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How eco-innovation affects sustainable performance: A systematic review

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Abstract Innovation, particularly environmental innovation, is essential for long-term company success. This study presents a systematic review of the relationship between eco-innovation and sustainable performance, focusing on the influences of country of origin, industry type, and company size. A comprehensive selection process reduced an initial pool of studies to 55 relevant papers. Some studies examined the direct relationship between eco-innovation and overall sustainable performance, finding primarily significant and positive outcomes. Specific dimensions of eco-innovation, such as eco-product, eco-process, and eco-marketing innovations, positively impact various aspects of sustainable performance. However, some studies noted non-significant relationships, indicating that environmental innovation does not always affect environmental, financial, or social performance. Several studies also incorporated moderators and mediators to understand these relationships better. Most of the research was conducted within the manufacturing sector in developing countries and included companies ranging from micro-enterprises to large corporations. The findings suggest that eco-innovation enhances sustainable performance; however, the impact varies significantly depending on the context. Notably, there are substantial gaps in the literature concerning the service industry and the differential effects on small and medium-sized enterprises (SMEs) compared to larger firms. This indicates a need for future research to delve into eco-innovation within the service sector, the challenges SMEs face in adopting eco-innovations, and the contextual factors affecting the relationship between eco-innovation and sustainable performance. Moreover, the current body of research is skewed towards developing countries, suggesting an imbalance that future studies should address by including more data from developed nations. Such an approach would provide a more comprehensive global perspective on the relationship between eco-innovation and sustainable performance. While eco-innovation generally benefits sustainable performance, its varying impact across different industries, company sizes, and countries highlights the necessity for diversified research in this field.

Keywords: environmental innovation, natural-resource based-view, business sustainability

1. Introduction

1.1. Background of the study

Innovation is critical in addressing the issues of natural resources and climate change (Dogaru, 2020). Several companies believe innovation will be the key to dramatically improving corporate environmental practices and performance. Environmental concerns can be solved through innovation (Acciaro et al., 2014) and can also be a driver of economic growth and social wellbeing (OECD, 2009). Companies can proactively design products and services that are both commercially appealing and environmentally sound while also helping to meet a social need (Székely & Knirsch, 2005). Innovation is defined by the Organization for Economic Cooperation and Development (OECD) as the creation or enhancement of new products, services, processes, or organizational approaches (OECD, 2009). Eco-innovation refers to innovation with a lesser environmental impact (Ghisetti & Rennings, 2014; OECD, 2009). Eco-innovation is a critical component of sustainability-oriented innovation (SOI). It entails making deliberate changes to an organization's philosophy, beliefs, products, and processes to produce and achieve social and environmental value and commercial rewards (Adams et al., 2016). It prioritizes human needs and enhances people's quality of life while minimizing ecological damage (Putri & Sari, 2019). Eco-innovation is essential to the global shift to a more sustainable economy (Dogaru, 2020).

The resource-based view (RBV) holds that a firm's resources and capabilities define its competitive advantage. RBV provides a theoretical foundation for investigating the connection between resources, capabilities, and performance. However, Hart (1995) claims that RBV ignores the natural environment. Because human and organizational capabilities have a global impact on the environment, it is expected that the natural environment would put the firms' resources and capabilities to the test. Businesses would be dependent on nature, and their strategies would be built around skills that allow for environmentally sustainable economic activity (Hart, 1995).

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This research aims to conduct a literature review on the relationship between eco-innovation and sustainable performance. Furthermore, it intends to explore and compare the findings of past studies on eco-innovation techniques and the sustainable performance relationship in various nations and industries. Finally, it wishes to offer potential future study directions for the literature on eco-innovation and sustainable performance. Section 2 of this study provides the concepts and theoretical evolution of eco-innovation and sustainable performance. The methodologies utilized in this paper are described in Section 3. The findings and discussions are presented in Section 4. Section 5 concludes with conclusions and recommendations.

1.2. Concepts and theoretical developments

1.2.1. Eco-innovation

The deployment of a new or significantly better product (good or service), process, new marketing approach, or new organizational method in company processes, workplace organization, or external relations is referred to as innovation (OECD, 2009). Product, process, organizational, and marketing innovations are the four layers of innovation activities (Klewitz & Hansen, 2013; OECD, 2005; Rennings, 2000). According to OECD (2005), product innovation is the development of a new product or the improvement of an existing one. Meanwhile, process innovations occur when output is created with fewer inputs or when there are modifications or enhancements in the delivery of goods and services. Furthermore, when an organization alters its structure or management or implements new organizational processes, it engages in corporate innovation. Finally, marketing innovation is demonstrated by implementing new marketing tactics (such as product design, promotion, and price).

