

A systematic review and scientometric analysis of the driving factors of eco-innovation: trends and future research.

by Khalid Mady; Reda Shaker Abdelkareem; Muhammad Abi Sofian Abdul Halim; Khatijah Omar; Tamer Elsheikh

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Abstract

The present study aims to systematically review the existing body of literature that addresses the drivers of eco-innovation to gain an in-depth understanding of the driving factors of eco-innovation. 65 Scopus and Web of Science indexed articles were selected and examined. A scientometric analysis was conducted to redefine and visualise the existing trends and future research on eco-innovation drivers using the VOSviewer software application. The analysis showed that eco-innovation driving factors were classified into six main drivers namely: institutional pressures, eco-friendly demand, internal environmental orientation, eco-capabilities, green absorptive capacity, organisational capabilities. While the current study adds to the existing body of knowledge, it provides further research avenues on drivers of eco-innovation, such as strategic environmental orientation and normative pressure. The findings of this paper are valuable for policymakers, practitioners, and firms' managers as the present research have developed an in-depth understanding of the driving factors of eco-innovation that can develop their eco-innovation strategies.

Keywords: eco-innovation, eco-innovation drivers, systematic review, scientometric analysis.

Introduction

The business world has recently found itself at a crossroads in facing the issue of climate change. On the one hand, businesses can take a familiar track and ignore the worst impacts of their conduct on the environment. However, following this direction could threaten firms with a reduction in their competitiveness, especially with the growing environmental pressure exerted by; governments, social media and green-oriented consumers (Barforoush *et al.*, 2021; Fernando *et al.*, 2021; Wang *et al.*, 2022). On the other hand, firms could go off track and pursue actions and solutions to deal with climate change. Firms that are taking actions aligned with climate change initiatives can not only reduce the risks that result from climate change but also seize the significant possibilities that a cleaner future offers (Almeida & Wasim, 2022; Rodríguez-González *et al.*, 2022; Sellitto *et al.*, 2020).

Eco-innovation is a "win-win solution", enabling firms to relieve the pressures that come from regulatory requirements or communities while sustaining their competitive advantage (Mady, Abdul Halim, & Omar, 2022). Therefore, an extensive body of literature has already examined the notion of "eco-innovation" (Reyes *et al.*, 2017; Sanni, 2018; Vieira de Souza *et al.*, 2018). There have been two main streams of literature concerning eco-innovation; first, exploring the driving factors of eco-innovation (Jun *et al.*, 2021; Kiefer *et al.*, 2018; Salim *et al.*, 2019). Second, investigating the consequences of adopting eco-innovation (Dong *et al.*, 2022; Liao,

2016; Ong *et al.*, 2019; Padilla-Lozano & Collazzo, 2022). The latter stream of literature has covered the essential incentives and enabling factors that have motivated firms to adopt eco-innovation practices (Mady, Abdul Halim, Omar, *et al.*, 2022). Although previous studies have emphasised the drivers of eco-innovation, there remains only scattered knowledge regarding what driving factors urge firms to adopt an eco-innovation strategy. Hence, a comprehensive review is necessary to provide an in-depth understanding of eco-innovation drivers. There this study comes up to fill this research gap and provide a systematic literature review that underpins the drivers of eco-innovation.

Eco-innovation has recently received much attention from various disciplines, such as; environmental sciences, management, and economics (Eiadat *et al.*, 2008; Fernando *et al.*, 2021; J. A. Zhang & Walton, 2017). With this magnitude of literature, reviewing relevant literature has required thoroughness and a systematic method to derive further insights and understanding regarding the research purposes. A systematic review is considered an appropriate method to manage and avoid bias in the literature review process (Tranfield *et al.*, 2003). In addition, a systematic review provides scholars with a strong knowledge base that contributes to theoretical development in fields where research has previously been conducted, making it possible to spot areas that might require more research (Liberati *et al.*, 2009; Munn *et al.*, 2018). While several studies have used the systematic method to review the notion of eco-innovation, only a few studies have addressed the determinants of eco-innovation practices (*i.e.*, Pacheco *et al.*, 2017, 2018). Furthermore, the results of the most recent studies on the drivers of eco-innovation have not been covered in systematic review studies since 2018, despite the interest in studying the drivers of eco-innovation growing rapidly in recent years.

The current study has systematically reviewed existing studies addressing the driving factors of eco-innovation practices. The study aimed to provide an in-depth understanding of the internal characteristics of firms and the external pressures that motivate firms to adopt eco-innovation practices. The present study has updated and organised the emerging stream of research investigating the drivers of eco-innovation. This study has also contributed to the existing body of knowledge by applying a scientometric technique to analyse the results of the systematic review of the selected articles. The present study has provided new insights into the current trends and the nature of the evolution of scientific knowledge regarding drivers of eco-innovation using scientometric analysis.

Therefore, this paper is structured as follows. First, the theoretical and background of eco-innovation is introduced containing the definition and nature of eco-innovation and types of eco-innovation. Thereafter, the methodology section was presented. then the paper reports the data analysis and the results were descriptive analysis, content analysis, and scientometric analyses were reported. Then the paper ended with a conclusion the summaries research aim, main research findings, contribution, limitations, and suggestions for future research.

2. The theoretical background of eco-innovation

2.1 The definitions and the nature of eco-innovation

Historically, research on eco-innovation can be regarded back to

Eco-innovation extends beyond applying green technology to reduce the environmental damage produced by businesses to foster innovations across the whole life cycle of products (Mady, Abdul Halim, & Omar, 2022). Therefore, eco-innovation is viewed as a novel business approach through which firms can renovate their; business model, managerial conduct, structure, production processes, and products to become eco-friendly and mitigate any negative effects on the environment (Maçaneiro *et al.*, 2013; Khan *et al.*, 2021). Eco-innovation constitutes a "win-win solution" for businesses to promote environmental sustainability while boosting their performance and competitiveness (Doran & Ryan, 2012; Hazarika & Zhang, 2019; Bataineh, 2021).

The OECD (1997) divided conventional innovation into three categories: process innovation, which appears in production methods and procedures technologically; product innovation, which is the improvement of current goods and the creation of new ones; and organisational innovation, reflected in the introduction and implementation of new organisational structures, managerial techniques, and changed strategic orientations (Rennings, 2000). The OECD's (1997) classification indicates that process and product innovation reflect technological innovation. Nonetheless, adding a new aspect of innovation, such as organisational innovation and expanding innovation to embed services, does not reflect the differences between environmental and non-environmental innovations (Frondel *et al.*, 2007). The existing literature has applied several concepts interchangeably to reflect environmental orientation in innovation, including; environmental innovation, sustainable innovation, green innovation, and eco-innovation (Vörösmarty and Tátrai, 2019). Nonetheless, Schiederig, Tietze, and Herstatt (2012) stated that although all the notions shared innovation objects and market orientation, minor differences existed between them.

Besides ecological and economic aspects, sustainable innovation includes a social aspect differentiating it from the other three notions. Eco-innovation is an accurate and well-considered concept as it extends beyond the entire innovation system phases from inputs and materials to the consumption phase (product life cycle) (Carrillo-Hermosilla *et al.*, 2010; Kemp & Pearson, 2007). Due to the difficulty in defining eco-innovation, an in-depth understanding of the concept can be achieved by reviewing several definitions used in prior studies. Fussler and James (1996) defined the term as "new products and processes which provide customer and business value but significantly decrease environmental impacts". Additionally, Kemp and Pearson (2007, p. 7) defined eco-innovation as "the production, assimilation or exploitation of a product, production process, service or management or business method that is novel to the organisation (developing or adopting it). It may result, throughout its life cycle, in a reduction of; environmental risk, pollution, and other negative impacts of resource use (including energy use), compared to relevant alternatives".

Foxon and Andersen (2009, p. 15) explained eco-innovation through the idea of creating value, defining the term as "these innovations which can attract green rents

on the market". Based on this definition, enhancing firms, green competitiveness may emanate from price premiums for the green characteristics of their products and for a firm's green image or resource efficiency, which reduces costs. Carrillo-Hermosilla, Del Rio, and Konnola (2009, p. 26) described eco-innovation as "a systemic change process which develops and implements a new idea to improve environmental performance". The definition contradicted the previous definitions, as it focused on improving environmental performance instead of minimising environmental concerns as an environmental outcome of eco-innovation.

The above definitions agree on the term 'novelty' to express innovation. Nevertheless, firms do not necessarily come with new products, processes or administrative and organisational systems but include the technological methods, processes, or systems adopted and developed by other firms or institutions (Klewitz & Hansen, 2014). Eco-innovation does not require inward investment in R&D activities, which coincides with SMEs potential (Abdelkareem et al., 2022; Abdelkareem, 2019; Carrillo-Hermosilla et al., 2010; Kemp & Pearson, 2007). The definitions have also emphasised that eco-innovations minimise the environmental impacts of activities across life cycle phases. Life cycle phases start from material and production inputs to the consumption phase, regardless of whether environmental motivation is the primary goal behind the development and application or a side effect of the other goal (cost-saving production). Notably, innovation includes the performance of matters differently, technologically or through organisations (Carrillo-Hermosilla et al., 2010; Galankashi and Rafiei, 2022).

