

Finally, with the data collected from WOS, we created a choropleth map (Figure 5) according to the number of publications that allows, after the bibliometric analysis of the studies derived from the literature review, to identify the countries that are conducting the most studies related to the main topic of this paper. As the map shows, the countries where we found the most publications related to our search are, in this order, Spain, China, and the United States.

The map in Figure 6 shows the countries in which the most papers have been published and the interrelationship between them, considering the citations received by authors from other countries. In this respect, articles written by Spanish authors received citations mainly from China, England, the United States, Australia, and Germany. In the case of China, citations mainly came from England, Spain, Germany, Turkey, Australia, and Ireland and mainly from Spain, Ireland, and China in the case of North America.

Once the bibliometric analysis has been carried out, it is necessary to review the literature, which is developed in the following section and whose references are compiled in Table 5.

TABLE 5 Recapping table with the references analyzed in each section.

Section	References
4.1. Conceptualization of eco-innovation	Scarpellini et al. (2020) García-Sánchez et al. (2020) Vence and Pereira (2018) Hall et al. (2013) Horbach (2008) Pan et al. (2020) Carrillo-Hermosilla et al. (2010) Kemp and Pearson (2007)
4.2. Types of eco-innovation	Hofstra and Huisingh (2014) Prieto-Sandoval et al. (2018) Vence and Pereira (2018) Kemp and Pearson (2007) Liao (2018) Rodríguez-Rebés et al. (2021) Rodríguez-García et al. (2019) García-Granero et al. (2018)
4.3. Drivers of and barriers to eco-innovation	Bitencourt et al. (2020) Hojnik et al. (2018) Doran and Ryan (2012) Rizos et al. (2016) Kirchherr et al. (2018) Kayikci et al. (2021) Pacheco et al. (2017) Andries and Stephan (2019)
4.4. Impact of eco-innovation on business performance	Tang et al. (2017) Scarpellini et al. (2017) Hizarci-Payne et al. (2020) Rexhäuser and Rammer (2013) García-Sánchez et al. (2019) Lopes Santos et al. (2019) Xue et al. (2012) Lee and Min (2015) Benijts (2014)

4 | LITERATURE REVIEW

4.1 | Conceptualization of eco-innovation

Innovation and design are two words that must go together when we talk about one of the main drivers of business success (Scarpellini et al., 2020). Innovations become eco-innovations, also known as green innovations, sustainable innovations, and environmental innovations (Hizarci-Payne et al., 2020), when they are inspired by an important concept in this field: eco-design. According to García-Sánchez et al. (2020), eco-design is the development and commercialization of technologies, products, and services that aim to reduce the impact they may have on the environment.

Hand in hand with eco-design, we find eco-innovation, a concept that has been discussed on numerous occasions throughout the existing literature and which consists of using techniques, processes, systems, and products in a way that reduces or avoids harmful impacts on the environment (Vence & Pereira, 2018). The term "eco-innovation" came into use around the mid-1990s; however, this key concept in transforming the linear model into a circular one (Scarpellini et al., 2020) has gained more interest in the last two decades (Hizarci-Payne et al., 2020).

Several definitions of eco-innovation can be found in the literature. Among them are those collected by Liao (2018) from Hall et al. (2013) and Horbach (2008), who state that environmental innovation is a variant of innovation and consists of using techniques, processes, systems, and products in a way that reduces or avoids harmful impacts on the environment.

On the other hand, Pan et al. (2020) and Carrillo-Hermosilla et al. (2010) define eco-innovation as, respectively, an important approach to address current environmental problems and as any innovation that reduces the negative impact of consumption and production on the environment.

However, although we have found several definitions of eco-innovation, we will use the one given by Kemp and Pearson (2007) in the "Final Report MEI Project About Measuring Eco-Innovation," as it is one of the definitions that has been repeated the most throughout

the articles reviewed for this work. These authors define eco-innovation as exploitation, assimilation, or production that is novel for the company and that reduces negative impacts on the environment compared to other alternatives (Kemp & Pearson, 2007).