Sustainability-oriented innovation (SOI) is a type of innovation that is becoming increasingly relevant for business owners today. Along with the usual economic dimension, this idea encompasses environmental and social dimensions of innovation (Fatoki, 2019). The three sectors are intricately interwoven (economic, social, and ecological). The natural system constrains the sociological and economic domains. In general, the economy is part of a social system, which is part of an ecological system (Hansen & Große-dunker, 2013). According to Klewitz and Hansen (2013), companies begin their sustainability journey by addressing the environmental or social components. Furthermore, existing literature prioritizes eco-innovation above triple bottom line dimensions or SOIs (Ganapathy et al., 2014; Klewitz & Hansen, 2013). This research focuses on the ecology dimension of sustainability-oriented innovation, also known as environmental or eco-innovation.

The concept of eco-innovation occurs when environmental demands and corporate practices align (Yurdakul & Kazan, 2020). Eco-innovation is decreasing the environmental impact of economic activities and ensuring the sustainable use of natural resources (Dogaru, 2020). This happens when new ideas, behaviors, products, and processes help to solve environmental issues (Rennings, 2000). Regarding implementation, Cheng and Shiu (2012) define it as a coherent collection of actions in implementing eco-innovation projects. According to them, there are three sorts of eco-innovation implementations: eco product, eco-process, and eco-organization innovation. They are similar to the definitions of the three sorts of inventions mentioned above. The only distinction is that it concentrates on innovation, which results in a smaller environmental impact. Implementing eco-product and eco-process innovation differs from implementing eco-organizational innovation since these two entail many unique and necessary activities that contribute to overall eco-innovation implementation (Cheng & Shiu, 2012). Yurdakul and Kazan (2020) also included marketing innovation as an eco-innovation dimension. It encompasses all product design or packaging aspects, product placement, promotion, and pricing.

1.2.2. Sustainable performance

The term "sustainable performance" refers to environmental, economic, and social performance (Chardine-Baumann & Botta-Genoulaz, 2014). It takes a holistic approach that combines all three performances. According to Gong et al.'s (2018) analysis of the literature on sustainable performance indicators, economic, environmental, and social views can all be attained concurrently.

Economic performance is the most well-known and essential criterion for gauging sustainability (Gong et al., 2018; Nor-Aishah et al., 2020). These are the financial advantages of environmental projects (Eltayeb et al., 2011). Among them are profitability, revenue growth, increasing market share, and image enhancement (Nor-Aishah et al., 2020). Furthermore, environmental performance is measured using an index that assesses the company's efforts to lessen its environmental impact (Larrán Jorge et al., 2015; Schaltegger & Wagner, 2011). Source reduction activities such as resource conservation (energy and water) and food and packaging recycling or reuse improve environmental performance in food processors (Pullman et al., 2009). Businesses may help the environment by creating environmentally friendly goods that reduce waste and maximize resource utilization (Eltayeb et al., 2011). As a result, companies are becoming more successful and more ecologically conscious. Finally, the third dimension of sustainable performance is a social performance, which is the ability of a firm to enrich its employees and customers (Rajak & Vinodh, 2015). The social sustainability viewpoint focuses on internal human resources, external population, stakeholder participation, and macro-social performance (Rajak & Vinodh, 2015). It is commonly missing from frameworks for monitoring sustainability performance and activities for reporting (Husgafvel et al., 2015).

2. Methods

The data were collected from DLSU Online Library, Research Rabbit website, Google Scholar, and Scopus database from May to June 2022. Publications were collected using the search strings "sustainability-oriented innovation," "eco-innovation," "green innovation," "environmental innovation," AND/OR "sustainable performance," and "business performance." The author also considered similar studies and recommended articles and references of initially found studies. Literature was grouped into two: the first set was used for overview, concept, and developments on the variables, and the second set focused on the relationship between the independent variable eco-innovation and dependent variable sustainable performance.

