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A Systematic Review on Green Technology Innovation and Sustainable Business Performance

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Abstract

Despite increasing pressure from several stakeholders, businesses are shifting their traditional models towards digital and sustainable business models. Drawing on stakeholder theory, this review aims to explore the intersection of green technology innovation and sustainable business performance, as these two domains appear fragmented and underdeveloped in the existing literature. This review included a thorough search of Web of Science and Scopus databases using the keywords “technology”, “green”, “innovation”, and “sustainability”. We selected 84 peer-reviewed articles out of 332 articles. Selected articles mainly addressed green technology innovation on sustainable business performance. Our review generated results in the form of themes, including innovation in products and social performance, economic performance, environmental performance, and innovation in processes and social effectiveness. Green innovation was identified as a mediator between these factors. This research adopted a systematic review methodology. The review was divided into three sections: the ten most-cited articles, with a year filter applied to assess the impact of primary research in the field; the ten most-cited reviews, filtered from 2013 to 2022; and the 16 country-specific articles, all published between 2013 and 2022. Each section was given a subheading. The study shows a positive relationship between green technology innovation and successful sustainable business practices. Green products and practices greatly affect economic, social, and environmental performance. Implementing green innovation notably reduces resource use, emissions, and waste, enhancing environmental sustainability. The research mainly examines sustainable business performance, highlighting green technology innovation as a mediator between sustainability and business success. Ultimately, our review offers a valuable avenue for future scholars to explore stakeholder involvement, organizational culture, the adoption of new technologies, employer branding, digital orientation, and organizational agility.

Keywords

Green Technology Innovation, Sustainable Business Performance, Stakeholder Theory, Systematic Review

JEL Classification

O31, O33, Q01, Q56

Introduction

The globe is facing several challenges due to the Fourth Industrial Revolution (World Economic Forum, 2025). The unknown factors may appear daunting; yet, with the integration of digital elements, the sustainable digital transformation process can become significantly more innovative, rapid, adaptable, and scalable (KPMG, 2025). Green innovation technology is described and has started to be referred to as the behavior of developing environmentally friendly new products and processes, continuing to pursue economic growth advantages provided by technological innovation and seeking green ecological benefits through energy cleaning and emission reduction (Zailani et al., 2014). Green innovation technology is categorized into two main areas: green product innovation and green process innovation. The goal of "energy conservation" is more prominent in green product innovation.

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The discovery of new energy sources that conserve materials, combined with the use of the latest technology that is easily generated and recyclable, leads to the development of green products (Sun, Li, & Wang, 2022). In green process innovation, the goal of "emission reduction" is more significant. Its objective is to eliminate pollution in the industrial process by improving processes, changing equipment, and innovating (Coelho, Ferreira & Proença, 2024).

Green innovation technology is categorized into two main areas: green product innovation and green process innovation. The goal of "energy conservation" is more prominent in green product innovation. The discovery of new energy sources saves materials, and the use of new technology that is easily generated and recyclable leads to the development of green products (Liu et al., 2025). The objective of "emission minimization" takes on more importance in green process innovation. Through process optimization, equipment replacement, and innovation, it aims to eradicate pollution from the manufacturing process (Xu et al., 2025). Green innovation is an organizational strategy designed to address climate crises and promote low-carbon growth; yet its implementation continues to pose considerable challenges (Qin et al., 2025).

The growing emphasis on issues raised by businesses has raised a new concern about the negative impact of human activities on the planet. This has led to the need for sustainable development. Sustainable methods do come at a higher cost, which is why companies are now required to modify their operations and improve processes (Liu et al., 2025). However, Fernando et al. (2019) claim that companies recognize the importance of eco-friendly business standards due to increasing external pressures. Both subjects of green technology innovation and sustainable business performance have received extensive studies on their relationship (Zhao & Huang, 2022). Notably, Mansour et al. (2024b) emphasized the importance of environmental innovations for both business and society in preparing for a sustainable future. The relationship between advancements in technology and effective, sustainable business performance is a prime target of study in the field of environmental and business research (Stankevičienė et al., 2025; Xie et al., 2019).

Although the potential benefits of sustainable business performance and green technology innovation, a complex interaction exists among multiple influencing factors that determine how effectively companies profit from their innovations (Arranz, 2024). Notably, the success of green technology relies on investment amounts, as well as the level of care from stakeholders and investors, and how regulations facilitate its implementation (Borah et al., 2025). The relationship between the performance of a sustainable business and green technology innovation is receiving attention from researchers. Organizations with green technology innovation programs perform better in all three dimensions: financial, social, and environmental (Asadi et al., 2020). Using green technology benefits businesses in two ways: it strengthens their brand and enables them to outperform other companies in the market (Sahoo et al., 2023). Organizations can enhance their reputation and differentiate themselves in the competition by implementing these measures (Sahoo et al., 2023). Both sustainable business performance and green technology innovation exhibit a complex interaction with multiple influencing factors that determine how effectively companies profit from their innovations (Mukhtar, Shad, & Lai, 2025).

Despite extensive reviews discussing the potential benefits of innovations such as sustainable innovations (Wilke & Pyka, 2025), open innovation (Ferreira & Jayantilal, 2025), green innovation strategies (Silvério et al., 2025), and institutions and innovation (Goletsis et al., 2025), Surprisingly, green technology innovation and sustainable business performance are less explored in the existing literature (Mukhtar et al., 2025). More importantly, previous studies encouraged exploring green innovation for a sustainable business (Mansour et al., 2024c; Nguyen et al., 2025). Similarly, recent studies have suggested conducting a systematic review on the intersection of green technology innovation and sustainable business performance (Qin et al., 2025). Similarly, Palmié et al. (2024) encouraged exploring an interesting avenue such as green technology innovation for sustainable business models. By doing so, we conduct a systematic literature review on green technology innovation and its impact on business sustainability, providing a comprehensive overview of these fields and future agendas for business and society.

This research focuses on green technology innovation for sustainable business performance, as it prepares us for a sustainable future. However, companies need to take sustainable business practices seriously because implementing green technology innovation helps both companies and the planet (Borah et al., 2025). This research contributes in several ways. First, our research contributes to the growing body of knowledge on sustainable business performance as firms refine their decisions about implementing green technology innovations into their operations. Second, this research provides comprehensive and fresh insights, both country-wise, publication-wise, and citation-wise, to gain a better understanding of green technologies and their potential benefits for science, business, and society. Finally, our review offers a valuable avenue for future scholars to explore stakeholder involvement, organizational culture, the adoption of new technologies, employer branding, digital orientation, and organizational agility.