2.2 Eco-innovation types.

Firms or non-profit organisations can develop eco-innovations, occasionally subject to market trade (Carrillo-Hermosilla et al., 2010). Based on their nature, eco-innovations can be classified into: technological, organisational, social, and institutional (Rennings, 2000). **Technological eco-innovations** include technologies to counter environmental damage or prevent additional damage. **Organisational eco-innovations** are organisational changes and shifts in organisational structures aligning with environmental targets. Nonetheless, few eco-innovation studies have highlighted the two latter categories. **Social eco-innovation** refers to changes in; lifestyles, consumer behaviour, and individual values concerning environmental issues. Firms' commitment to environmental concerns affects the compatibility of their practices with societal expectations to ensure legitimacy or acceptance of their actions (Pacheco et al., 2017). Consequently, CSR policies on environmental issues may emerge, driving firms to strengthen or guide their strategies toward green issues and develop a green corporate identity (Wu-gan Cai & Zhou, 2014). **Institutional eco-innovation** denotes institutional solutions involving changes in standards and regulations offered by local or international governments or agencies which can produce new organisational or structural changes in companies, governments, or society as a whole (Pacheco et al., 2017). From an organisational perspective, institutional eco-innovation counts on firms to discover the broader role of the business community in society, such as renewing relationships with other stakeholders, specifically the government, while dealing with eco-innovation (Paavola, 2007).

Andersen (2008) presented an operational classification that divided the eco-innovation role in the market into five types. **Add-on eco-innovations** refer to environmental solutions developed by the environmental industry to improve the environmental performance of products and customers. This type deals with technologies and services that; clean up, recycle, and control emissions or extract natural resources and clean energy. The second type of eco-innovation is **integrated eco-innovation**, which seeks to develop and improve processes and products technologically to become more eco-friendly than counterparts in the market. **Alternative product eco-innovation** involves developing products that utilise new technological paths, such as renewable energy technologies, in making radical product innovations at the production or product level. At a broader systemic level, **macro-organisational eco-innovation** includes new solutions for organising society eco-efficiently, which entails organising consumption and production through new functional coordination with other types of institutions in society. Finally, **general-purpose eco-innovations** suggest technologies that considerably contribute to developing other technological innovations and, thus, drastically affect the entire economy and innovation process.

Kemp and Pearson (2007) developed a distinctive classification encompassing four classes: environmental technologies, organisational eco-innovations, product and service eco-innovations, and green system innovations. One of the primary cornerstones of eco-innovation is environmental technologies that alleviate reverse effects on the environment, such as; pollution control technologies, waste management and environmental monitoring technologies, and cleaner energy technologies. Organisational eco-innovations include organisational systems and managerial methods developed to manage environmental issues. Eco-innovations should be depicted in environmentally developed products and services to provide environmental benefits. Green system innovations are a set of changes in; knowledge, institution, infrastructure, and even customer lifestyle and behaviour to create a new system of production and consumption as an alternative to the existing system, which is more eco-friendly.

There are three different types of eco-innovations: eco-products, eco-processes, and organisational innovations (Mady, Abdul Halim, & Omar, 2022; Triguero *et al.*, 2013). Firstly, eco-organisational innovation involves developing a corporate culture and innovative organisational approaches to improve management processes and control an organisation's environmental effect, such as; eco-training, eco-auditing, and eco-learning (C. C. Cheng & Shiu, 2012; Triguero *et al.*, 2013). An environmental management system, such as ISO 14001, is classified under eco-organisational innovation (C. C. J. J. Cheng *et al.*, 2014). Secondly, eco-process innovation refers to installing industrial processes that mitigate environmental effects, such as waste disposal techniques or integrative solutions (C. C. J. J. Cheng *et al.*, 2014; Hojnik & Ruzzier, 2016b). Thirdly, eco-product innovation refers to the production of new eco-friendly products or improvement of the environmental features of the current products over the whole life cycle (Cheng & Shiu, 2012; Pujari *et al.*, 2004).

Based on the mentioned classifications, technological eco-innovation has been introduced in all classifications, either explicitly or under similar meanings, such as

technological eco-innovation (in Kemp & Pearson, 2007; Rennings, 2000) and add-on eco-innovation (in Andersen, 2008), or implicitly with other categories, such as eco-product innovation. Similarly, all the classifications have regarded organisational eco-innovation as a dominant element of eco-innovation, known as eco-organisational innovation (Kemp & Pearson, 2007; Rennings, 2000) or macro-organisational eco-innovation (Andersen, 2008). Certain classifications have explained that eco-innovation generally emphasises changes in; customer values, behaviour, and lifestyle or even the entire society towards sustainability, known as social eco-innovation (Rennings, 2000) and green system innovations (Kemp & Pearson, 2007). Furthermore, no specific classification closely relates to a specific organisation based on its type (manufacturing or services) or size (large companies or SMEs). Hence, Pacheco *et al.* (2017) mentioned the opportunity to conduct future eco-innovation studies in manufacturing SMEs. The last classification only comprises three types of eco-innovations (eco-product innovation, eco-process innovation, and eco-organisational innovation). Nonetheless, these types cover eco-innovation practices and activities in organisations (C. C. Cheng & Shiu, 2012).

3. Research Methodology

The methodological approach adopted in this study is a systematic review methodology. A systematic review is considered a scholarly work that offers an overview of existing scientific knowledge on a certain discipline (Zawacki-Richter *et al.*, 2020). It can also contribute to identifying research gaps in the literature and highlighting new opportunities for further research (Conforto *et al.*, 2011; Munn *et al.*, 2018). Based on the aims of this research, a systematic review was undertaken; this study aims to determine the potential drivers of eco-innovation by reviewing the literature regarding the driving factors of eco-innovation practices. As such, the study adopted a research methodology which involved the following four steps (Filho & Saes, 2013; Salim *et al.*, 2019):

3.1 Determination of the research question.

Systematic reviews are conducted to find clear answers to focused research questions. The success of the systematic review process relies highly on the ability of a reviewer to formulate research questions precisely (Khan *et al.*, 2011). As such well-defined research questions will direct a review in identifying the literature that should be included, the research approach to identifying the relevant studies and the data that should be retrieved from each study (Tranfield *et al.*, 2003). As mentioned previously, the main research question was: What are the driving factors of eco-innovation?

3.2 Selection of relevant studies.

A thorough and unbiased search is among the main features of a systematic review compared to a traditional narrative review. Selection criteria should be constructed well before a review to include research papers that answer research questions (Briner & Denyer, 2012). The present study followed the steps developed by Tranfield *et al.* (2003) to identify relevant studies (see Figure 1). Scopus and the web of science, as the top scientific databases, were selected to conduct a thorough search for the relevant

literature. In addition, the study identified a range of keywords and search strings and used the "and" and "or" operators to cover the broadest scope of relevant studies. As several terms are interchangeably used to refer to innovations that reduce environmental degradation, the present study used alternative terms for "eco-innovation": green innovation, sustainable innovation, and environmental innovation. The study also used several synonyms of the term "drivers" to describe the factors that motivate firms to adopt eco-innovation practices, such as; anticipates, determinants, driving factors, and success factors. The search process was limited to articles and review papers published from 2008 to 2022. After screening the research results, 443 articles were assessed to ensure that the selected papers met the research purpose. Only 65 studies addressed the driving factors of eco-innovation.