For publications to be considered in the second set of literature, the published research should examine the effect of eco-innovation on sustainable performance. The published research's independent variable eco-innovation has to have any of the four dimensions of eco-innovation, which are eco-process innovation, eco-product innovation, eco-organizational innovation, and eco-marketing innovation, or the innovation variable as a whole is defined as an innovation (practices or implementation) to minimize the business impact on the environment. At the same time, the dependent variable sustainable performance has to have one of the three sustainable performance dimensions, which are economic, environmental, and social. Business, firm, organizational, and financial performance were considered on the economically sustainable performance dimension in the condition that they have any of the measures enumerated by Nor-Aishah et al. (2020): profitability, revenue growth, increased market share, and image improvement. After reading the articles, duplicities and non-related studies were eliminated. The total data set include 55 publications.

3. Results

3.1. Eco-innovation and sustainable performance: The direct and indirect relationship

Empirical research on the long-term performance of sustainability-oriented innovation has produced varied results. Previous studies examined the direct relationship between eco-innovation and overall sustainable performance and the relationship between eco-innovation aspects and overall sustainable performance dimensions. Some of the relationships tested were significant, while others were not. The literature has also demonstrated the indirect effects of eco-innovation on long-term performance via moderators and mediators of the linkages.

3.2. Direct relationship

Studies on Eco-innovation dimensions and sustainable performance dimensions relationships can also be found in the literature. The results of the relationship testing were primarily significant and positive, as presented in figure 1. First, between environment innovation and sustainable performance (Dong et al., 2014; Fernando et al., 2019; Maletič et al., 2014, 2016; Muangmee et al., 2021; Rodríguez-Espíndola et al., 2022). Next, the relationship between environmental innovation and environmental performance (Küçükoğlu & Pınar, 2015; Li, 2014; Rehman et al., 2021; Wayan Edi Arsawan et al., 2021; Weng et al., 2015; Yurdakul & Kazan, 2020; Zandi et al., 2019); environmental innovation and financial or economic performance (Alos-Simo et al., 2020; C. C. J. Cheng et al., 2014; Farza et al., 2021; Weng et al., 2015; Yurdakul & Kazan, 2020; Zandi et al., 2019) are also positive.

The effects of the three dimensions of eco-innovation were also assessed and were found to be significant and positive on sustainable performances. Eco-product innovation influences a firm's financial performance (Tariq et al., 2018; Xie et al., 2019; Martinez-Alonso et al., 2020) and environmental performance (El-Kassar & Singh, 2019). Eco-process innovation positively affects economic (El-Kassar & Singh, 2019; Martínez-Alonso et al., 2019; Sezen & Çankaya, 2013), and social (Sezen & Çankaya, 2013) and environmental performances (El-Kassar & Singh, 2019; Sezen & Çankaya, 2013). Further eco-product innovation, eco-organizational innovation, and eco-process innovation were found to enhance a company's financial performance (Hizarci-Payne et al., 2021) and socioeconomic performance (Tumelero et al., 2019). Eco-marketing innovation improves environmental and economic performance (Geng et al., 2021). Eco-process and eco-product innovation have a significant and positive effect on environmental performance, while eco-organizational innovation has a significant and positive effect on economic performance (Ch'ng et al., 2021). Eco-product and eco-process also positively affect environmental performance (Küçükoğlu & Pınar, 2015; Singh et al., 2020; Tantayanubutr & Panjakajornsak, 2017), and economic and social performance (Tantayanubutr & Panjakajornsak, 2017).

However, some relationships were not significant according to previous studies' findings. Environmental innovation was found to have no significant effect on the environment (Ghisetti & Rennings, 2014; Li, 2014) and financial performance (Li, 2014). Likewise, Ganapathy et al. (2014) and Sezen & Çankaya (2013) found that environmental innovation has no significant effect on the three dimensions of sustainable performance. Additionally, Ch'ng et al. (2021) showed that eco-organizational innovation has no significant effect on environmental performance, eco-process and eco-product innovations have no significant impact on economic performance, and all these three have no significant effect on social performance. Martínez-Alonso et al. (2019) also discovered that product innovation has no considerable impact on sustainable economic performance.

El-Kassar & Singh (2019) also proved that eco-product innovation has no significant effect on organizational performance (financial performance). Table 1 further summarizes these findings.