Literature Review

The green innovation technology is described and started to refer to as the behaviour of developing environmentally friendly new technology of product and process, continuing to pursue economic growth advantages provided by

technology innovation and seeking the green ecological benefits of energy cleaning and emission reducing (Zailani et al., 2014; Bataineh, Sánchez-Sellero & Ayad, 2024). Prior research has encouraged the exploration of green technology innovation (Mansour et al., 2024a). Notably, Mansour et al. (2024b) emphasized the importance of environmental innovations for both business and society in preparing for a sustainable future.

Green innovation technology is categorized into two main areas: green product innovation and green process innovation. The goal of "energy conservation" is more prominent in green product innovation. The discovery of new energy sources, the protection of materials, and the use of new technology that is easily generated and recyclable lead to the development of green products (Sun, Li, & Wang, 2022). In green process innovation, the goal of "emission reduction" is more significant. Its objective is to eliminate pollution in the industrial process by improving processes, changing equipment, and innovating (Yang et al., 2024).

Stakeholder Theory

Recent developments in technological adoption encouraged the application of stakeholder theory (Wang et al., 2025). Similarly, a recent study highlighted the importance of stakeholders in the adoption of green technological innovations (Luo et al., 2025). In addition to this, another stream of research has explored the importance of integrating stakeholders in achieving sustainable business and green technologies (Zhang et al., 2025). More importantly, the incorporation of stakeholders inside organizations encompasses three essential dimensions: stakeholder awareness, stakeholder engagement, and adoption behaviour. These aspects collectively enhance generative innovation inside organizations (Hossain et al., 2013). However, understanding stakeholders involves comprehending their viewpoints, requirements, and expectations. This understanding enables companies to synchronize their green technology innovation initiatives with stakeholder interests, guaranteeing that efforts are pertinent and informed (Sing et al., 2022).

Furthermore, empirical studies indicate that stakeholder integration enhances an inclusive strategy for environmental stewardship, hence advancing green technology innovation for sustainability (Petrou et al., 2020). This integration enables organizations to access a broader range of perspectives, resources, and expertise, ultimately leading to the development and adoption of new solutions that align with environmental sustainability objectives (Chatterjee & Mariani, 2022). Integrating stakeholders, which includes their knowledge, engagement, and adoption behaviour, could be crucial in improving OLC. Firms' willingness to try new things is directly correlated to the level of stakeholder knowledge that employees possess (Hristov & Appolloni, 2022).

Green Process Innovation

Green process innovations refer to new technologies, products, services, or business models that benefit the environment and society (Adams et al., 2016; Sarath, 2024) or meet customer needs with reduced negative impacts (Goodman, Korsunova, & Halme, 2017). They are similar to traditional innovations but differ in terms of objective, complexity, search direction, and uncertainty (Noci & Verganti, 1999; Bos-Brouwers, 2010; Klewitz & Hansen, 2014). Green innovation enables firms to become agents of sustainable development by enhancing their sustainability performance and addressing societal problems (Wicki & Hansen, 2019). To maintain long-term viability, firms must pursue specific innovation. Established green technology businesses often diversify. Diversification helps current firms add green technologies and gain a competitive advantage through green product creation and addressing unserved areas. Resource-based diversification (Ansoff, 1957; Montgomery, 1994) uses a company's resources and core capabilities (Prahalad & Hamel, 1990) to enter new green (niche) markets.

There is an extensive body of literature on innovation determinants and outcomes (Kiefer et al., 201; Mendoza-Silva, 2021), including the importance of innovation for long-term survival (March, 1991) and the drivers and barriers to developing innovations (Tidd, 2020), both in the context of Sustain. The innovation process approach is undeveloped in the literature (Crossan & Apaydin, 2010), notably in SOIs. Several innovation process models can broaden this process viewpoint (Verworn & Herstatt, 2002). Innovation processes—the steps that create a new product or service—can be studied using the fireworks model (Crossan & Apaydin, 2010). Innovation processes are studied using flow models (Verworn & Herstatt, 2002). In innovation management and design literature, these models show innovation development as a linear path from concept through product launch (Verworn & Herstatt, 2002). Empirical research benefits little from this prescriptive stance. Innovation processes can be chaotic, especially in the early stages or when involving radical breakthroughs (Piliang, Bastian, & Muchlish, 2025).

Green Product Innovation

Green product innovation reduces pollution, conserves resources, and improves the environment. It has enabled enterprises to reconcile profitability and environmental responsibility, integrating the economy, society, and environment (Chams & García-Blandón, 2019). Green product innovation, according to the European Commission (2001), reduces environmental impacts and risks, uses fewer resources, and minimizes waste during disposal. Green product innovation preserves the environment and provides more environmental benefits than traditional goods (Reinhardt, 1998). Green product innovation utilizes nontoxic chemicals or biodegradable materials during manufacture to minimize disposal impacts and enhance energy efficiency (Lin, Tan, & Geng, 2013). Green product innovation requires a "cradle to grave" strategy to product design, distribution, usage, and disposal or reuse/recycling (Noci & Verganti, 1999). Green product innovation encompasses product durability, recyclability,

reduction of raw materials, the use of environmentally friendly raw materials, and the elimination of hazardous substances (Xie, Huo, & Zou, 2019). Green product innovation—introducing new or improved products, such as technical components or material developments (Khan, Dhir, Parida & Papa, 2021)—aims to reduce environmental impacts throughout a product's life cycle (Bishop, Styles & Lens, 2021) while meeting market needs. Green product innovation has become crucial to growth and environmental sustainability (Sarath, 2024). Green product innovation may help firms avoid environmental objections and regulatory fines, explore new markets, and succeed with innovative green products. Green product innovation boosts green competency, image, and financial success (Oduro, 2024).