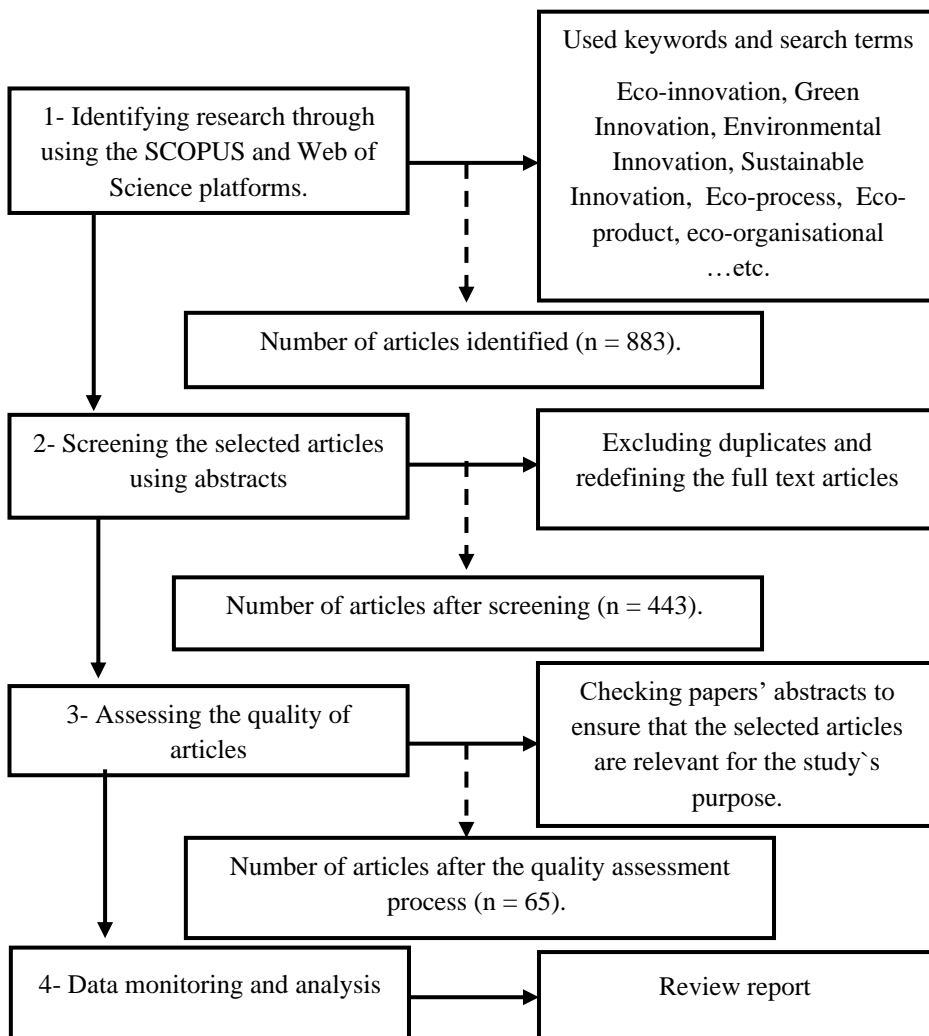


Figure 1. The process of selecting articles regarding the driving factors of eco-innovation.

3.3 Analysis and synthesis of the selected studies.

The process of analysing and synthesising is a crucial stage in a systematic review aimed at understanding the elements and characteristics of selected studies and integrating them to develop new knowledge that cannot be extracted from the individual studies (Briner & Denyer, 2012). The present study applied some criteria for classifying the selected studies (Reyes *et al.*, 2017): publication year, research area, application sectors, research methods, and drivers of eco-innovation. 65 articles published during 2008-2022 addressed one or more of the driving factors of eco-innovation, so these papers were subject to analysis based on the above criteria.

Scientometric analysis was used in this study, which relied on software-aided techniques to analyse the current body of knowledge (Ghosh *et al.*, 2021). The VOSviewer software application is among the most popular science mapping software developed to appraise and visualise the patterns and networks of the existing scientific knowledge (Gaviria-Marin *et al.*, 2019). VOSviewer has recently been used at an increased rate because it provides researchers with robust and visual results concerning research trends and potential areas for future research. Notably, VOSviewer is supplied free (Ghosh *et al.*, 2021). Consequently, VOSviewer was adopted to conduct two main types of analysis: co-occurrence analysis and co-citation analysis. Co-occurrence analysis investigates the links between the most used keywords in certain areas (Fauzi, 2022). Co-citation analysis identifies the impact of; scholarly papers, journals, and authors in certain scientific disciplines by investigating the relationship between pairs of papers commonly mentioned in other papers together on a visual map (Aghimien *et al.*, 2022).

4. Results and Discussion

a. Results of the descriptive analysis

Figure 2 shows that very few papers (15) were published during 2008-2014. However, there was a noticeable increase in published papers between 2016-2019. Figure 3 also illustrates that 92% of the included papers were articles, but only 5 were systematic review papers.

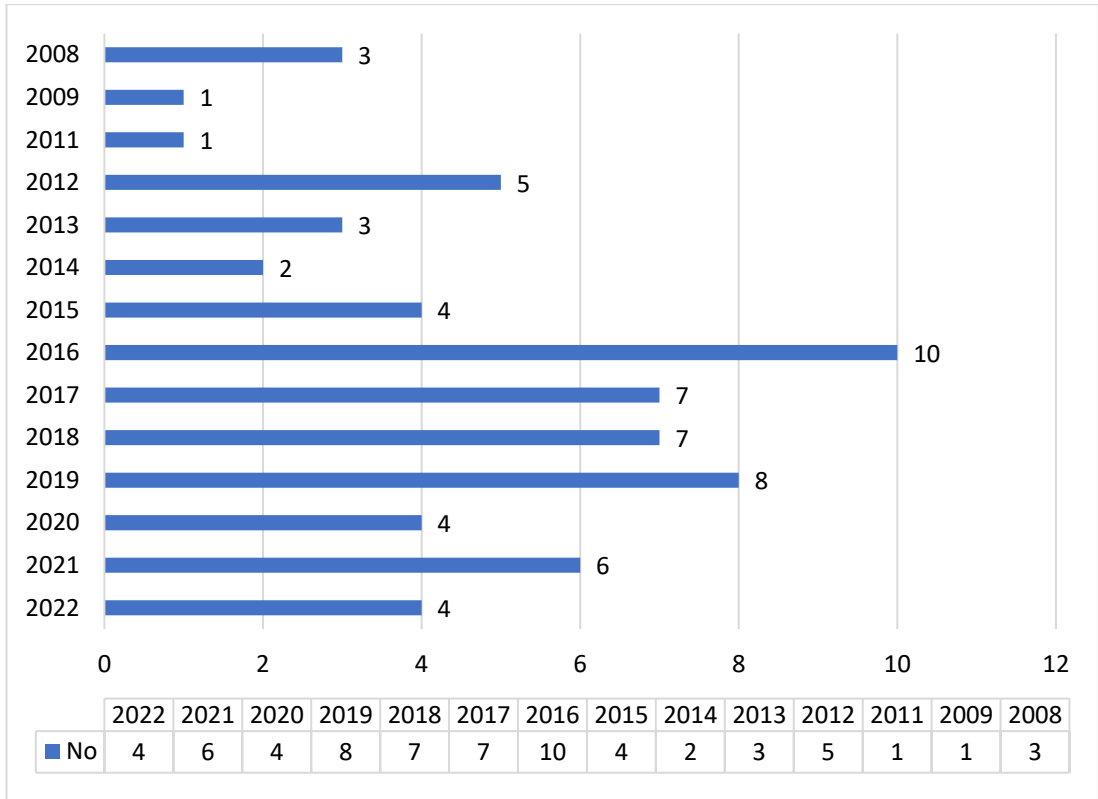


Figure 2 Number of articles published per year

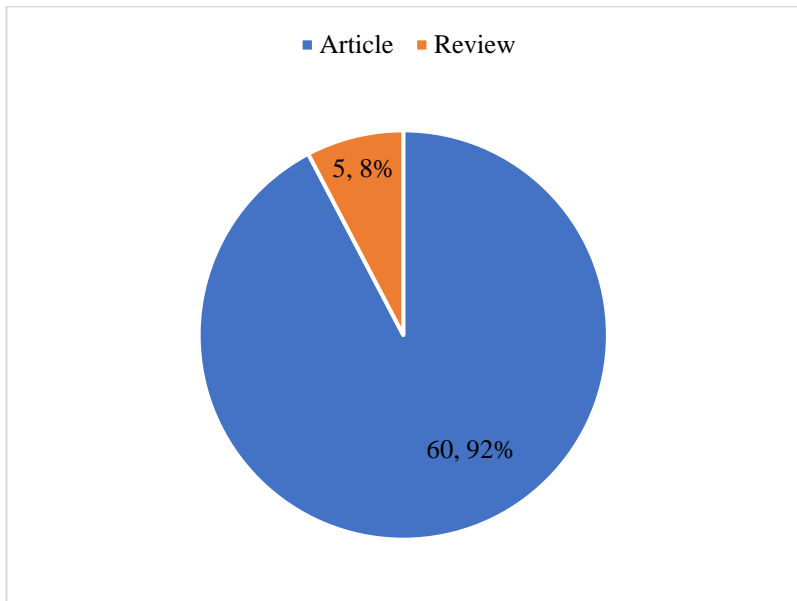


Figure 3 Distribution of papers between articles and reviews

Of the selected papers, 32% were published in the Journal of Cleaner Production, followed by Business Strategy and The Environment (9%), and Research Policy (5%). The Journal of Cleaner Production was regarded as the publication most interested in studying the topic of eco-innovation, which has a high impact factor in the sustainability and environmental science area.

Regarding the research method, most studies (approximately 69%) were quantitative and employed the survey technique. 8% applied the systematic review method, and only 8% used the qualitative method (see figure 4). This outcome indicated that the quantitative method was the most used method for investigating eco-innovation drivers.