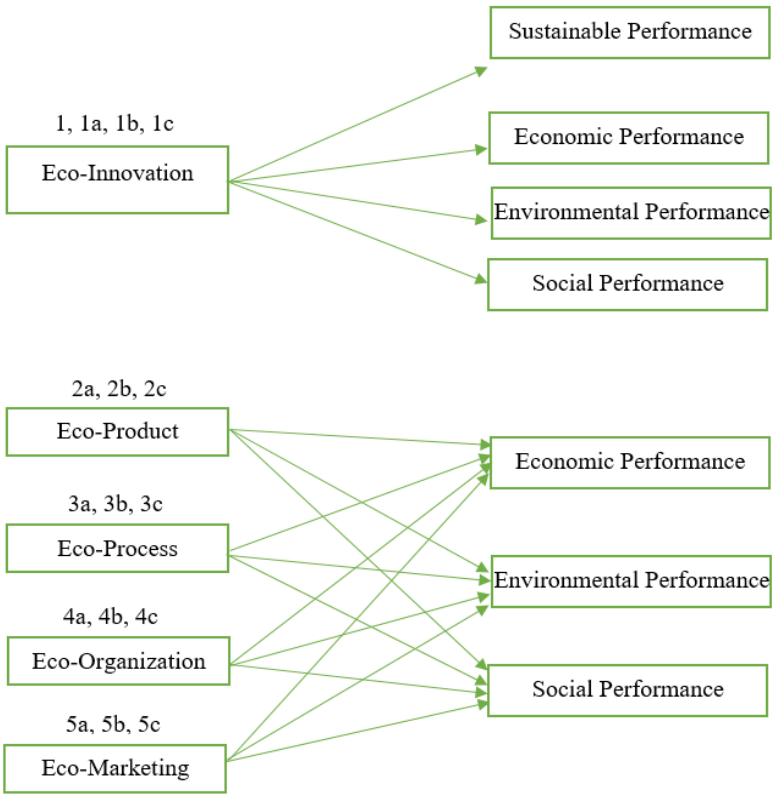

Figure 1 Results of previous studies on Eco-Innovation and Sustainable Performance Direct Relationship.

3.3. Indirect relationship

Previous research has also found an indirect relationship between eco-innovation and long-term performance, as shown in figure 2. Environmental strategies were discovered to mitigate the impact of Green Innovation on environmental performance (Rehman et al., 2021). Furthermore, the level of implementation reduces the effects of eco-marketing innovation on environmental and economic performance (Tumelero et al., 2019). When a firm's implementation level is higher, its associations become less. Ch'ng et al. (2021) discovered that Market Turbulence strengthens the positive effect of eco-organizational innovation on social performance. Similarly, Resource Commitment improves the impact of environmental innovation techniques on financial performance (Li, 2014). Furthermore, Market Resource Intensity, Technological Turbulence, and Market Turbulence boosted the effect of green product innovation on firm financial performance (Tariq et al., 2019). Furthermore, the effect of family involvement on process innovation on economic performance (Martnez-Alonso et al., 2019); the association between country economic development and eco-innovation and firm performance (Hizarci-Payne et al., 2021). Finally, (El-Kassar & Singh's 2019) findings suggest that green product innovation considerably impacts environmental and organizational performance in organizations with strong training practices.

There were also mediators in the eco-innovation and sustainable performance relationship. Some of which were even Eco-innovation dimensions. According to Xie et al. (2019), Green Product Innovation mediates the relationship between green process innovation and financial performance. Furthermore, eco-process and eco-product innovation are partial mediators of the relationship between eco-organizational innovation and business performance. In contrast, eco-process innovation mediates the association between eco-process innovation and business performance (Cheng et al., 2014). Service Innovation Capability also bridges environmental innovation and long-term commercial performance (Fernando et al., 2019).