Organizational Performance

Managers and researchers still worry about company success (Almatrooshi et al., 2016). Management and organization literature argues that organizational performance is comprehensive and generic. Snow & Herbiniak (1980) and Richard et al. (2009) state that organizational performance has yet to be defined. Performance depends on context. Organizational performance has historically been viewed as primarily economic (Barney, 1991). From this perspective, organizational performance means achieving economies of scale, decreasing total costs, especially the cost of products sold, and aligning dynamic resources with the vision to build a sustainable and long-term competitive advantage in the industry (Porter, 1987). Sustainability is also becoming increasingly prominent in discussions of organizational performance (Maletič, 2018; Sarfraz et al., 2021; Gunarathne, 2021). Stakeholders, including government, partners, and customers, are adjusting their sustainability expectations (Singh & Misra, 2021). Stakeholders want the company to be more responsible for the environment and society (Spielmann et al., 2021) while retaining financial and economic success (Bel Hadj Miled, 2025). Thus, organizations must design social, environmental, and economic performance measures. The triple bottom line (TBL) concept enables organizations to evaluate their social, environmental, and economic performance (Elkington, 2013).

Social Performance

Social performance is a company's commitment to society (Rezaee, 2017). The triple bottom line theory, an accounting framework for assessing sustainable organizational performance, emphasizes social performance (Nicoletti Junior et al., 2022). Organizations benefit society without polluting (Grant & Vasi, 2017; Razaee, 2017). The social line of organizational performance suggests that the organization's commercial activity will benefit and be fair to society and its stakeholders, including labour, community, and society (Esteban-Sanchez et al., 2017). The social line of performance toward customers may involve giving value and utility through priced items or services (Jermsittiparsert et al., 2019). Consumers, employees, and the community have social responsibility (Huang et al., 2024). Create schools, universities, and hospitals, plant trees, reduce ecological losses from manufacturing, and minimize carbon footprints (Jermsittiparsert et al., 2019). Current stakeholder theory and resource-based view research suggest that organizations can contribute to society by innovating green products and services, supported by key stakeholders such as employees, and a combination of core competencies and resources, including organizational agility, digital orientation, employer branding, and innovative capabilities. Asadi et al. (2020) believe green innovation and technology may assist firms in enhancing social performance. Innovative enterprises, particularly those with greener operations, create jobs and increase per-capita income, according to a study. Economists believe that small innovations in economic development can significantly enhance people's lives and make gains more permanent (Aquilani et al., 2020). Green innovation can lower the cost of important commodities and services that society values (Lubberink et al., 2018). According to a study, green innovation and technology increase a company's social performance by giving products and services to the bottom of the pyramid. Bottom-of-pyramid consumers cannot afford high-quality, green products and services (Pincay et al., 2024).

Economic Performance

An organization's economic performance is its ability to meet consumer demand at optimal levels, achieve market equilibrium, minimize costs by maximizing consumer utility through efficient input use, and efficiently and sustainably utilize organizational and natural resources (Miemczyk & Luzzini, 2019). Organizational performance is the economy. Thus, the economic system is a meta-system and an organizational sub-system (Coase, 2012). The organization's economic indicators can increase economic meta-system performance (von Faber, 2024). Triple Bottom Line literature concerns the future and sustainability. Thus, organizations' economic performance must promote the economies of future generations (Spangenberg, 2005). The organization's economic performance should strengthen the economy by generating employment, offering higher-quality goods and services at lower prices, and contributing to the economy's growth (Gherghina et al., 2018). Based on resource-based strategy and stakeholder theory, continuous green innovation technology may help firms enhance economic performance (Wang & Juo, 2021; Asadi et al., 2020). Customer utility, cost optimization, economies of scale, and profitability are directly affected by green innovation and technology (Muñoz-Pascual et al., 2019). Consumers encourage ecologically friendly products and services (Nicolau et al., 2020; Agag et al., 2020).

Green innovation and technology are the only way enterprises can meet customer demand for ecologically friendly products and services (Huang, 2016; Wang, 2020). Thus, green technology and eco-friendly products and services help businesses enhance customer usefulness (Yousaf et al., 2021). Green innovation technology's efficiency and effectiveness in manufacturing products and services are vital (Dangelico et al., 2021). Green innovation and

technology create goods with fewer materials, better procedures, and fewer resources (Janssen & Jager, 2002). Thus, it maximizes economies of scale and optimizes production costs (Dev et al., 2020). According to a study, consumers are environmentally concerned and willing to pay extra for green products and services; thus, companies can charge high prices and profit (De Toni et al., 2017).

Environmental Performance

An organization's economic performance is its ability to meet consumer demand at optimal levels, achieve market equilibrium, minimize costs by maximizing consumer utility through efficient input use, and efficiently and sustainably utilize organizational and natural resources (Singh et al., 2016; Miemczyk & Luzzini, 2019). The economic system is a measure of the organization's performance. Thus, the economic system is a meta-system and the organization is a sub-system (Coase, 2012). Economic meta-system performance can improve if the organization performs well on economic indicators (Mert, 2018). Triple Bottom Line literature also considers the future and sustainability. Thus, organizations' economic performance must also support an economic system for future generations (Spangenberg, 2005). The organization's economic performance should also contribute to the robustness of the economic system by creating new jobs, providing higher-quality goods and services at lower prices, and enhancing the economy's productivity (Gherghina et al., 2018). Based on resource-based approach and stakeholder theory, continuous green innovation technology may help organizations improve their economic performance (Wang & Juo, 2021; Asadi et al., 2020; Dangelico et al., 2016). Green innovation and technology have a direct impact on a firm's economic performance, particularly in terms of indicators such as customer satisfaction, cost optimization, economies of scale, and profitability (Muñoz-Pascual et al., 2019). Consumers are becoming increasingly environmentally conscious and prefer products and services that utilize fewer natural resources and have a lower environmental impact (Nicolau et al., 2020; Agag et al., 2020). Green innovation and technology are the primary means by which companies can meet consumer demand for environmentally friendly products and services (Huang et al., 2016; Sellitto et al., 2020; Wang et al., 2020). Thus, embracing green technology and providing eco-friendly products and services would help enterprises maximize customer utility (Yousaf et al., 2021).

Some of the recent reviews discussed digitalization, innovation, and sustainability (Table 1).

Table 1. Reviews on Innovation and Sustainability.