As can be seen, there are slight differences between the definitions shown above. This is because some authors perceive eco-innovation to obtain competitive advantages, while others perceive it to achieve an environmental goal (Vence & Pereira, 2018). Therefore, it is necessary to conduct a preliminary study on the types of eco-innovation that exist, what motivates and restrains companies to apply these strategies, and, subsequently, to see what the impact of environmental innovations is on the business performance of the companies that apply them.

4.2 | Types of eco-innovation

Although most of the authors reviewed in this paper agree, throughout the literature review, we found several types of eco-innovation. Prieto-Sandoval et al. (2018) refer to four types of eco-innovations based on Hofstra and Huisingh (2014). These are exploitative, restorative, cyclical, and regenerative eco-innovations.

Vence and Pereira (2018) compiled other types of eco-innovations. In this compilation, we find authors such as Kemp and Pearson (2007), who presented in the "Final Report MEI Project About Measuring Eco-Innovation" mentioned above and who cite four other typologies of eco-innovation referring to environmental technologies, organizational innovations, product, and service innovations, and, finally, green system innovations.

In addition to Kemp and Pearson, Vence and Pereira present five other types of eco-innovations. Depending on the role they play in the market, eco-innovations can be complementary, integrated, alternative product, macro-organizational, or general purpose.

Although there are different classifications of the concept of eco-innovation, there are four types of environmental innovations that have been most repeated in our literature review, including those developed by authors such as Liao (2018), Rodríguez-Rebés et al. (2021), and Rodríguez-García et al. (2019), where three types of product, process, and organizational eco-innovations are mentioned. In addition, García-Granero et al. (2018) refer to marketing eco-innovations. These four types can be defined as follows:

- Product eco-innovations: These refer to the use of new or improved goods or services (Liao, 2018). When a product is manufactured, the materials used can have a negative impact on the environment (García-Granero et al., 2018), so it is necessary to develop appropriate technologies to enable the manufacture of new products on the market that are beneficial to the environment (Rodríguez-García et al., 2019).
- Process eco-innovations: When a company conducts its productive activities, not only does the product have an environmental impact, but so does the way in which the entity produces that product (García-Granero et al., 2018). Therefore, process eco-innovations pursue the use of more environmentally friendly technologies when producing products and services (Rodríguez-García et al., 2019), which is why it is necessary to make efficient use of resources in the production process (Liao, 2018).
- Organizational eco-innovations: These environmental innovations refer to how the organization and its employees conduct different activities, adopting environmental management models (Rodríguez-García et al., 2019). These eco-innovations not only focus on important aspects such as research and development (R&D) but also pay special attention to the way companies manage their business (Liao, 2018).
- Marketing eco-innovations: Within this typology of eco-innovations, we find those that aim to reduce the negative environmental effects generated by companies in their marketing activities. Despite being a relevant activity to business performance, green innovation in marketing has received less attention than others (García-Granero et al., 2018).

Once the different typologies of environmental innovations or eco-innovations have been set up, it is necessary to study what factors motivate or restrain companies in implementing these strategies.

4.3 | Drivers of and barriers to eco-innovation

As we have seen, eco-innovation has been dealt with by numerous authors throughout the literature because of the relevance it is taking on in business. This interest in environmental innovation goes hand in hand with the different factors that drive this process of change. However, the motivation behind the implementation of eco-innovation strategies can be conditioned by a series of circumstances that can put a brake on its development.

4.3.1 | Drivers

There are several reasons why companies decide to invest in eco-innovation and implement such strategies. Throughout the literature review, we found different drivers that can determine whether such a strategy is conducted. In this regard, Bitencourt et al. (2020) state that investing in R&D will allow companies to develop cleaner technologies and thus encourage changes in both products and production processes. In addition, market turbulence forces companies to be in a continuous process of differentiation, so this hostile environment motivates companies to generate competitive advantages over the rest of the companies in the sector. This results in consumers demanding environmentally friendly products, giving rise to the so-called "green value," which can be used to gain a competitive advantage (Hojnik et al., 2018).