3.4. Environmental innovation and sustainable performance: Industry context dynamics

The majority of the publications on eco-innovation and sustainable performance relationships were conducted in the manufacturing industry (Fernando et al., 2019; Ganapathy et al., 2014; Geng et al., 2021; Li, 2014; Martínez-Alonso et al., 2019; Muangmee et al., 2021; Rehman et al., 2021; Singh et al., 2020; Tantayanubutr & Panjakajornsak, 2017; Tariq et al., 2019; Tumelero et al., 2019; Xie et al., 2019; Yurdakul & Kazan, 2020; Zandi et al., 2019). Meanwhile, there were also some studies that considered various industries (Alos-Simo et al., 2020; Ch'ng et al., 2021; C. C. J. Cheng et al., 2014; Dong et al., 2014; El-

Kassar & Singh, 2019; Farza et al., 2021; Ghisetti & Rennings, 2014; Hizarci-Payne et al., 2021; Küçükoğlu & Pınar, 2015; Maletič et al., 2016, 2014; Rodríguez-Espíndola et al., 2022; Wayan Edi Arsawan et al., 2021; Weng et al., 2015).

Table 1 Summary of findings of previous studies on Eco-Innovation and Sustainable Performance relationship.

Path Name	Significant Result	Not Significant Result
1	Dong et al., 2014; Fernando et al., 2019; Maletič et al., 2014, 2016; Muangmee et al., 2021; Rodríguez-Espíndola et al., 2022	-
1a	Alos-Simo et al., 2020; C. C. J. Cheng et al., 2014; Farza et al., 2021; Weng et al., 2015; Yurdakul & Kazan, 2020; Zandi et al., 2019	Li, 2014; Ganapathy et al., 2014; Sezen & Çankaya, 2013
1b	Küçükoğlu & Pınar, 2015; Li, 2014; Rehman et al., 2021; Wayan Edi Arsawan et al., 2021; Weng et al., 2015; Yurdakul & Kazan, 2020; Zandi et al., 2019	Ghisetti & Rennings, 2014; Li, 2014; Ganapathy et al., 2014; Sezen & Çankaya, 2013
1c	-	Ganapathy et al., 2014; Sezen & Çankaya, 2013
2a	Tariq et al., 2018; Xie et al., 2019; Martinez-Alonso et al., 2020; Hizarci-Payne et al., 2021; Tantayanubutr & Panjakajornsak, 2017	Ch'ng et al., 2021; Martínez-Alonso et al., 2019; El-Kassar & Singh; 2019
2b	El-Kassar & Singh, 2019; Tumelero et al., 2019; Ch'ng et al., 2021; Küçükoğlu & Pınar, 2015; Singh et al., 2020; Tantayanubutr & Panjakajornsak, 2017	-
2c	Tumelero et al., 2019; Tantayanubutr & Panjakajornsak, 2017	Ch'ng et al., 2021
3a	El-Kassar & Singh, 2019; Martínez-Alonso et al., 2019; Sezen & Çankaya, 2013; Hizarci-Payne et al., 2021; Tumelero et al., 2019; Tantayanubutr & Panjakajornsak, 2017	Ch'ng et al., 2021
3b	El-Kassar & Singh, 2019; Sezen & Çankaya, 2013; Ch'ng et al., 2021; (Küçükoğlu & Pınar, 2015; Singh et al., 2020; Tantayanubutr & Panjakajornsak, 2017	-
3c	Sezen & Çankaya, 2013; Tumelero et al., 2019; Tantayanubutr & Panjakajornsak, 2017	Ch'ng et al., 2021
4a	Hizarci-Payne et al., 2021; Tumelero et al., 2019; Ch'ng et al., 2021	-
4b	-	Ch'ng et al., 2021
4c	Tumelero et al., 2019	Ch'ng et al., 2021
5a	Geng et al., 2021	-
5b	Geng et al., 2021	-
5c	-	-

Legend: The effects of Eco-innovation on Sustainable Performance (1), Economic (1a), Environmental (1b), Social (1c); Eco-product Innovation on Economic (2a), Environmental (2b), Social (2c); Eco-process Innovation on Economic (3a), Environmental (3b), Social (3c); Eco-organizational on Economic (4a), Environmental (4b), Social (4c); Eco-marketing Innovation on Economic (5a), Environmental (5b), Social (5c).

Table 2 Previous studies on eco-innovation and sustainable performance relationship by Industry.