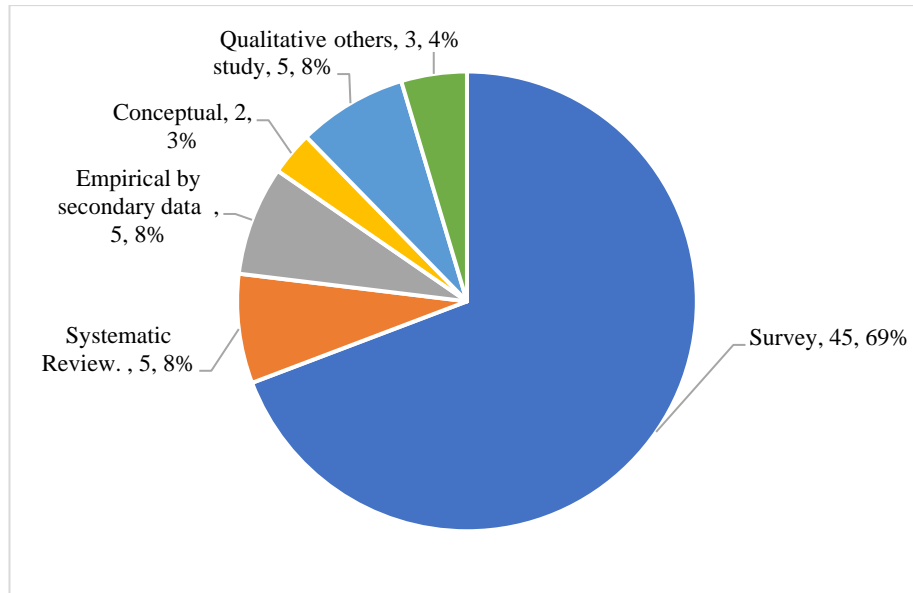


Figure 4 Distribution of papers by research method.

Table 1 illustrates that the drivers of eco-innovation have been investigated in various application sectors, such as; manufacturing firms, SMEs, and the chemical industry. Most selected papers (36%) were applied in the manufacturing industry. However, few studies have focused on exploring the drivers of eco-innovation in service firms. This outcome could be attributed to the fact that the manufacturing industry has a high negative environmental impact. 20% of the included papers were applied to SMEs, indicating that adopting eco-innovation could play a critical role in opening up more SME opportunities. As Pacheco et al. (2017) mentioned, there has been an increasing trend in the publications on eco-innovation in SMEs, which is still in its early stage. However, 9 research papers were conceptual and theoretical papers that do not have an application study, therefore these papers were excluded from table 1.

Table 1 Distribution by application sectors

Industry	N	%
Manufacturing industry	20	36%
Multiple industries	14	25%
SMEs	11	20%
Chemical industry	3	5%
Service firms	2	4%
Metal and mechanical engineering	1	2%
Information and electronics	1	2%
Green-tech sectors	1	2%
Electrical and electronic appliances	1	2%
Construction-based firm	1	2%
Agricultural and Agri-food sectors	1	2%

The present study followed the criteria of the research area developed by the Web of Science to classify the selected papers. Seven key research areas were highlighted (see Figure 5): (1) business and management; (2) environmental science and technology; (3) economics and ecological studies; (4) regional & urban planning; (5) ethics and business; (6) information science and library science; and (7) operations research and management science. The bulk of the studies (59) that were chosen was in only three categories of business and management (30), environmental science and technology (24) and economics and ecological science (5). It is also crucial to emphasise that more than 46% of the research focused on environmental strategy, environmental policy, and organisational innovation in the manufacturing industry.

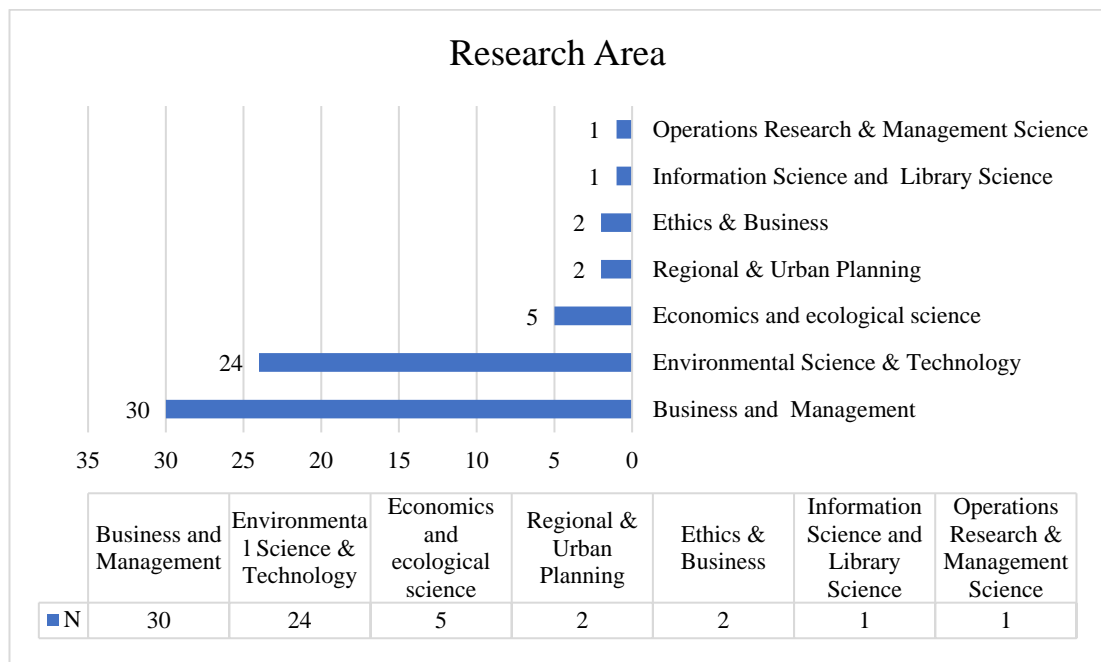


Figure 5 Distribution of the selected papers by research area

Existing trends and future research suggestions from the thematic analysis.

The thematic analysis of the included papers suggested various directions for further research. First, there has been little qualitative analysis of the drivers of eco-innovation. Hence, qualitative methods could provide a comprehensive and in-depth understanding of how certain driving factors can foster eco-innovation practices among firms. A case study and an interview study which are interpretive could boost the literature on drivers of eco-innovation. Second, most research on eco-innovation drivers has been applied in the manufacturing industry (Kesidou & Demirel, 2012; Mady, Abdul Halim, Omar, *et al.*, 2022). Therefore, there has been a noticeable lack of focus in research investigating the driving factors of eco-innovation within the service industry. The hotel, hospitality, and tourism industry may be a potential application sector for additional studies to provide the body of literature with insight into the motivating factors for eco-innovations within the service industry. Third, an extensive body of literature has mostly investigated the drivers of eco-innovation on either firm-level or industry-level. However, adopting eco-innovations for supply

chain management requires much more evidence through further research (Khanra *et al.*, 2022).

b. Results of the content analysis.

After analysing the main features of individual papers, a content analysis of the selected papers was conducted to identify the driving factors motivating firms to adopt eco-innovation practices. Based on the content analysis results, it was noticed that a wide range of drivers could stimulate firms to adopt eco-innovation. From the content analysis of the selected studies, the drivers were classified into two main types: internal and external. This outcome indicated that these two main factors were predominantly behind firms' decisions to implement eco-innovations.

According to Table 2, several studies have examined the internal and external factors influencing the adoption of eco-innovations. As these internal drivers included a wide variety of factors, the internal drivers were placed into three distinct categories: organisational capabilities, strategically environmental orientation, and absorptive capacity. First, as mentioned in the literature, eco-innovation can be driven by a large variety of internal resources and capabilities. These resources and capabilities include; technological capabilities (Bar, 2015; Wugan Cai & Li, 2018), environmental capabilities (Fernando & Wah, 2017; Sumrin *et al.*, 2021), and environmental management systems or ISO 14001 (Ben & Hong, 2022; Li *et al.*, 2019). Second, managerial environmental awareness, managerial environmental concern and sustainable orientation have been used as synonyms for the same term that refers to how a company's strategy responds to environmental messages from the outside (environmental issues) and how outside partners recognise environmental concerns. (Hojnik & Ruzzier, 2016b; Sun & Sun, 2021a; Yang *et al.*, 2020). Third, the existing literature has provided strong evidence that knowledge management practices, including; knowledge management, green knowledge sharing, knowledge acquisition, and knowledge cumulativeness, have served as a spur for enterprises to undertake eco-innovation. This outcome has been particularly noted in environments characterised by significant business unpredictability and technical volatility (De Marchi, 2012; Polas *et al.*, 2021; Stanovicic *et al.*, 2015). As such, absorptive capacity has been seen as a dynamic capability that enables businesses to use the mix of absorbed and existing knowledge to generate new organisational capabilities that may address environmental concerns (Albort-Morant, Henseler, *et al.*, 2018; Albort-Morant, Leal-Rodríguez, *et al.*, 2018; Mady, Abdul Halim, Omar, *et al.*, 2022; Qi *et al.*, 2021).