On the other hand, Doran and Ryan (2012) state that regulatory pressure is one of the main drivers of eco-innovation. These regulations force companies to invest in eco-innovation to reduce pollution and avoid negative impacts on the environment. In addition, they

consider that the generation of knowledge drives different economic agents to strengthen ties to favor the development of eco-innovation. Further, Hojnik et al. (2018) note that the so-called "green barriers" prevent companies from trading in other markets unless they comply with certain environmental requirements, which encourages the need to invest in eco-innovation.

In terms of firm size, Andries and Stephan (2019) state that when small firms adopt environmental measures voluntarily, they benefit economically more than large firms do. This is because the reputation that small firms achieve with these practices can benefit them in terms of increased demand or approval from their stakeholders, which will lead to an improvement in their business performance (Andries & Stephan, 2019). As we can see, the drivers of eco-innovation are diverse, with business motivations ranging from improving the company's reputation to reducing costs or simply complying with regulations (Hojnik et al., 2018).

4.3.2 | Barriers

The drivers mentioned above cannot be applied to all types of companies, as there are several factors that condition the implementation of different eco-innovation strategies. Among these factors, Rizos et al. (2016) lists a series of difficulties that some companies face, such as the assessment of what the future benefits will be compared to the costs they currently face, what the availability of technologies will be like, or how demand will act in terms of eco-friendly products. In addition, these authors identify several barriers that smaller versus larger firms face in adopting eco-innovation strategies. Although both types of firms face these difficulties, they do not face them under the same conditions.

Within these barriers we find that SMEs lack a large amount of capital, government support, and effective legislation. In addition, they lack sufficient information and technical and technological knowledge to be able to implement such strategies (Kirchherr et al., 2018). This is compounded by the administrative burdens faced by SMEs and the lack of an environmental culture within SMEs (Kayikci et al., 2021).

On the other hand, multinationals have the technology, finance, human resources, and know-how to be able to innovate, while SMEs lack a strong R&D department and will therefore rely on external agents to carry out innovation tasks (Jordan et al., 2014). Furthermore, we find that multinationals can adopt CE concepts and determine how to implement them; however, SMEs will need to rely on research institutes, agencies, and universities to enhance organizational learning and facilitate the adoption of sustainable practices (Pacheco et al., 2017).

In addition, according to Andries and Stephan (2019), the main reason that smaller companies adopt environmental improvement programs is regulation, which forces them to introduce eco-innovations in the same way as large companies even though they lack the necessary resources. For small firms, these innovations come at a high cost that they will not be able to compensate for with a higher volume of goods or services sold, something that large firms will be able to do (Andries & Stephan, 2019).

Having established the drivers of and barriers to eco-innovation, we will now analyze the different perspectives in the literature on the impact of the implementation of eco-innovative strategies on economic performance.

4.4 | Impact of eco-innovation on business performance

So far, we have seen what eco-innovation is, what types exist, and what its main drivers and barriers are. Among the drivers of environmental innovation, we have found some related to management's conviction about potential cost savings or gaining a competitive advantage, among others. In this section, we will focus on the impact of eco-innovations on the business performance of organizations that are committed to sustainable practices.

Despite the measures taken by many countries to implement environmental innovations (Liao, 2018), these have not always had the same impact in all cases. A meta-analysis of several articles published between 1978 and 2008 showed that 55% of these showed a positive effect, 15% negative, and 30% showed that eco-innovations had no impact on outcomes (Tang et al., 2017). Today, more than a decade later, research still lacks clear evidence about the impact of eco-innovations on business performance.

However, out of these three academic approaches and after having reviewed the literature selected for this paper, we find two main conflicting perspectives on whether organizations that invest in eco-innovation improve or worsen their business performance. According to Scarpellini et al. (2017), these two approaches are the following:

- Win–lose: Engaging in economic activities and protecting the environment entail additional costs, harming economic productivity and competitiveness (Scarpellini et al., 2017).
- Win–win: When companies improve their environmental performance, they reduce their costs and increase their sales (Scarpellini et al., 2016). Furthermore, through greening supply chains, companies can explore new market opportunities (Hojnik et al., 2018).