Manufacturing Industry	Various Industries
Fernando et al., 2019; Ganapathy et al., 2014; Sezen & Cankaya, 2013; Geng et al., 2021; Li, 2014; Martínez-Alonso et al., 2019; Muangmee et al., 2021; Rehman et al., 2021; Singh et al., 2020; Tantayanubutr & Panjakajornsak, 2017; Tariq et al., 2019; Tumelero et al., 2019; Xie et al., 2019; Yurdakul & Kazan, 2020; Zandi et al., 2019	Alos-Simo et al., 2020; Ch'ng et al., 2021; C. C. J. Cheng et al., 2014; Dong et al., 2014; El-Kassar & Singh, 2019; Farza et al., 2021; Ghisetti & Rennings, 2014; Hizarci-Payne et al., 2021; Küçükoğlu & Pınar, 2015; Maletič et al., 2016, 2014; Rodríguez-Espíndola et al., 2022; Wayan Edi Arsawan et al., 2021; Weng et al., 2015
Total: 15 publications	Total: 14 publications

3.5. Environmental and sustainable performance: Business size standpoints

Large, small, and medium enterprises differ in eco-innovation practices and sustainable performance. Very few studies focused on large firms (Farza et al., 2021; Rehman et al., 2021). Some also focused on smaller firms or SMEs (Geng et al., 2021; Muangmee et al., 2021; Rodríguez-Espíndola et al., 2022; Singh et al., 2020; Wayan Edi Arsawan et al., 2021; Zandi et al., 2019). Majority of the published research considered firms of all sizes (Alos-Simo et al., 2020; Ch'ng et al., 2021; C. C. J. Cheng et al., 2014; Dong et al., 2014; El-Kassar & Singh, 2019; Fernando et al., 2019; Ganapathy et al., 2014; Ghisetti & Rennings, 2014; Hizarci-Payne et al., 2021; Küçükoğlu & Pınar, 2015; Li, 2014; Maletič et al., 2014, 2016; Martínez-Alonso et al., 2019; Singh et

al., 2020; Tantayanubutr & Panjakajornsak, 2017; Tariq et al., 2019; Tumelero et al., 2019; Weng et al., 2015; Xie et al., 2019; Yurdakul & Kazan, 2020).

3.6. Environmental and sustainable performance: Geographical context perspectives

The majority of previous study's respondents were from developing countries (i.e., Malaysia, Thailand, China, etc.) (Ch'ng et al., 2021; C. C. J. Cheng et al., 2014; Dong et al., 2014; Fernando et al., 2019; Ganapathy et al., 2014; Geng et al., 2021; Küçükoğlu & Pınar, 2015; Li, 2014; Muangmee et al., 2021; Rehman et al., 2021; Rodríguez-Espíndola et al., 2022; Sezen & Çankaya, 2013; Singh et al., 2020; Tantayanubutr & Panjakajornsak, 2017; Tariq et al., 2019; Tumelero et al., 2019; Wayan Edi Arsawan et al., 2021; Weng et al., 2015; Xie et al., 2019; Yurdakul & Kazan, 2020; Zandi et al., 2019). Meanwhile, few studies were also conducted in developed countries (Alos-Simo et al., 2020; El-Kassar & Singh, 2019; Farza et al., 2021; Ghisetti & Rennings, 2014; Hizarci-Payne et al., 2021; Maletič et al., 2014, 2016; Martínez-Alonso et al., 2019).