Internal resources and capabilities are critical but do not by themselves lead to the adoption of environmentally friendly innovation practices, such as eco-innovation practices (Wu-gan Cai & Zhou, 2014; Wugan Cai & Li, 2018; Mady, Abdul Halim, Omar, *et al.*, 2022). Previous studies have stated that external driving factors can broadly drive firms to adopt eco-innovation practices (Chen *et al.*, 2018; Kalyar *et al.*, 2019). The set of drivers refers to the external institutional and societal pressures on firms to adopt a particular direction. As such, these pressures can encourage a firm to adopt or give up certain choices about proactive environmental strategies, such as eco-innovation (Daddi *et al.*, 2016). External drivers that are highly influential in triggering eco-innovation practices can be classified into three key pressures: environmental

regulation, eco-friendly product demand, and competitive pressure (Wu-gan Cai & Zhou, 2014; Wugan Cai & Li, 2018; Mady, Abdul Halim, Omar, *et al.*, 2022).

Table 3 illustrates that environmental regulation has been seen as the most significant determinant promoting eco-innovation compared to other innovation types (Doran & Ryan, 2012; Horbach, 2008; Kammerer, 2009). Regulatory pressure is considered coercive pressure that other organisations and governmental agencies impose in terms of either rules or expectations (DiMaggio & Powell, 1983; Simpson, 2012). Many studies have emphasised the role of environmental policies and laws imposed on firms and the economic incentives governments provide to adopt eco-innovation practices (Huang *et al.*, 2016; Kanda *et al.*, 2018; Kesidou & Demirel, 2012). From prior research, customer demand has been among the most influential pressures fostering eco-innovation (see Table 3). Customer pressure, as a source of normative pressure, is a vital driver that can compel firms to rethink their priorities regarding environmental practices and their role in organisational strategies and processes (Zhu *et al.*, 2013). Table 3 also shows that competitive pressure is the third kind of pressure exerted by rivals. A firm may imitate various successful environmental practices competitors use to acquire a competitive edge (Wu-gan Cai & Zhou, 2014; Spence *et al.*, 2011; Yalabik & Fairchild, 2011). Therefore, some firms in competitive markets or, more appropriately, greener competitive markets are more responsive to customer needs in adopting new green processes and products (Wugan Cai & Li, 2018; Liao, 2018; Ning *et al.*, 2022).

Existing trends and future research suggestions from the content analysis.

From the content analysis of the selected papers, it was evident that there has been a wide range of drivers of eco-innovation studied in previous research. However, there have been limitations which could be recommendations for future research.

First, competitive or mimetic pressure as a driver of eco-innovation has received less attention (Hojnik & Ruzzier, 2016b; Ning *et al.*, 2022). Future research could focus on investigating the effect of competitive pressure on eco-innovation. In addition, further research could explore the role of competitive factors, such as; price competition, competition strategies, anti-competitive practices, and technological change, in adopting eco-innovation (Mady, Elstouhy, & Battour, 2022). Second, as aforementioned, eco-innovation can be divided into many classifications, such as; eco-product, eco-process, and eco-managerial innovation (Mady, Abdul Halim, & Omar, 2022). As Maldonado-Guzmán & Garza-Reyes (2020) elaborated, adopting different types of eco-innovation can be attributed to different internal and external factors. However, much attention has been centred on investigating the factors driving eco-innovation strategies regardless of their different practices. Therefore, examining the driving factors of different eco-innovation practices could be a promising opportunity for future research.

Third, whereas previous studies have widely explored the effects of the internal factors of eco-innovations (Ben & Hong, 2022; Sun & Sun, 2021b), several internal factors have been ignored. These ignored factors have included; individual traits of managers (e.g. leadership style), entrepreneurial orientation, and proactiveness of management. In contrast, fourth, firms' absorptive capacity has received more attention (Albort-

Morant, Leal-Rodríguez, *et al.*, 2018; Hansen & Klewitz, 2012; Song *et al.*, 2020). However, the evidence on the role of the adaptive capacity of a firm in adopting eco-innovation remains unclear. Finally, the evidence that external environmental pressures are the most influential drivers of eco-innovation is still widely disputed. Some researchers have attributed such controversy to the effect of external pressure regardless of the integration of internal drivers with external drivers (Keshminder & del Río, 2019; Majid *et al.*, 2019). Therefore, involving the internal mechanism in the relationship between the external environmental pressures and adopting eco-innovation still needs more evidence in future research. The internal mechanism can be one of the internal driving factors in Table 2, such as managerial environmental awareness, eco-capabilities, and integrative capability.

Table 2 Classifications and studies that have addressed the internal drivers of eco-innovation.

Drivers	Key Words/ Synonym Terms	Studies
Organisational Capabilities	Dynamic Capabilities, Integrative Capability	(Albort-Morant <i>et al.</i> , 2016); (Mousavi & Bossink, 2017); (Wu-gan Cai & Zhou, 2014).
	Environmental Management System, ISO 14001	(Li <i>et al.</i> , 2019); (Ben & Hong, 2022).
	Technological Capabilities	(Wugan Cai & Li, 2018); (Bar, 2015); (Díaz-garcía <i>et al.</i> , 2016); (Cuerva <i>et al.</i> , 2014).
	Supply-Side Factor	(Triguero <i>et al.</i> , 2013); (Horbach, 2008).
	Technology-Push Factors	(Sanni, 2018).
	Eco-Capabilities, Green Core Competence	(Sumrin <i>et al.</i> , 2021); (Y. S. Chen, 2008); (Wugan Cai & Li, 2018); (Fernando & Wah, 2017).
	Ordinary Relationship Learning Capabilities	(Albort-Morant <i>et al.</i> , 2016).
	Organisational Capabilities	(Cuerva <i>et al.</i> , 2014) (Keshminder & del Río, 2019); (Del & Carrillo-hermosilla, 2016); (Kesidou & Demirel, 2012); (Salim <i>et al.</i> , 2019).
Strategic Environmental Orientation	Managerial Environmental Concern	(Eiadat <i>et al.</i> , 2008); (Hojnik & Ruzzier, 2016b)
	Sustainable Orientation	(Aboelmaged & Hashem, 2019)
	Environmental Awareness	(Polas <i>et al.</i> , 2021); (Sun & Sun, 2021b); (Liao, 2017); (Hazarika & Zhang, 2019).

	Managerial Environmental Awareness	(Sumrin <i>et al.</i> , 2021); (Peng & Liu, 2016); (Polas <i>et al.</i> , 2021).
	Strategic Environmental Orientation	(Yang <i>et al.</i> , 2020); (Mady, Abdul Halim; Omar, <i>et al.</i> , 2022); (Ben & Hong, 2022).
Absorptive Capacity	Knowledge Management, Green Knowledge Sharing, Knowledge Acquisition, Knowledge Cumulativeness	(Stanovcic <i>et al.</i> , 2015) (Liao <i>et al.</i> , 2018); (Abbas, 2019); (Song <i>et al.</i> , 2020); (Polas <i>et al.</i> , 2021); (Díaz-garcía <i>et al.</i> , 2016).
	Absorptive Capacity	(Hansen & Klewitz, 2012); (Albort-Morant, Leal-Rodríguez, <i>et al.</i> , 2018); (Song <i>et al.</i> , 2020); (Qi <i>et al.</i> , 2021); (Mady, Abdul Halim, Omar, <i>et al.</i> , 2022).

Table 3 Classifications and studies that have addressed the external drivers of eco-innovation.

Drivers	Key Words/ Synonym Terms	Studies
Environmental Regulations	Legislative Requirements	(Bar, 2015); (Horbach <i>et al.</i> , 2012); (Kanda <i>et al.</i> , 2018); (Li <i>et al.</i> , 2017); (Fernando & Wah, 2017).
	Environmental Regulations	(Wugan Cai & Li, 2018); (De Marchi, 2012); (Doran & Ryan, 2012); (Kesidou & Demirel, 2012); (Eiadat <i>et al.</i> , 2008); (Kammerer, 2009).
	Regulatory Pressure	(F. Zhang & Zhu, 2019); (Huang <i>et al.</i> , 2016); (Mady, Abdul Halim, Omar, <i>et al.</i> , 2022); (Qi <i>et al.</i> , 2021); (Liao <i>et al.</i> , 2018).
	Coercive Pressure	(X. Chen <i>et al.</i> , 2018); (Liao <i>et al.</i> , 2018); (Ning <i>et al.</i> , 2022).
	Economic Incentive Instrument	(Hojnik & Ruzzier, 2016b); (Wugan Cai & Li, 2018).
	Command And-Control Instrument	(Hojnik & Ruzzier, 2016b); (Wugan Cai & Li, 2018).