Other authors, however, believe that while the impact of eco-innovations on firm performance may be negative in the short term, in the long term, it will provide economic benefits.

4.4.1 | Literature review on the positive effect of eco-innovation on business performance

That environmental innovation has a positive impact on the business performance of companies is a position that has been advocated by numerous authors. In fact, the predominant evidence in the literature

focuses on the positive effect that eco-innovation has on business economic performance (Hojnik et al., 2018).

Innovation is one of the most important means of differentiating companies in an increasingly competitive environment, benefiting from the production of better and more innovative products, enhancing reputation to gain stakeholder support, increasing market share, and improving customer satisfaction, among other benefits (Liao, 2018). Furthermore, authors such as Liao (2018), Marín-Vinuesa et al. (2018), and Scarpellini et al. (2017) argue that eco-innovations can lead to cost reductions and thus improve business performance.

On the other hand, we find a position that, despite claiming that eco-innovation might have a negative effect in the short term, over time this effect will turn positive. However, the effect that these innovations can have depends not only on time but also on the type of eco-innovation (Hojnik et al., 2018). As we have seen previously, there are several types of eco-innovations according to the literature; of these, we highlighted four as the most recurrent. These are product, process, organizational, and marketing.

Hizarci-Payne et al. (2020) established the impact that each of these types of green innovations had on firms, stating that they all have a positive impact on business performance:

- *Process* eco-innovation: Companies that adopt novel and more environmentally friendly production systems and delivery mechanisms promote cost reduction and operational efficiency.
- *Product* eco-innovation: Acts such as modifying the composition of a product to prevent its impact from being harmful to the environment help the company to position the product in the market, improve its image or reputation, and gain an important competitive advantage.
- *Organizational* eco-innovation: When sustainable practices are promoted within the organization through a pro-environmental philosophy, a chain effect occurs that allows the company to comply with government regulations (and thus avoid having to pay penalties), meet the needs of its stakeholders, and increase the company's presence in the market, all of which contribute to improved business performance.
- *Marketing* eco-innovation: Green marketing or environmental marketing has emerged with the aim of meeting the needs of customers while reducing the negative impact that activities have on the environment. This approach to marketing can generate significant benefits for companies that apply it, such as improved performance and cost savings. In addition, the creation of green products can establish a brand image that enhances the company's market position and can help to build customer loyalty and win new customers.

4.4.2 | Literature review on the negative effect of eco-innovation on business performance

In contrast to the previous position, there are authors who claim that eco-innovation does not always have a positive impact, as the successful implementation of this strategy requires a strong initial investment and a high degree of turnover per worker (Doran & Ryan, 2012), so the implementation of green innovations does not always result in a positive return for companies (Rexhäuser & Rammer, 2013).

In addition, eco-innovations may not be beneficial in aspects such as the revenues, competitiveness, image, or performance of the companies that implement such strategies (García-Sánchez et al., 2020). Moreover, according to García-Sánchez et al. (2019), implementing environmental innovation strategies entails high costs that will harm both production and distribution in these companies. Following the same authors, a study conducted on more than 6000 international companies between 2002 and 2017 confirms that these strategies have a negative impact, especially in munificent environments.

Despite the above, even if the implementation of eco-innovation does not increase the current profitability capacity, García-Sánchez et al. (2019) found that investors will value these investments positively, thus causing an increase in their market value, this being an indicator of great relevance when considering the expectations that investors have about the possible profits that companies can obtain in the future.

The discrepancies observed about the impact that eco-innovations have on business performance may be due to the fact that some studies have shown that this impact has been positive while others have shown that it has been negative; however, it must be considered that not all companies are the same, nor are the countries where these studies are carried out or the environment in which these companies are located. Therefore, we will now discuss how numerous factors can affect the impact that these environmental innovation strategies can have on business performance.