Author(s)	Aim	Results
Berrone et al., (2023)	How do management scholars contribute to sustainable development goals?	Sustainable Development Goals (SDGs) are in alignment with the most pertinent strategic objectives of enterprises, while contextualizing the SDGs within the geographical and industrial frameworks of the firms. Engaging with other organizations and stakeholders to achieve more significant advancements and innovating through business process reengineering.
Palmié et al., (2024)	The role of digitalization and sustainability	This review found complementarities and conflicts among three dimensions of business models (value propositions, value creation and delivery processes, value capture mechanisms), the various options within each dimension, the different digital technologies, the diverse digital affordances, the relationship between digitalisation and sustainability, and the outcomes of the triple bottom line.
Tang et al., (2023)	Employee green behaviour for sustainable initiatives	Employee eco-friendly behaviour has significant ramifications for environmental sustainability within organisations.
Grego et al., (2024)	Antecedents of digital capabilities	This review provides a framework that elucidates the distinctions among IT capabilities, IT-enabled capabilities, and digital capabilities.
Pan & Nishant (2023)	AI linked to digital sustainability	This review revealed sensemaking, interrelationships among supply chain actors, green innovation competencies, measurements, tactics, and enhancement of AI tools.

Methods

The systematic review of literature is one of the innovative ways in which research successfully summarizes the findings of past studies in one place and provides new avenues for future researchers. Therefore, for the development of research on a particular subject, concept, problem, or opportunity, a systematic review of literature is a highly innovative solution. However, the method through which a systematic review of literature should be undertaken needs to be developed carefully so that relevant contributions in theory and construct can be made effectively. Therefore, several researchers such as Tranfield et al. (2003), Pittaway et al. (2004), and Donthu et al. (2021 have established a comprehensive framework for conducting a systematic review of literature that aligns

with the research objectives. This framework has been widely adopted by subsequent studies, as evidenced by the works of Hanelt et al. (2021) and Ghobakhloo (2020). The methodology of the present systematic literature review study is best described in the following sections.

Literature Review Databases

This study systematically reviewed past research, checking the Web of Science and SCOPUS databases. Scientific studies cite these databases because they contain all leading academic journals across many subject areas (Pattinson et al., 2016). As leading resources, Web of Science and SCOPUS deliver extensive publications from top peer-reviewed journals in both organizational science and sustainability. Researchers who have undertaken similar systematic literature reviews on the topic of sustainable business performance and green innovation have also recommended using both Web of Science and Scopus for their purposes (Agrawal et al., 2022; Oduro, Maccario, & De Nisco, 2022).

Searching Strategy

The systematic literature review initiation begins with collecting keywords and expressions relevant to the research area. Analyzed information helps researchers build search queries, which they implement into SCOPUS and Web of Science research databases. The databases were selected because they provide access to peer-reviewed journal articles that are widely recognized across multiple disciplines (Pattinson et al., 2016). To ensure comprehensive coverage of relevant literature, previous literature reviews on the topics of Industry 4.0 and agility were accessed. Research conducted by gave us important direction in creating our search strings (Birkel & Müller, 2021; Khan et al., 2021). Table 2 presents a summary of the search terms and keywords selected for the literature review.

Table 2. Keywords and Search Strings.

Keywords Green Innovation	Sustainable Business Performance
Green Innovation	Triple Bottom Line
Green Process Innovation	Sustainable Business Performance
Green Product Innovation	Organizational Sustainability
Search Strings	(‘Green Innovation’, OR ‘Green Product Innovation’ OR ‘Green Process Innovation’ AND ‘Triple Bottom Line’ OR ‘Sustainable Business Performance’ OR ‘Organizational Sustainability)
Time Horizon	2012-2022

Search Results

The utilization of keywords and search strings in both databases resulted in the identification of 322 academic sources, including journal articles, conference papers, proceedings, and book chapters. To ensure that a comprehensive and relevant body of literature was extracted, multiple keywords and search strings were employed, as outlined in Table 2. Non-academic sources, such as editorial notes, white papers, and commentaries, were excluded to guarantee the inclusion of only scholarly and pertinent literature in the current systematic review of literature.

Inclusion and Exclusion Criteria

The results obtained from the search in both databases were screened based on the inclusion and exclusion criteria by reading their abstracts. The inclusion criteria for the current systematic literature review required that the articles included contain either the keywords related to Sustainable Business Performance, Triple Bottom Line, and Organizational Sustainability, or Green Innovation, Green Product Innovation, and Green Process Innovation, as mentioned in Table 1, in either the title, abstract, or keywords section. Another inclusion criterion that has been considered is the empirical nature of the data. Empirical studies have been included for review. Of the 322 articles retrieved, 84 were deemed highly relevant to the study's context and were included for review and analysis after applying the inclusion and exclusion criteria and removing duplicates.

Quality Assessment

The present research investigated the quality assessment of each article by analysing the full text with critical analysis. While reading the full text of each of the 84, we determined that 45 articles would not add any value to the discussion of the relationship between green innovation and sustainable business, as these articles were either focused on green innovation, sustainable business performance, or any other aspect that was utterly irrelevant to our purpose of study. Thus, the final 39 research papers were included in our study.

Results

The following section describes and highlights the descriptive findings of the systematic literature review study of the present research:

Year-Wise Publications

The present research searched through 10 years of literature from 2013 to 2022 (Figure 1). The findings of the present research study highlight an increasing trend in the literature from 2013 to 2016, which assesses and examines the relationship between green innovation technology and the triple bottom line. However, a decreasing trend was also observed in 2017. The researcher has revisited the research on examining the relationship between green innovation technology and the triple bottom line from 2018 to 2022, revealing a mixed set of trends.

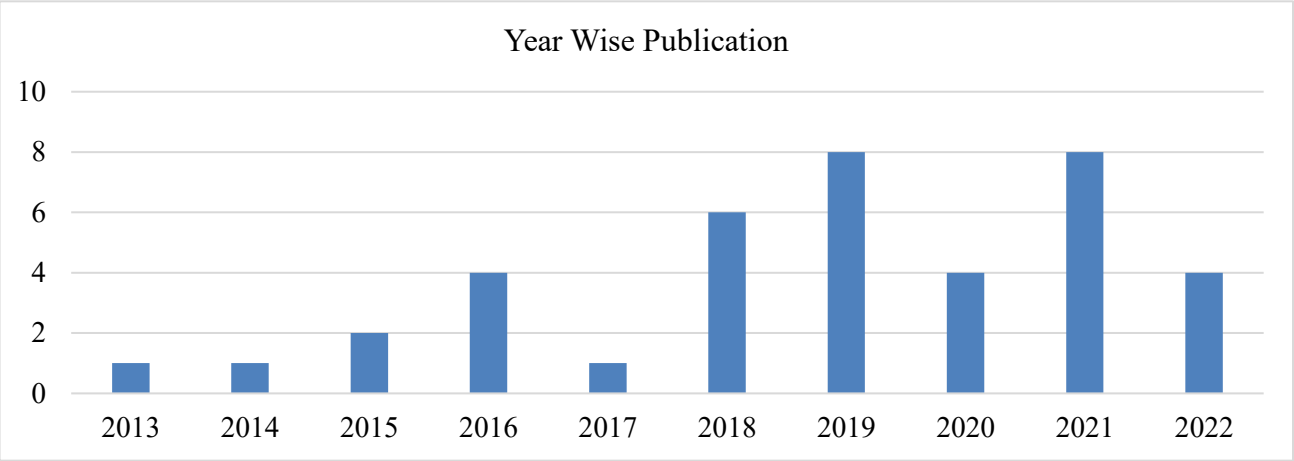

Fig. 1. Year-Wise Publications.