Eco-Friendly Demand	Product	Market Orientation	(Liao, 2017).
		Market Expectation	(Medeiros & Vidor, 2018); (Bar, 2015).
		Market Demand	(Lin <i>et al.</i> , 2013).
		Customers' Green Demands, Eco-Friendly Product Demand	(Wu-gan Cai & Zhou, 2014); (Wugan Cai & Li, 2018); (Mady, Abdul Halim, Omar, <i>et al.</i> , 2022).
		Demand-Pull Factors	(Sanni, 2018); (Triguero <i>et al.</i> , 2013); (Horbach, 2008).
		Customer Pressure	(Yalabik & Fairchild, 2011); (F. Zhang & Zhu, 2019); (Huang <i>et al.</i> , 2016); (Ben & Hong, 2022).
		Customer Demand	(Cuerva <i>et al.</i> , 2014); (Hojnik & Ruzzier, 2016b); (Liao, 2017).
		Normative Pressure	(X. Chen <i>et al.</i> , 2018) ; (Ning <i>et al.</i> , 2022).
		Green Image	(Y. S. Chen, 2008); (Kammerer, 2009).
Competitive Pressure		Competitive Pressure	(Hojnik & Ruzzier, 2016b); (Yalabik & Fairchild, 2011); (Wugan Cai & Li, 2018); (Wu-gan Cai & Zhou, 2014);
		Mimetic Pressure	(Ning <i>et al.</i> , 2022); (Liao, 2017).

c. Results of the co-citation analysis

The study employed the VOSviewer software application, version 1.6.18, to create and visualise the links between the selected papers based on the units of analysis used in the selected studies. The unit of analysis could be keywords of research, documents, journals, and authors. The graphs produced by this software illustrated networks of the unit of analysis on a visual map where the size of the bubble fluctuated depending on the significance of the unit of analysis. The analysis items were clustered using colours and the position of bubbles (Gaviria-Marín *et al.*, 2019). Scientometric analysis using this software can add a temporal analysis through which the patterns of research interests can be tracked over time.

1- Most cited journal

A total of 29 sources were cited in the sample of publications. Table 4 shows that four sources were mostly cited, with at least three extracted papers on eco-innovation drivers. It was also clear that the Journal of Cleaner Production had the highest number of extractions, with 21 documents mentioning a total of 2,523 between them. The Journal of Cleaner Production was the most cited. This journal is highly ranked with an H-index of 232 in the "Business, Management and Accounting: Strategy and Management". Following that were six documents for "Business Strategy and the Environment," with 259 citations.

Table 4. Top cited sources

Source	Documents	Frequencies	Citations	Total Link Strength
Journal of Cleaner Production	21	32%	2523	48
Research Policy	3	5%	1795	32
Ecological Economics	3	5%	1422	27
Business Strategy and the Environment	6	9%	259	21

2- Most cited publications

Regarding the most cited publications, more than 61 papers were referenced at least once, and 24 were referenced more than 100 times. In total, only 14 papers were cited at least 200 times. Figure 6 and Table 5 illustrate the 14 publications with more than 200 citations. Table 5 shows that the works of Horbach (2008) and Horbach *et al.* (2012) were cited 794 and 711 times, respectively. Both were applied in Germany and used a method aside from survey, namely, econometric analysis. Cluster 1 (Red), including Y. S. Chen (2008), De Marchi (2012), and Wugan Cai & Li (2018), focused on the effect of internal capabilities, such as; technological capabilities, green competence, R&D, and cooperation of firms with external partners on eco-innovation strategy. The focus of cluster 2 (green) was investigating the drivers of eco-innovation by studying the effects of firms' performance in terms of either environmentally or economically, including three prior studies: Horbach *et al.* (2012), Eiadat *et al.* (2008), and Bossle *et al.* (2016). Cluster 3 (blue) involved three studies that paid more attention to examining the drivers of one or more types of eco-innovation, including; Kammerer

(2009), Triguero *et al.* (2013), and Cuerva *et al.* (2014). A survey of industry participants was the most common research strategy (Table 3 illustrates this), but there were many other options, such as review and economic analysis. Most studies were applied in the manufacturing industry, such as; electrical and electronic appliances and the chemical industry. In addition, previous studies have been carried out in various countries, either developed countries, such as the UK (Kesidou & Demirel, 2012) and European countries (Triguero *et al.*, 2013) or developing countries, such as Vietnam (Lin *et al.*, 2013) and China (Wugan Cai & Li, 2018)

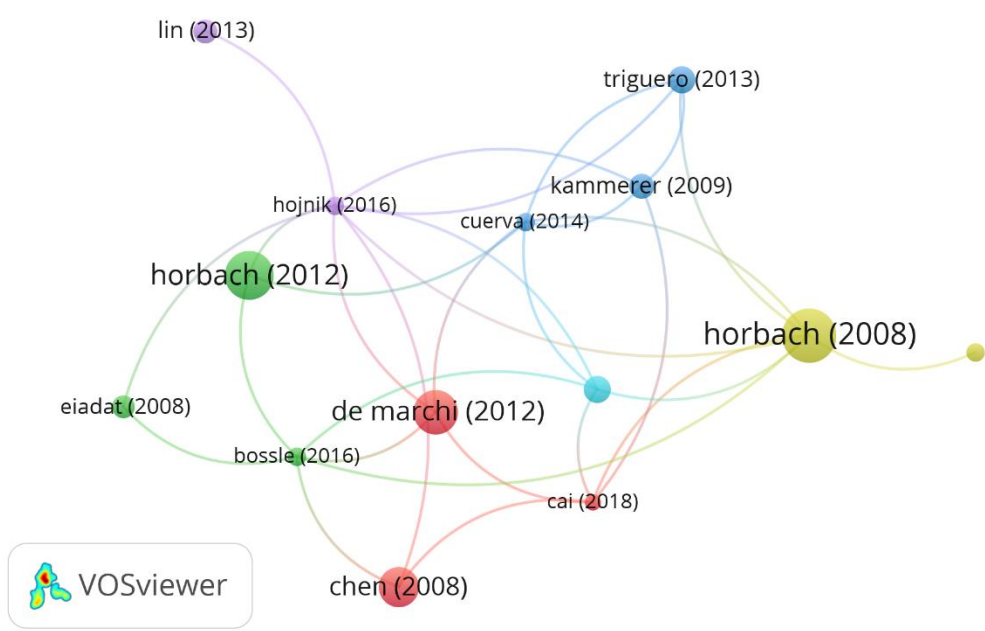


Figure 6. Most cited publications

Table 5. Most cited publications

Document	Title	Source	Method	Focus	Industry	Countries	Citations
Horbach (2008)	Determinants of environmental innovation - New evidence from German panel data sources	Research Policy	Econometric analyses by German panel databases	Drivers of eco-innovation	Manufacturing and services	Germany	794
Horbach <i>et al.</i> (2012)	Determinants of eco-innovations by type of environmental impact: The role of regulatory push/pull, technology push and market pull	Ecological Economics	Econometric Analysis	Drivers of eco-innovation practices by type of environmental impact	Manufacturing and services	Germany	711
De Marchi (2012)	Environmental innovation and R&D cooperation: Empirical evidence from Spanish manufacturing firms	Research Policy	Survey	The role of R&D cooperation in EI	Manufacturing	Spain	631
Y. S. Chen (2008)	The Driver of Green Innovation and Green Image - Green Core Competence	Journal of Business Ethics	Survey	Impact of green core competence on green innovation	Information and electronics	Taiwan	575
Kesidou & Demirel (2012)	On the drivers of eco-innovations: Empirical evidence from the UK	Research Policy	Survey	Insights on the driving forces of eco-innovation	Manufacturing	UK	370
Triguero <i>et al.</i> (2013)	Drivers of different types of eco-innovation in European SMEs	Ecological Economics	Survey	Drivers of eco-innovation types for SMEs	SMEs	Multiple European countries	367
Kammerer (2009)	The effects of customer benefit and regulation on environmental product innovation.: Empirical evidence from appliance manufacturers in Germany	Ecological Economics	Survey	Analysing the role of customer benefits, and regulations in eco-product innovation	Electrical and electronic appliances	Germany	344
Lin <i>et al.</i> (2013)	Market demand, green product innovation, and firm performance:	Journal of Cleaner Production	Survey	The impact of market demand on green	Motorcycle	Vietnam	323