4.4.3 | Constraints on the impact of eco-innovation on business performance

As we observed in the previous section, it is generally accepted that eco-innovations increase productivity, reduce costs, and allow companies to enter new markets, thus improving these companies' business performance (Marín-Vinuesa et al., 2018). However, we also observed that there is no consensus in the literature on the actual impact of environmental innovations on business performance (Lopes Santos et al., 2019). This may be due to several institutional factors that condition this impact and prevent a homogeneous assessment of how several types of eco-innovations affect business performance. These factors are related to the level of economic development:

a. Emerging versus developed countries

Lopes Santos et al. (2019) showed that the level of development of the countries where firms were located positively or negatively influenced economic performance after implementing eco-innovation

strategies. In this study, three indicators were analyzed: return on sales (ROS), return on assets (ROA), and firm profitability (ROE).

On the one hand, these authors found that eco-innovation activities are positively related to all three indicators in developed countries, despite declining revenues. On the other hand, in emerging countries, it was observed that despite the decline in sales performance, asset performance and revenues increased, and revenues were higher than in developed countries during the study period.

b. Business environment

García-Sánchez et al. (2019) argued that companies operating in industries with greater resources enjoy greater growth, which does not imply that they need to promote pro-environmental practices to improve their economic situation.

According to these authors, the abundance of resources implies a lower opportunity cost for firms operating in more competitive industries (Goll & Rasheed, 2004), so they are more likely to invest in eco-innovations without worrying about the impact that such investments may have on their results (Xue et al., 2012). This is why the negative impact that eco-innovation strategies have on business performance will be greater in industries with greater resources (García-Sánchez et al., 2019), as they invest a greater amount of money without having to worry about the economic return that this will bring to the company.

On the other hand, we find that eco-innovation has a positive impact on the market value of companies that develop and apply such strategies. Recall that market value is a good indicator to establish how investors view the company in terms of its possible future growth (Nicolau & Santa-María, 2013), and it is a useful indicator to reflect the market's assessment of a company's results, which allows the measurement of its business performance (Lee & Min, 2015).

However, this impact is not the same across industries and/or sectors. According to García-Sánchez et al. (2019), companies that operate in sectors where there is a high level of munificence enjoy a better valuation by the market after implementing eco-innovation strategies as they have greater competitive opportunities and better conditions for growth. Furthermore, it should be considered that, in more favorable environments, companies will be able to enjoy greater tax incentives, as well as benefit from government subsidies, which will allow them to implement the necessary technologies to promote green energy (Benijts, 2014).

5 | CONCLUSIONS AND IMPLICATIONS

The results obtained from this bibliometric and bibliographic study led us to the following conclusions. On the one hand, we find that interest in sustainability and eco-innovation strategies has grown in recent years both from academics and from governments and companies. On the other hand, this review shows that although researchers have not reached a consensus on the impact of eco-innovation strategies on business performance, most of them favor a positive impact on the profitability of these companies, in either the short or long term, while others think that the impact will not be positive for their profitability but will be positive for their market value. Furthermore, unlike Hojnik et al. (2018), Liao (2018), or Doran and Ryan (2012), after our analysis, we can see that the impact of eco-innovation can be different depending on a series of factors, so it cannot be stated that eco-innovation has a positive or negative impact in all cases. Therefore, we note that that the impact of eco-innovation on business performance varies according to the size of the company, the country where it is located, and the environment in which it is located. These results are in line with those obtained by Zheng and Iatridis (2022) and Hizarci-Payne et al. (2020).

Along these lines, we find that small companies face different barriers that hinder the implementation of sustainable strategies compared to large companies, which have more resources and can implement them with less difficulty. In addition, depending on whether the country in which the company is located is developed or emerging, the application of sustainable strategies will affect certain indicators in one way or another. In developed countries, ROS, ROA, and ROE will increase, while in emerging countries, only ROA and ROE will increase. On the other hand, companies with more resources will invest more in eco-innovation, as they are not as concerned about the economic return as companies in a less favorable environment for eco-innovation. Therefore, the negative impact will be greater on the economic performance of the former, as they invest more.