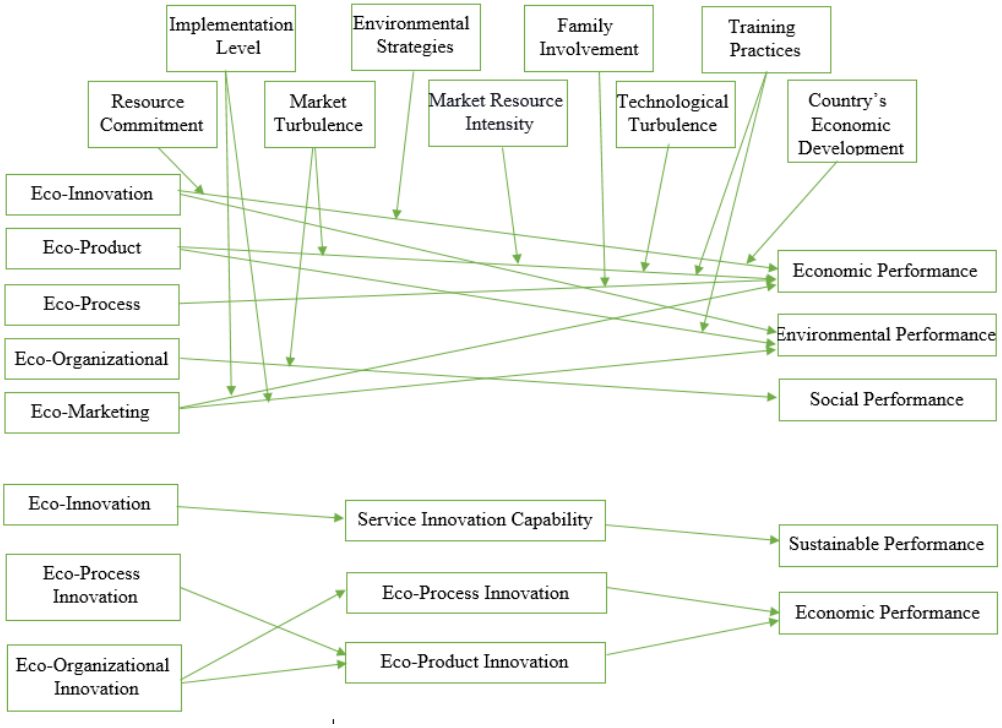

Figure 2 Results of previous studies on Eco-innovation and sustainable performance indirect relationship.

Table 3 Previous studies on eco-innovation and sustainable performance relationship by Business Size.

Large Enterprises	SMEs	Various Sizes
Farza et al., 2021; Rehman et al., 2021	Geng et al., 2021; Muangmee et al., 2021; Rodríguez-Espíndola et al., 2022; Singh et al., 2020; Wayan Edi Arsawan et al., 2021; Zandi et al., 2019	Alos-Simo et al., 2020; Ch'ng et al., 2021; C. C. J. Cheng et al., 2014; Dong et al., 2014; El-Kassar & Singh, 2019; Fernando et al., 2019; Ganapathy et al., 2014; Ghisetti & Rennings, 2014; Hizarci-Payne et al., 2021; Küçükoğlu & Pınar, 2015; Li, 2014; Maletič et al., 2014, 2016; Martínez-Alonso et al., 2019; Singh et al., 2020; Tantayanubutr & Panjakajornsak, 2017; Tariq et al., 2019; Tumelero et al., 2019; Weng et al., 2015; Xie et al., 2019; Yurdakul & Kazan, 2020
Total: 2 publications	Total: 6 publications	Total: 21

Table 4 Previous studies on eco-innovation and sustainable performance relationship by Country's Economic Development Status.

Developed	Developing
Alos-Simo et al., 2020; El-Kassar & Singh, 2019; Farza et al., 2021; Ghisetti & Rennings, 2014; Hizarci-Payne et al., 2021; Maletič et al., 2014, 2016; Martínez-Alonso et al., 2019	(Ch'ng et al., 2021; C. C. J. Cheng et al., 2014; Dong et al., 2014; Fernando et al., 2019; Ganapathy et al., 2014; Geng et al., 2021; Küçükoğlu & Pınar, 2015; Li, 2014; Muangmee et al., 2021; Rehman et al., 2021; Rodríguez-Espíndola et al., 2022; Sezen & Çankaya, 2013; Singh et al., 2020; Tantayanubutr & Panjakajornsak, 2017; Tariq et al., 2019; Tumelero et al., 2019; Wayan Edi Arsawan et al., 2021; Weng et al., 2015; Xie et al., 2019; Yurdakul & Kazan, 2020; Zandi et al., 2019
Total: 8 publications	Total: 21 publications

4. Discussion

The literature demonstrates that eco-innovations have both direct and indirect effects on long-term performance. The majority of the findings were significant and positive, while a few were not and were negative. Tumelero et al. (2019), for example, discovered that eco-process innovation had no meaningful impact on socio-economic performance. They proposed that it be validated in various study contexts. Furthermore, Geng et al. (2021) advised replicating their study in other industrial sectors to demonstrate the relationship between the variables used in their research (i.e., eco-marketing innovation and environmental and economic performance). Some authors emphasized the importance of using metrics correctly (Ganapathy et al., 2014; Xie et al., 2019).