	evidence from the Vietnam motorcycle industry			product innovation and firm performance			
Eiadat <i>et al.</i> (2008)	Green and competitive? An empirical test of the mediating role of environmental innovation strategy	Journal of World Business	Survey	Environmental pressures for eco-innovation strategy adoption	Chemical	Jordan	305
Cuerva <i>et al.</i> (2014)	Drivers of green and non-green innovation: empirical evidence in Low-Tech SMEs	Journal of Cleaner Production	Survey	Exploring the drivers of eco-innovation in Low-tech SMEs	Low-tech SMEs	Spain	249
Bossle <i>et al.</i> (2016)	The drivers for the adoption of eco-innovation	Journal of Cleaner Production	Review	Reviewing the drivers of eco-innovation	NA	NA	248
Yalabik & Fairchild (2011)	Customer, regulatory, and competitive pressure as drivers of environmental innovation	International Journal of Production Economics	Economic analysis	Examining the role of customer, regulation, and competitive pressure in investing in eco-friendly production.	NA	NA	243
Hojnik & Ruzzier (2016a)	What drives eco-innovation? A review of an emerging literature	Environmental Innovation and Societal Transitions	Review	Reviewing the emerging literature on eco-innovation drivers	NA	NA	236
Wugan Cai & Li (2018)	The drivers of eco-innovation and its impact on performance: Evidence from China	Journal of Cleaner Production	Survey	Drivers of eco-innovation and its influence on firm performance	Multiple industries	China	220

d. Results of the co-occurrence analysis

The present study applied a co-occurrence analysis to cluster the author keywords using the VOSviewer software application. Of the 63 keywords with at least two occurrences, only 32 main keywords emerged after excluding the keywords irrelevant to research purposes, such as; business performance, economic performance, developing countries, Spain, design, model, SEM, partial least squares, and methodology. As Table 6 and Figure 6 show, the core nodes were; "eco-innovation", "environmental innovation", and "green innovation", which represented the most frequent keywords with 36, 31, and 22 occurrences, respectively. It was obvious that although the studies used several synonyms to refer to the same term, namely, sustainable innovation, environmental innovation, green innovation, and eco-innovation, the term "eco-innovation" has become the most used in the existing literature (see Figure 7). In addition, the term eco-innovation has recently become common in the literature concerning eco-innovation drivers (as shown in Figure 8).

1- The main research was focused on eco-innovation drivers.

Table 4 and Figure 6 show that six main thematic groups were produced from the co-occurrence analysis. The map visualises six colour-coded clusters (red, green, blue, yellow, purple, and light blue) reflecting the drivers of eco-innovation.

- Cluster 1 (Red, Institutional pressures) represents a line of research focusing on the external forcing factors of eco-innovation. This cluster includes pressures exerted by external actors, such as; regulatory bodies, stakeholders, and social communities. The success of firms in complying with these pressures can give them legitimacy from external actors (Mady, Abdul Halim, Omar, *et al.*, 2022; Ning *et al.*, 2022). In addition, implementing eco-innovation practices can result from cooperation with stakeholders, such as; universities, research, and governmental institutions.

- Cluster 2 (Green, Eco-friendly demand) includes five keywords, most notably market orientation. Market demand is a vital driver that can compel firms to rethink and align their priorities and products with customer preferences (Liao, 2017; Mady, Abdul Halim, & Omar, 2022). Converting customer preferences into eco-friendly products that reduce adverse effects on the environment may motivate firms to adopt eco-innovation to make their products more eco-friendly which, in

turn, helps differentiate themselves from their competitors (Abdullah & Zailani, 2016; Wugan Cai & Li, 2018).

- Cluster 3 (Blue, Internal environmental orientation) comprises five keywords emphasising that adopting an eco-innovation strategy relies fundamentally on internal environmental orientation. A great stream of research adopting the resource-based view perceives eco-innovation as a strategic resource (Khanra *et al.*, 2022). Hence, firms with this view will likely align their organisational resources and strategies to adopt proactive environmental solutions, such as eco-innovation.
- Cluster 4 (Yellow, Eco-capabilities) involves the two prominent capabilities necessary to implement eco-innovation practices: R&D and dynamic capabilities. Firms with R&D capabilities are most likely to use such capabilities to produce and develop their products and processes as environmentally friendly (Cuerva *et al.*, 2014; Kesidou & Demirel, 2012). Dynamic capabilities are viewed as an influential driver of eco-innovation, which enables firms to align their resources and capabilities with a dynamic business environment (Kiefer *et al.*, 2018). R&D and dynamic capabilities help firms perceive and meet external requirements and pressures from either regulatory bodies or the market.
- Cluster 5 (Purple, Green absorptive capacity) comprises the capabilities required to; perceive, absorb, align, and exploit the entailed environmental knowledge, such as; absorptive capacity, knowledge management, and environmental management systems (Mady, Abdul Halim, Omar, *et al.*, 2022). The function of absorptive capacity is to support the learning process by sensitising firms to new environmental trends and knowledge (Qi *et al.*, 2021; Song *et al.*, 2020).
- Cluster 6 (Light Blue, Organisational capabilities) emphasises the role of organisational capabilities in adopting eco-innovation practices. A wide range of organisational capabilities has been addressed in previous studies, such as technological capabilities, environmental management systems (ISO14001), and relationship learning capabilities. A line of literature adopting the notion of

"technological trajectory" highlights that the innovation of new ideas, eco-products, and eco-processes must be preceded by the technology readiness of firms (Kiefer *et al.*, 2018; Y. Zhang *et al.*, 2020).

Table 6 Clusters of the main keywords at a minimum of two co-occurrences

Cluster 1(9 items)	OC	TLS	Cluster 4 (5 items)	OC	TLS
Eco-innovation	36	101	Environmental innovation	31	75
Institutional pressures	7	23	Research-and-development	15	48
Regulatory pressure	3	14	Dynamic capabilities	4	9
Stakeholder pressures	3	13	Sustainable innovation	2	6
Cooperation	3	9	Environmental sustainability	2	6
Legitimacy pressure	2	10	Cluster 5 (5 items)	OC	TLS
Normative pressure	2	12	Green innovation	22	65
Proactive environmental strategies	2	8	Absorptive capacity	5	13
Regulations	2	8	Knowledge management	5	10
Cluster 2 (5 items)	OC	TLS	Environmental awareness	2	5
Market orientation	6	16	Environmental management systems	2	1
Green product innovation	5	17	Cluster 6 (3 items)	OC	TLS
Collaboration	3	11	Capabilities	6	17
Customer pressure	2	9	Corporate social responsibility	3	10
Environmental orientation	2	6	Corporate sustainability	2	7
Cluster 3 (5 items)	OC	TLS			
Resource-based view	7	19			
Environmental regulations	6	18			
Environmental strategies	3	9			
Environmental management	2	4			
Managerial environmental awareness	2	5			

* OC – Occurrence, TLS – Total Line Strength.

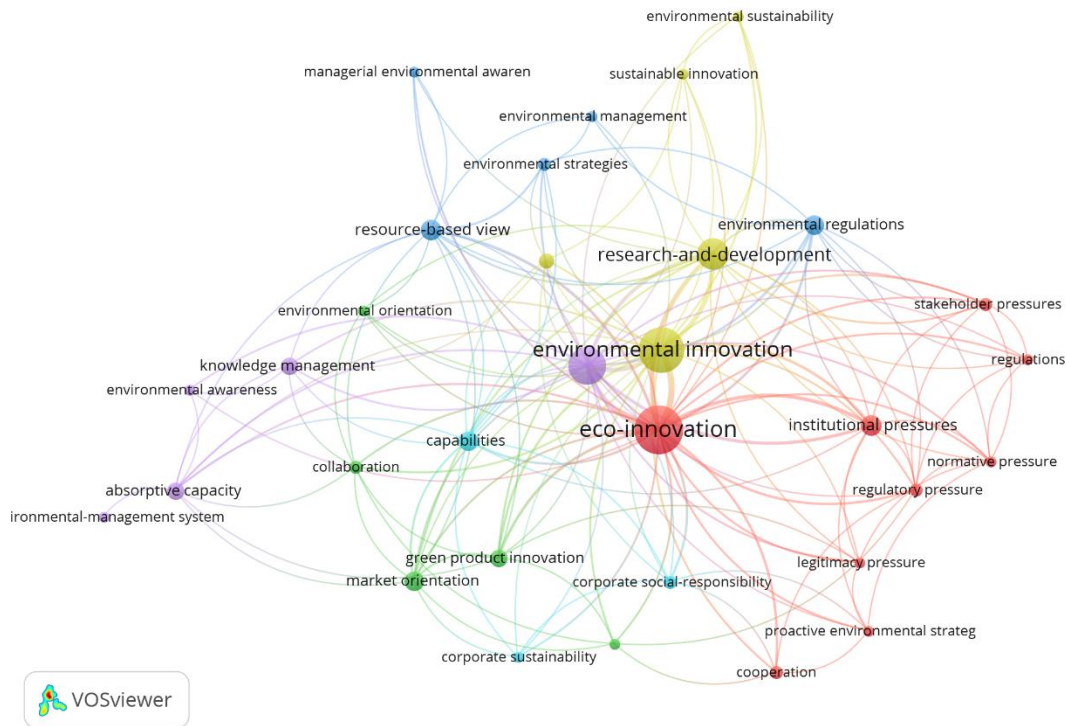


Figure 7 Network visualisation of the co-occurrence of keywords

2- Existing trends and future research suggestions.