The conclusions obtained from the analysis conducted in this paper provide information that can facilitate the understanding of the lack of consensus that can be observed in the existing literature in the field of eco-innovation and firm performance (Liao, 2018; Marín-Vinuesa et al., 2018; Tang et al., 2017), providing a series of external factors that can explain the reasons for these discrepancies (Hizarci-Payne et al., 2020; Zheng & Iatridis, 2022). In addition, the conclusions derived from both the bibliographic and bibliometric analyses allow us to outline a picture of the state of the art in this field of knowledge that can be of great use for researchers, as well as to help develop possible lines of research that can be carried out in future studies.

5.1 | Contribution to theory

This study makes several contributions to the existing literature. Firstly, this paper exposes and summarizes the different positions observed in the literature that refer to the impact of eco-innovation on firm performance in the two main scenarios (positive and negative impact), which broadens and deepens the previous literature. Secondly, the analysis presented in this paper combines a systematic literature review with a bibliometric analysis to establish a contextual framework to guide researchers in understanding the current situation of this field of knowledge. Thirdly, the results obtained in the present work contribute to the theory of resources and capabilities (Penrose, 1995), since it has been shown that both resources and capabilities are key factors to companies when investing in

eco-innovation strategies, highlighting that the companies that invest the most in this type of strategy are those that have the greatest resources. Related to the above, the present work contributes to the institutional theory regarding the impact that eco-innovation has on results, as they depend on both the firm's environment and its level of institutional development (Zhou et al., 2016).

5.2 | Managerial and policy implications

In addition to the theoretical implications described in the previous section, this work contributes in a practical way to the development of different environmental strategies. In this sense, the barriers and drivers described in this study are of great relevance for managers who want to implement eco-innovation strategies within their company. In addition, the different positions summarized in this review process, as well as the factors that can condition the negative or positive economic impact, are of great relevance for managers and companies when it comes to knowing how, depending on the situation in which the organization finds itself, eco-innovation can influence both its results and the behavior of investors.

In addition to the above, the bibliometric analysis conducted in this study reflects the growing concern and the emerging interest in this topic, particularly in the last decade. This analysis provides relevant information for companies to visually and easily observe the concern that exists in continuing to advance in sustainability matters to efficiently address environmental problems such as waste of resources, generation of waste, energy expenditure, or greenhouse gas emissions, among others. Furthermore, the distinction between the four types of eco-innovation highlighted in the studies analyzed in the review process can help companies understand how this type of green innovations can be applied in different areas and stages of the production process, which can be a differentiating element within the market.

On the other hand, in the current environment in which environmental recovery and digital transformation towards a CE model are being highlighted through the establishment of the Sustainable Development Goals (SDGs), it is necessary to emphasize the impact that the implementation of different environmental innovations has with the aim of improving the current climate crisis. Thus, this work should be considered when implementing the different actions aimed at sustainable economic growth, considering that eco-innovations are essential to improve the different production models by reducing the carbon footprint, thus contributing to a more environmentally friendly economy.

5.3 | Research limitations and future research directions

This paper has few limitations that need to be highlighted. Firstly, systematic reviews may have several limitations, ranging from the selection of the database to the interpretation of the results. In this case, the literature review has been conducted by only considering two databases: Scopus and WOS, with the latter being more relevant. Although these databases are two of the most widely used globally, the selection of these databases may limit the scope of the review, as there may be relevant studies that are not published in these databases. In addition, the search equations applied in the systematic review process were conducted using general keywords, so we may have missed some papers that used more specific keywords. In addition, when selecting the studies analyzed in this paper, a series of criteria were applied that may have excluded other studies with valuable information due to being published in a different period or language than the one selected.

On the other hand, the bibliometric analysis was conducted using a single software: VOSviewer. Despite being a widely used software by the scientific community and providing relevant information, there are other software tools that could have offered a more complete type of analysis.