Some studies studied the direct relationship between some eco-innovation features and long-term performance. However, some relationships were not tested based on the findings, such as the non-significant effect of eco-innovation on sustainable performance, eco-product on environmental performance, eco-process and environmental performance, eco-marketing innovation on economic performance, etc., and eco-marketing innovation on environmental performance. Furthermore, the significant effect of eco-innovation on social performance, eco-organizational on environmental performance, and the significant and not significant effect of eco-marketing innovation on social performance, as well as the impact of eco-product, eco-process, eco-organizational, and eco-marketing on overall sustainable performance. Meanwhile, the indirect relationships between eco-innovation and sustainable performance, eco-innovation and social performance, Eco product and sustainable performance, eco-product and social performance, eco-process and sustainable performance, eco process and environmental performance, eco-process and social performance, eco-organizational and sustainable performance, eco-organizational and economic performance, eco-organizational and environmental performance, eco marketing and sustainable performance, eco-marketing, and social performance, were also not examined in the literature. Thus, future research may want to investigate these research gaps.

The majority of papers on eco-innovation and sustainable performance linkages focused on the manufacturing industry. The manufacturing business may use too many natural resources, making it a major source of pollution (water and air) and a contributor to climate change (Rehman et al., 2021). Furthermore, most businesses use or participate in environmental innovation strategies in their industrial activities (Munodawafa & Johl, 2019). However, this may be a challenge for companies because the literature focused too heavily on the manufacturing sector and ignored the service industry. Firms, particularly those in the manufacturing industry, now provide products and after-sales services to their consumers. Thus, it is critical to examine the service sector or the impact of eco-service innovation when assessing sustainable performance. Future studies may focus on the service component or perspective of sustainable performance.

Regarding business size, the majority (21) of the studies included all sizes (from micro to large) of businesses in their research. Only two of the 29 papers focused on major firms, while six focused on SMEs. Larger companies are more likely to encourage eco-innovation, have fewer financial risk exposure, and have more cash flow than small businesses (Przychodzen & Przychodzen, 2015). Environmental resources, capital resources, attitude, perception, commercial environmental benefits, expertise, and skilled labor are all challenges that SMEs encounter when applying eco-innovation strategies (Abdullah et al., 2016; Bos-Brouwers, 2010). Furthermore, money, expertise, and qualified staff hamper SMEs' innovation ability (Bos-Brouwers, 2010). As a result, future research into the factors that inhibit organizations from implementing sustainability-oriented innovation is recommended (Maletic et al., 2016). Furthermore, a comparison of the effects of eco-innovation on long-term performance in SMEs and large firms is an intriguing area to investigate. However, because this feature is lacking in the literature, future research may wish to explore it.

Enterprises' environmental performance improvements are more visible in poor nations than in developed countries (Beltrán Esteve & Picazo-Tadeo, 2015). Furthermore, the relationship between sustainability-oriented innovation and organizational performance is influenced by the nation of origin or institutional element (Maletic et al., 2014, as cited by Maletic et al., 2016). Similarly, Hizarci-Payne et al. (2021) revealed a greater link between eco-innovation and firm performance in emerging markets. As a result, future research may look into the factors that drive the stronger association between eco innovation and corporate performance in emerging markets.

5. Conclusions and Recommendations

The literature demonstrates that eco-innovations generally positively affect long-term performance. However, some findings indicate no significant impact on socio-economic performance in certain areas, such as eco-process innovation. Further validation across different contexts is necessary and proper use of metrics is also crucial.

While direct relationships between eco-innovation features and long-term performance have been studied, many potential effects still need to be tested. Significant effects, such as eco-innovation on social performance and eco-organizational innovation on environmental performance, highlight the complex interactions within eco-innovations. Indirect relationships, such as between eco-product and sustainable performance, still need to be explored, presenting gaps for future research.

Most studies focus on the manufacturing industry, often neglecting the service sector's impact on sustainable

performance. Given the growing importance of the service industry, future research should address this oversight. Studies typically include businesses of all sizes, but larger firms, with more resources and less financial risk, are more likely to implement eco-innovations. SMEs must overcome barriers like limited capital and expertise, which hinder their innovation efforts. Investigating these barriers and comparing the effects of eco-innovation in SMEs versus large firms is recommended for future research.

Environmental performance improvements are more noticeable in developing countries than in developed ones. The relationship between sustainability-oriented innovation and organizational performance varies by country, with a stronger link observed in emerging markets. Future research should explore the factors driving this stronger association in emerging markets to provide deeper insights.

Ethical Considerations

Not applicable.

Conflict of Interest

The author declares no conflicts of interest.

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