Country-Wise Publications

The results of the present systematic literature review have also shown that most research examining the relationship between green innovation and technology is being undertaken in countries such as Italy, China, and Germany. Research from other countries, such as South Korea, the United States of America, and Malaysia, is also actively contributing to the research relationship between green innovation and technology (Raihan et al., 2022; Mukhtar, Shad, & Lai, 2025). Overall, it can be argued that countries with higher Gross Domestic Product, except for the United States of America, have been ahead in undertaking research and publishing their results in analysing, examining, and describing the relationship between both green technology innovation and triple bottom line (Jennifer & Taylor, 2007; Tseng et al., 2020). Furthermore, it is recommended that future researchers conduct further studies and undertake cross-country and cross-cultural research to gain a deeper understanding of the phenomenon of green technology and the triple bottom line (Figure 2).

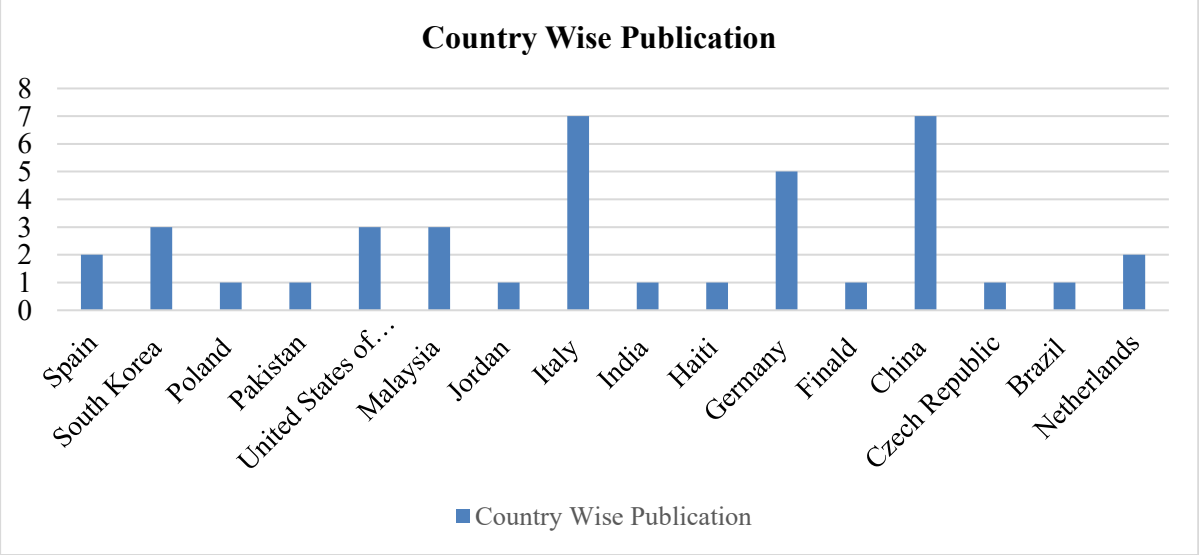

Fig. 2. Country-Wise Publications.

Journals

The results of the present systematic literature review suggest that research examining the relationship between green technology innovation and the triple bottom line is being published in a wide variety of journals. However, our study has identified the four most popular journals for researchers examining such phenomena. These journals include Sustainability, Journal of Cleaner Production, Journal of Business Research, and Business Strategy and the Environment (Adams et al., 2016; Goh et al., 2020; Ahmad, Wong, & Butt, 2023). The researcher has found that most researchers who have participated in our systematic literature review study have chosen a range of multidisciplinary journals. This is consistent with the idea that research on the relationship between green technology innovation and triple bottom line is itself a discipline in nature (Hacking & Guthrie, 2008; Isil & Hernke, 2017; Vukovic et al., 2025). The results are presented in Figure 3 below.

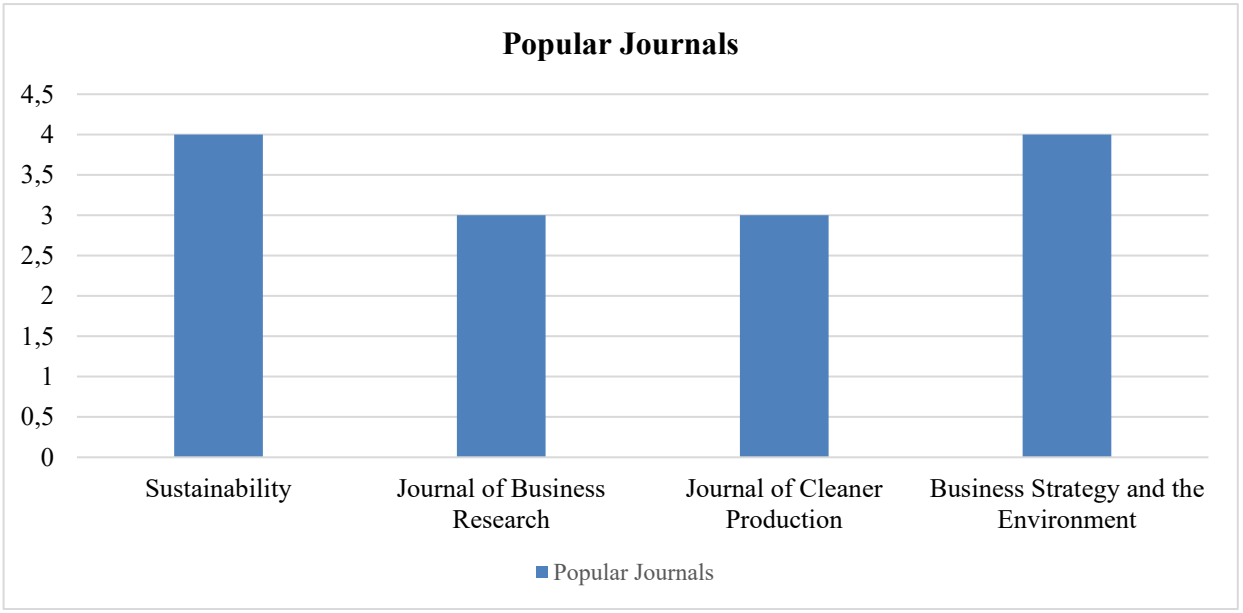

Fig. 3. Popular Journals.