Despite these limitations, our study highlights the growing interest in the economic impact of companies' implementation of different environmental strategies. This analysis has focused on the impact of eco-innovation on business performance.

Although there is incipient and extensive literature on the subject, there are still many issues to be explored to clarify the current situation of the business environment in the context of sustainability, the CE, and environmental innovations. In this sense, we propose future lines of research with the aim of filling some of the gaps that exist in the current academic literature. Following Centobelli et al. (2020) and taking into account the clusters obtained from the bibliometric analysis, the selected articles can be classified into four main areas (Table 6): (1) research on the development of eco-innovation strategies, (2) transition towards a sustainable and CE, (3) impact of eco-innovation strategies on firm performance, and (4) strategic management of eco-innovation and identification of barriers and drivers.

5.3.1 | Research on the development of eco-innovation strategies

Eco-innovation can be defined as the exploitation, assimilation, or production novel to the firm that reduces negative impacts on the environment compared to alternatives (Kemp & Pearson, 2007). In this sense, the literature has focused on defining and studying the types of eco-innovation that exist. However, there is no solid literature analyzing how different countries are coming together to promote and develop eco-innovation strategies through government policies and awareness through the education system, so we propose to analyze the role of these institutions in promoting eco-innovation practices.

On the other hand, although there are numerous studies that analyze the relationship between eco-innovation and the CE (Abu Seman et al., 2019; Aldieri et al., 2019; Aminoff & Pihlajamaa, 2020), it is important to analyze how the different principles established in the

TABLE 6 Main topics and future research avenues.

Cluster	Exemplary references	Future research avenues
Red (Cluster 1): Research on the development of eco-innovation strategies.	Scarpellini et al. (2020) Lee and Min (2015) Dong et al. (2014)	• Analyze the role of government policies in promoting eco-innovation. • Study the integration of circular economy principles in eco-innovation strategies. • Analyze the economic impact of other green firm capabilities. • Investigate on the role of education in promoting the adoption of eco-innovations.
Green (Cluster 2): Transition towards a sustainable and circular economy.	Durán-Romero et al. (2020) Gliedt et al. (2018) Rizos et al. (2016) George et al. (2015)	• Investigate innovation in technologies and business models that enable an effective transition towards a circular and sustainable economy. • Analyze the environmental, social, and economic impact of the transition towards a circular and sustainable economy. • Establish new indicators and measurement tools that allow evaluating progress towards a circular economy. • Determinate how the post-pandemic recovery funds and the war in Ukraine have changed the current scenario to observe the role of the circular economy in this new scenario. • Identify how the digital transition can help in the transition towards a sustainable economy model.
Blue (Cluster 3): Impact of eco-innovation strategies on firm performance.	Xue et al. (2019) García-Granero et al. (2018) Tang et al. (2017)	• Analyze the long-term impact of eco-innovation. • Analyze the impact of eco-innovation in the current global context, after the Covid-19 crisis and the war in Ukraine. • Analyze the impact of eco-innovation strategies on poverty reduction, job creation, and biodiversity conservation.
Yellow (Cluster 4): Strategic management of eco-innovation and identification of barriers and drivers.	Rodríguez-Rebés et al. (2021) Nandi et al. (2021) Lopes Santos et al. (2019) Lin et al. (2019) Andries and Stephan (2019)	• Exploration of stakeholder involvement in eco-innovation management. • Analyze underdeveloped countries and how they are managing eco-innovation. • Establish new barriers and drivers in the current global context when it comes to implementing eco-innovations. • Determinate how AI can help companies to implementing eco-innovation strategies. • Determinate how companies manage their investments in innovative technologies aimed at reducing their environmental impact.

CE relate to each type of eco-innovation (product, process, organizational, and marketing). In this sense, we propose as a future research avenue to investigate how organizations integrate the CE principles in their eco-innovation strategies.