The temporal distribution for each cluster is described in Figure 8. As a result, it offers insights into how each research stream has changed over time. As Figure 7 shows, earlier studies conducted between 2016 and 2017 focused on the fundamental drivers of environmental innovation, including; environmental regulations, environmental management systems, cooperation, and environmental strategies. In addition, the term "green product innovation" was also illustrated in the same period. All these drivers are displayed in purple on the map. Research on the internal drivers of eco-innovation, including; resource-based view, knowledge management, research and development, capabilities, dynamic capabilities, and market orientation, has been prominent between 2017 and 2018. These internal drivers are shown in green on the map. Between 2018 and 2019, research interest notably shifted to investigating the external pressures of eco-innovation, including; legitimacy, stakeholders, and regulatory pressure.

Furthermore, absorptive capacity also received much attention in the same period. These drivers can be viewed in bright green on the layover visualisation. The latest period after 2019 on the map has witnessed more attention for institutional pressures, including; regulatory and normative pressures and environmental awareness.

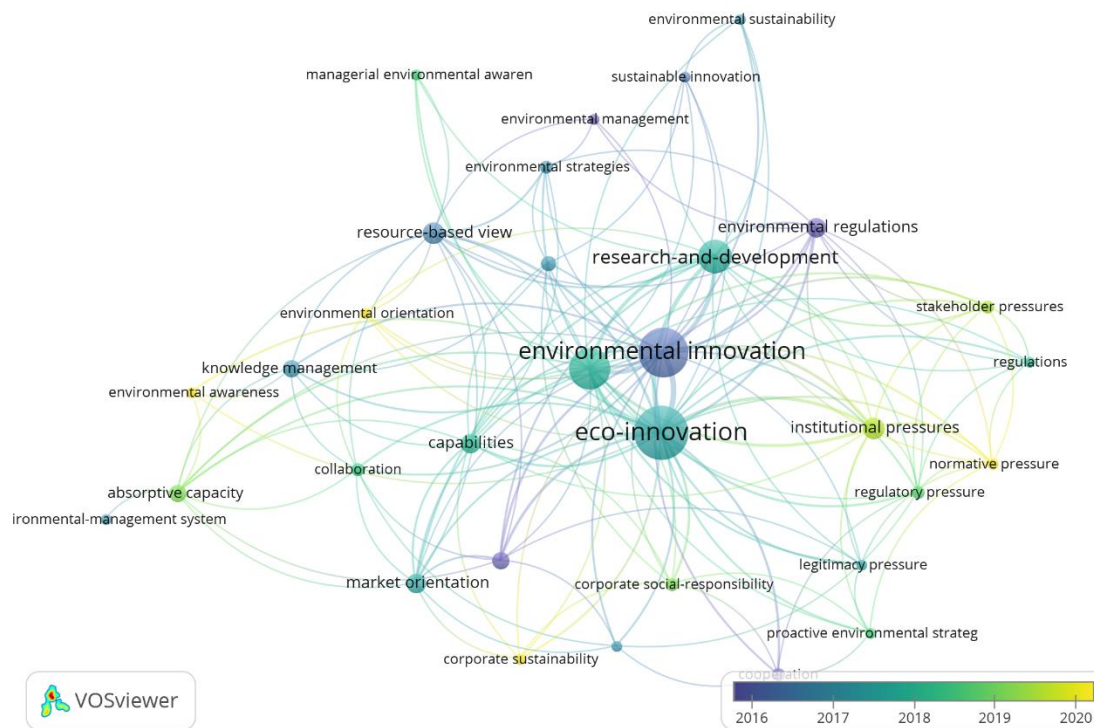


Figure 8 Layover visualisation of the co-occurrence of keywords

According to [Van Eck & Waltman \(2014\)](#), the greater the co-occurrence of keywords, the closer together the keywords are. The overlay map in Figure 8 comparing the TLS results in Table 6 highlights that many driving factors of eco-innovation could be promising opportunities for future research. Such factors include; environmental management systems, managerial environmental awareness (strategic environmental orientation), corporate environmental sustainability, cooperation, and customer pressure. These drivers are mentioned among the most recent studies and have a low TLS. This situation indicates that the drivers mentioned above have received limited attention from previous studies, despite their significance. For example, environmental management systems (EMS) (which have a TLS of one) are essential for firms to transform their practices to be eco-friendly. Managerial environmental awareness has received less attention in the literature, although it is important in creating the proactiveness of management to environmental performance. Hence, strategic environmental awareness (orientation) should be investigated further as a driver of eco-innovation.

Similarly, a firm's cooperation with external stakeholders has been regarded as the most influential factor in implementing an eco-innovation strategy. Based on technological aspects and specific knowledge, there are many partners a firm can cooperate with, such as; customers, suppliers, and competitors ([Marchi et al., 2022](#)). University-industry R&D cooperation is considered the most important form of cooperation that needs to be studied by further research.

Professional communities or social actors can exert normative pressures to define proper conduct and standards (Berrone *et al.*, 2013). Customers often pressure firms to follow certain conduct, and eco-friendly customer demand can force firms to adopt eco-innovation. Further research is recommended to deeply explore how eco-innovation practices can be fostered by pressures from customers with eco-friendly demand. In addition, several social actors can exert pressure on firms to adopt eco-innovations, such as social media communities, which are potential areas for future research.

Conclusion

This study aimed to determine what factors drive firms to adopt eco-innovation practices and to give direction to future studies on the drivers of eco-innovation. A systematic literature review was conducted as the adopted methodological approach. Besides a descriptive and content analysis of the available literature on Scopus and Web of Science platforms from 2008 to 2022, the study also relied on a scientometric analysis to explore the existing trends and potential areas for further research. Following a four steps of the systematic review, 65 relevant papers were subject to analysis. Based on the descriptive analysis of these papers, there were several research gaps related to thematic features, such as application areas and adopted methodological approaches. From the content analysis results for the available literature, the study classified the eco-innovation drivers into internal and external drivers. Internal drivers include a wide range of factors, these factors were grouped into three main drivers: organisational capabilities, absorptive capacity, and strategic environmental orientation (awareness). External drivers were classified under three main headings: regulatory pressure, eco-friendly product demand, and competitive pressure.

The content analysis results showed that numerous research points could be valuable for further investigation. For example, convincing evidence is still required of how competitive factors influence firms' motivation to adopt eco-innovation. In addition, the controversial empirical results concerning the effect of external environmental pressures, such as regulatory and customer pressure, on eco-innovation could be a promising opportunity for additional research by including internal mechanisms boosting the exploratory power of the relationship. Finally, the results of the scientometric analysis conducted through the VOSviewer software application illustrated that the eco-innovation drivers addressed in the literature were clustered into six main groups: institutional pressure, eco-friendly demand, internal environmental orientation, and green absorptive capacity and organisational capabilities. In addition, the results have also shown that some eco-innovation drivers need to receive more attention in future research, such as environmental management systems and managerial environmental awareness.

This study, however, provides theoretical as well as practical contributions. Theoretically, the present study has been an attempt to thoroughly review prior studies on eco-innovation drivers, especially those conducted after 2018, which have not previously been included in a systematic review. Then, the present study provided existing knowledge with a deeper insight into the eco-innovation drivers. In addition, this study has produced a classification of eco-innovation drivers that could be used in future research to examine the effect of its categories on adopting different types of

eco-innovation. Such eco-innovation types might be; disruptive eco-innovation, incremental eco-innovation, and radical eco-innovation.

Practically, By reviewing the studies addressing eco-innovation drivers, the results of this study provide managers, policymakers, and governmental agencies with guidelines on what and how such driving factors can motivate businesses to implement eco-innovation practices. Businesses need to enhance internal capabilities to implement eco-innovation practices, such as research and development and dynamic capabilities. For regulative bodies, this study has concluded that institution pressure, especially environmental regulation, can play an essential role in adopting eco-innovation. Consequently, effective environmental regulations motivating the business world could be an important practical implication for this study. Furthermore, the present study systemically reviews the current work in the eco-innovation field which helps SMEs managers aim to adopt eco-innovation in their organization to explore the antecedents and positive consequences of eco-innovation.

Finally, this study does not exist without its limitations that open new research avenues for further research. While this study systemically review literature published in the period from 2008 to 2022, other research could extend this period to make more comprehensive study. Furthermore, this research concentrated on the studies explored eco-innovation drivers, further research could explore and systemically review the consequences of eco-innovation.

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