Industry

The industry plays an important role in understanding the phenomena of green technology and innovation. Most green technology innovation is either being undertaken with the active collaboration of industry or is being applied directly into industry. The idea of industry playing an active role in green technology innovation is also consistent with the fact that, government in all around the world have offered varying level of support to industry to implement the green technology either by creating green products or implementing the philosophy of green process in their value chain (Hu et al., 2021; Ahmed et al., 2024; Liu & De Giovanni, 2025).

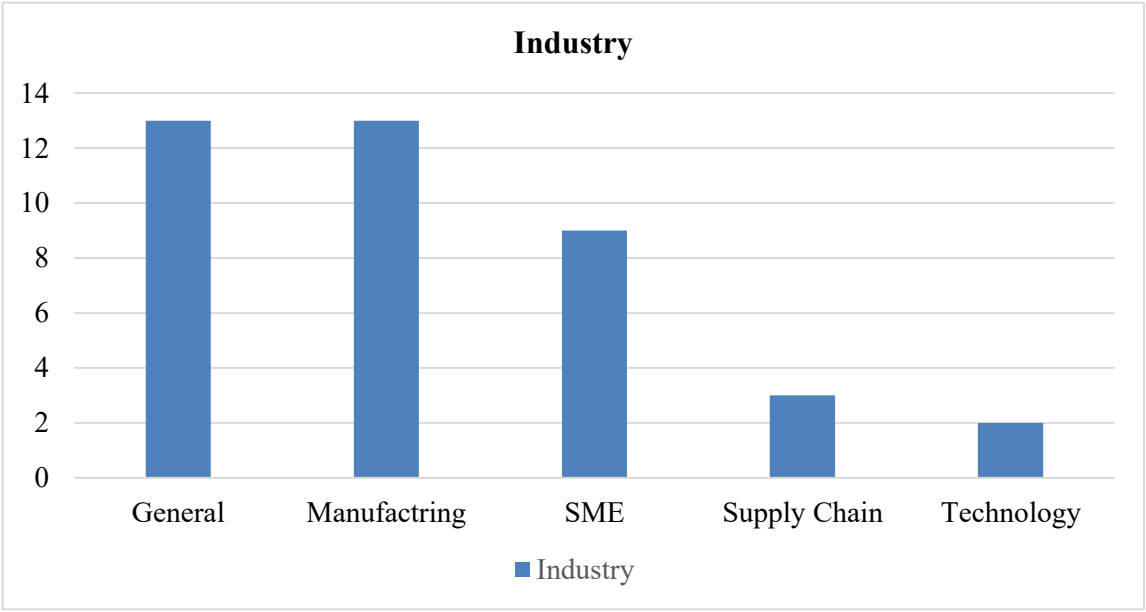

Fig. 4. Industry Specific.

Most researchers have explicitly based their research on a specific industry when examining the relationship

between green technology innovation and organizational performance using the triple bottom line (Khan, Yu, & Farooq, 2023; Lee, Pak, & Roh, 2024). The results show that the manufacturing industry of consumer goods, which spans textiles to fast-moving consumer goods, has been very active in implementing green innovations and technologies (Singh et al., 2024). The results are also consistent with the bare assertion of the present research that consumers' green activism has prompted industries with which consumers have direct contact to change their practices (Saraiva, Fernandes, & von Schwedler, 2020). The results show that the majority of researcher did not mention any industry while taking their sample to analyze the relationship between green technology innovation and sustainable business performance. The other industries into which researchers have attempted to study the relationship between green technology innovation and sustainable business performance include small and medium-sized enterprises (SMEs), followed by supply chain management and technology. The results are depicted in Figure 4.

Authors by Citations

The present research has also analyzed citations of papers that have been reviewed as part of the current systematic literature review study. The present research has found an interesting trend as a result. The papers that have focused on green products, green innovation, green technology, and their relationship with the environment and sustainable business performance are among the most popular research topics, as indicated by the number of citations (Xie, Huo, & Zou, 2019; Wang et al., 2021; Regman et al., 2021). It clearly suggests that research on the relationship between green technology (green products and green processes) is one of the widely read and understood studies (Schiederig, Tietze, & Herstatt, 2012; Sdrolia & Zarotiadis, 2019; Sahoo, Kumar, & Upadhyay, 2023). The results suggest, as depicted in Figure 5, that 11 papers out of 39 have managed to gain citations of 200 or more. Therefore, green technology, green products, green processes, sustainability, and sustainable business performance remain popular research topics among scholars in a range of multidisciplinary fields. Furthermore, it also suggests that more research is still needed, as researchers continue to explore and describe this phenomenon.