Moreover, no particular attention has been paid to other green firm capabilities such as green investment capability, green purchasing practices, or green digitalization capabilities (Khan et al., 2022). To fill these research gaps, we propose as a future line of research to study how the combination of these green firm capabilities (in line with eco-innovation) affects business performance, paying particular attention to the role of the digital transition on the path to sustainability within firms (Abbate, Centobelli, & Cerchione, 2023).

5.3.2 | Transition towards a sustainable and CE

The area of research focuses on the CE, which is defined as an alternative economic model to the linear model whose objective lies in waste minimization, long-term value retention, reduction of primary resources, and closed product loops (Morseletto, 2020). The literature has focused on studying what this concept consists of and what impact it can have on organizations that apply this new economic model, relating it to a series of environmental innovations that justify this impact. However, most of these studies were conducted prior to the global instability that has arisen in the post-pandemic era (Casado-Aranda et al., 2021), aggravated by the war in Ukraine. Therefore, as a future line of research, we propose to analyze how the post-pandemic recovery funds and the war in Ukraine have changed the current scenario to observe the role of the CE in this new scenario.

On the other hand, the impact of the CE on firm performance has been analyzed by several authors (de Jesus et al., 2018; George et al., 2015; Leder et al., 2020); however, it is necessary to analyze the environmental and social impact of this transition. In this way, it would be necessary to establish new indicators and measurement tools to know how the transition to a circular economic model is being made and to see its impact on other different areas.

Furthermore, the emerging growth of Industry 4.0 (Abbate, Centobelli, & Cerchione, 2023) makes necessary to research the role of this industry in the transition towards a more sustainable economic

model, so we propose to analyze, in parallel, the digital transition with the transition towards the CE to establish a relationship between them.

5.3.3 | Impact of eco-innovation strategies on firm performance

The literature has focused on studying the impact of eco-innovations on business performance. Although most studies claim a positive impact, this is not conclusive. In addition, the impact of eco-innovation may vary over time since the global context is constantly changing. In this sense, studies that analyze the impact of eco-innovation on economic outcomes focusing on the short term, without having a more long-term perspective.

To fill this research gap, we propose as a future line of research to analyze the impact of environmental strategies in the long term, which could eliminate the uncertainty that prevails in the literature instead of focusing on a short-term analysis that can lead to confusing results, with special emphasis on the current context of political and economic instability at the global level.

On the other hand, and in line with the research proposal in the previous section, we propose to analyze the impact of eco-innovation strategies in social and environmental terms, specifically on poverty reduction, job creation, and biodiversity conservation.

5.3.4 | Strategic management of eco-innovation and identification of barriers and drivers

This area of research refers to the strategic management that companies conduct when implementing eco-innovation strategies, as well as the external factors that, together with the barriers and drivers that lead organizations to implement them, can condition the impact of these strategies on the results of companies that apply them.

Regarding strategic management, there is a limited literature that analyzes the influence of institutional investors within listed companies when managing and implementing eco-innovation strategies. Although several authors have analyzed the environmental pressure of institutional investors when voting on executive say-on-pay (Ertimur et al., 2013; Obermann, 2019), we are not aware of any literature that analyzes the influence of these investors when implementing specific eco-innovation strategies.

Regarding external factors that condition the impact of eco-innovation, this paper sets out the size of the company, the environment in which it operates, and the level of development of the country in which it conducts its activity as conditioning factors. However, although there are studies that analyze the impact of eco-innovation on the results of companies located in developing countries, most of the studies that have been conducted focus on analyzing this impact in developed countries. Therefore, we propose to analyze this impact by prioritizing developing countries, since it is in these countries that most of the global production is located. In addition, we propose to study barriers and drivers different from those previously studied that have emerged on the current global context.

On the other hand, artificial intelligence (AI) is a concept that is awakening an emerging interest among academics (Bag et al., 2021; Nishant et al., 2020). Being a field in continuous change and growth, there is still much to study in this area. Therefore, as a future research line, we propose to establish a cause–effect relationship between the development of AI and the implementation of eco-innovation within organizations, to observe if this new technology is promoting such implementation and what is its economic impact.

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CONFLICT OF INTEREST STATEMENT

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests.

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