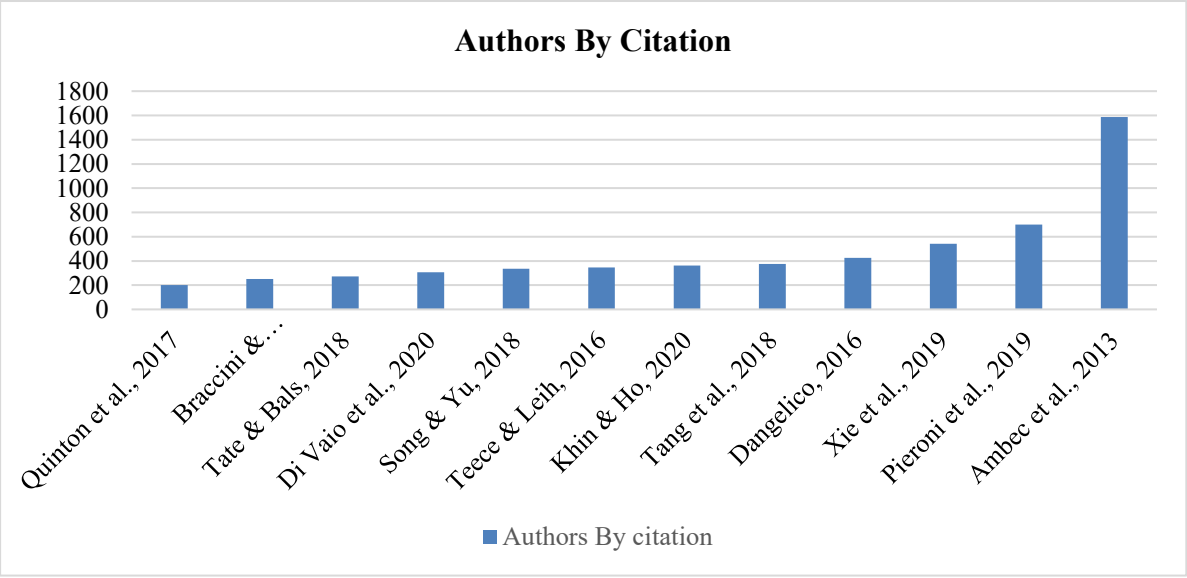

Fig. 5. Citations.

Discussion

The current systematic literature review paper aims to investigate the relationship between a company's sustainable business performance and advancements in green technology innovation. The study employed a comprehensive framework that encompassed various aspects of green technology development and sustainable business performance (Guo et al., 2023; Mukhtar, 2025). The study's findings revealed a strong correlation between green technology innovation and the successful operation of sustainable companies. According to the findings, businesses that invest in the development of green technologies are more likely to achieve sustained commercial success (Hu, Xu, & Chen, 2023; Ye & Dela, 2023). The use of a large and varied sample in the study, along with a reliable approach for statistical analysis, both contributed to strengthening the relationship (Kohtamäki et al., 2012; Bliese et al., 2024). The table below illustrates these findings and amply demonstrates the favorable relationship between the development of green technologies and the success of sustainable businesses. The general set of findings on the relationship between green technology and innovation, green products, and green process innovation, and aspects of sustainable business performance along the lines of the triple bottom line are depicted in Table 3 below.

Table 3. Relationships of Green Technology Innovation and Sustainable Business Performance.

S. No	Green Technology Innovation	Sustainable Business Performance	Relationship	Source
1		Social Performance	+	(Jum'a et al., 2022; Braccini & Margherita, 2019)
2	Green Product Innovation	Economic Performance	+	(Xie et al., 2019; Ayllón & Radicic, 2019; Jayashree et al., 2021)
3		Environmental Performance	+	(Ambec, 2013; Ardito et al., 2021; Rabal-Conesa et al., 2022)
4	Green Innovation Process	Social Performance	+	(Cantamessa & Montagna, 2016; Demirel & Danisman, 2019; Hermundsdottir & Aspelund, 2020)
5		Economic Performance	+	(Khin & Ho, 2019; Quinton et al., 2017; Wei, & Sun, 2021)
6		Environmental Performance	+	(Nasiri et al., 2021; Pieroni et al., 2019; Treiblmaier, 2019)

Theme 1. Innovation in Products and Social Performance

For businesses to maintain a competitive edge in their various industries, innovation in their products has become an integral part of their corporate strategy (Tate et al., 2018). As customers and stakeholders increasingly seek corporate responsibility and sustainability, social performance has become more important to businesses (Jum'a et al., 2022). Based on the outcome of our systematic literature study (Junior et al., 2018), product innovation and a company's social performance are positively related. This association can be understood on the basis that the kind of businesses that are successful in innovating products tend to provide them with valuable societal outcomes. For example, the company that produces an innovative "green" product that is environmentally friendly and has a less impactful carbon footprint can enhance the social performance of the company (Rabal-Conesa et al., 2022; Tate et al., 2018; Prazeres et al., 2022; Jayashree et al., 2021). Moreover, firms that drive innovation with a social performance orientation may build products that address social issues such as poverty, health, and education. The literature research also revealed that the relationship between social performance and product innovation has nuances (Prazeres et al., 2022; Jayashree et al., 2021; Jum'a et al., 2022; Junior et al., 2018). Several other variables can also impact the relationship, including the industry in which the business operates, its size, and the surrounding environment. For example, due to strict rules and standards, businesses in highly regulated areas, such as healthcare or energy, may become less significant and less able to grow, considering their social performance. As with large companies, smaller ones often have limited ability to utilize available resources towards social performance (Braccini & Margherita, 2019). According to a systematic literature review, a dynamic and evolving correlation exists between product innovation and social performance. For example, a company that has successfully innovated a product will initially reap social benefits; however, as the product gains wider adoption, these benefits may become less pronounced due to increased demand and production (Ambec et al., 2013). As people cannot stop innovating, businesses too can stop innovating to maintain their social performance and be responsive to changing social and environmental demands.

Theme 2. Innovation in Products and Economic Performance

Green product innovation enables firms to develop novel products and services that meet the changing wants and preferences of customers and has been identified as one of the key factors in economic development and competitiveness (Xie et al., 2019). Nevertheless, the impact of product innovation on a company's financial success can be complicated and may be influenced by several factors (Ayllón & Radicic, 2019). Based on the findings from our systematic review of the literature, the economic performance of the firm may be significantly improved through product innovation; more so green product innovation (Ardito et al., 2021; Ayllón & Radicic, 2019; Ayllón & Radicic, 2019; Braccini et al., 2019; Choi et al, 2020; Prazeres et al., 2022). Businesses can increase their market share and revenue by creating new products or improving existing ones. Cost reductions are also a benefit of product innovation, as the costs of new items may be less resource- or production-intensive compared to those of their predecessors (Mrugalska & Ahmed, 2021; Xie et al., 2019). Moreover, product innovations create new businesses and jobs, which are conducive to economic growth. The creation of new industries and markets, driven by the development of innovative goods and services, can promote economic activity and lead to increased employment opportunities. Such innovation of the product may serve the company and the general economy positively. However, the relationship between product innovation and economic performance is not always crystal clear. For example, launching new items can be costly, and there is no guarantee that they will be successful. Therefore, companies need to regulate their efforts to develop new products, paying attention to both the potential benefits and related risks (Ayllón & Radicic, 2019; Dangelico, 2016). Also, external factors such as competition, regulations, and customer inclination can influence the nature of the impact of product innovation on economic success. It may be challenging for businesses to differentiate themselves and stand out with their products in a highly competitive

world through innovation. Blind (2016) likens this to businesses facing legislative hindrances that limit their level of innovation or make it difficult for them to identify and respond to changing market trends (Jayashree et al., 2021).

Theme 3. Innovation in Products and Environmental Performance

Enterprises that want to prioritize sustainability and environmental protection should develop creative green products (Dangelico, 2016), an insight agreed upon by a variety of researchers examined in the current systematic literature review of studies. When creating new or improved products, companies can decrease their environmental impact, increase the efficiency of their resources, and address new environmental challenges (Prazeres et al., 2022). Product innovation and environmental performance are complex and influenced by multiple factors. Product innovation can enhance a firm's environmental performance, according to research (Jum'a et al., 2022). Inventing or innovating products, businesses can reduce the environmental effects and enhance resource efficiency. Businesses can produce products that consume less energy, resources, or materials. New technology to fight pollution and climate change may result from product innovation. Product innovation can also change customer behaviour to adopt more sustainable products and from traditional practices (Ambec, 2013; Ardito et al., 2021). Eco-friendly products can drive up demand for sustainable products and services, encouraging customers to live more responsibly. It might encourage sustainable consumption and production. Product innovation and environmental performance are far from transparent. New product development can require significant energy and resources, potentially offsetting any environmental benefits. Rather than recycling such items, disposing of outdated items, especially those with harmful components or low value, can damage the environment (Rabal-Conesa et al., 2022). Law, product market conditions, and customer preferences may also influence how product innovation affects the environmental performance. Well-regulated industries may struggle to develop new products that comply with regulations. In competitive markets, firms may face challenges in selling sustainable products because consumers' tastes do not always align with their preferences (Braccini et al., 2019).

Theme 4. Process Innovation and Social Effectiveness

Process innovation has been considered an essential approach for those companies willing to achieve social and environmental sustainability (Ayllón & Radicic, 2019). Business firms can reduce their environmental impact, improve working conditions, and promote social and economic development by enhancing their manufacturing processes and operations (2). The relationship between process innovation and social performance appears to be more complex and contingent upon various factors. According to the results of a comprehensive systematic review of the literature, process innovation can significantly enhance a firm's social performance metric (Cantamessa & Montagna, 2016; Demirel & Danisman, 2019). Firm modernization in terms of practices and processes leads to minimized negative impacts on the environment, an improved social prism, and socioeconomic development. For example, innovation in company practices can lead to the development of more efficient manufacturing policies that reduce waste, energy consumption, and resource depletion (Di Vaio et al., 2020). This can improve business efficiency, which in turn helps achieve organizational environmental sustainability (Hwang et al., 2015). Moreover, process innovation can improve the employees' working conditions and health (Hermundsdottir & Aspelund, 2020). Process streamlining enables companies to enhance safety, ergonomics, and reduce the physical stress and workload placed on employees (Kennedy & Bocken, 2020). Process innovation can also lead to the emergence of new training curricula and forums for skill development, allowing personnel to enhance their careers and expand their skill spheres. Moreover, through the creation of jobs and spurring regional economic activity, process innovation may benefit social and economic development (Mrugalska & Ahmed, 2021). Businesses can enhance their operations and manufacturing processes to become even competitive, create new jobs in the local economy. This can be used to achieve broader social and economic development objectives, thereby helping to reduce unemployment and poverty (Neri et al., 2021). However, the relationship between process innovation and social performance is not always simplistic. For example, the costs of adopting new production methods and technologies may be substantial, and the benefits may not be immediately apparent (Zhao & Huang, 2022).

Theme 5. Innovation Process and Economic Performance

It has been noted that organizations seeking to improve or enhance their productivity and competitiveness often find that process innovation stands out as a crucial strategic option (Damanpour & Evan, 1984; Čirjevskis, 2019). Cost reduction, enhanced productivity, and achieving sustainable development are possible for businesses through the optimization of manufacturing procedures and operations (Khin & Ho, 2019). However, the linkage between process innovation and economic achievement can often be challenging to explain, as several mediating factors are involved (Quinton et al., 2017). Research shows that losing process innovation has the potential to enhance a firm's financial performance significantly. By optimizing their manufacturing processes and operations, companies can reduce expenditure, enhance productivity, and elevate product quality (Tang et al., 2018). To illustrate, lowering resources, energy, and waste elimination during production enhances processes and is a method of expressing process innovation. Such innovations help ensure economic sustainability, enhance market competitiveness, and improve the firm's reputation (Wei & Sun, 2021). Furthermore, process innovation can lead to the development of new products and services that enhance a company's market share and revenue streams.

The linkage between a company's economic performance and the undertaking process innovations is not always directly proportional or linear. For instance, there are always costs involved in developing new ways of doing things,

such as implementing new technologies or manufacturing methods, which can prove to be very costly without yielding quick returns. Moreover, workforce restructuring that accompanies the implementation of specific innovations may lead to unemployment, and if not well-managed, can have adverse consequences for the economy (Teece & Leih, 2016). The way innovation is designed and executed governs its impact on the economy. Additionally, external influences such as regulations, market conditions, and customer preferences can also shape the impact of innovation on economic achievement. For companies operating in heavily regulated industries, integrating new manufacturing techniques that align with regulations may be challenging. Customer preferences are not always aligned with eco-friendly production processes, and firms in a monopolistic competition may struggle to market a sustainable offering (Xie et al., 2019).

Theme 6. Innovation Process and Environmental Performance

For businesses trying to achieve environmental sustainability and minimize their environmental footprint, process innovation has been recognized as a key strategy (Bhupendra & Sangle, 2015). Businesses can reduce waste, energy consumption, and resource depletion by upgrading their manufacturing processes and operations. Process innovation and environmental performance, however, may have a complex relationship that depends on several variables (Nasiri et al., 2021). According to the literature, process innovation may significantly enhance a company's environmental performance. Businesses can reduce their environmental impact and contribute to achieving sustainable development goals by optimizing manufacturing processes and operations (Pieroni et al., 2019). Innovative production processes minimize waste, reduce energy consumption, and mitigate resource depletion. Firms may improve market competitiveness and environmental sustainability. Process innovation may produce eco-friendly goods and services. Manufacturing techniques may improve product efficiency, innovation, and sustainability (Song & Yu, 2018). This helps enterprises compete and satisfy demand for sustainable products and services. Process innovation may help firms avoid environmental fines. Sustainable manufacturing lowers a company's environmental risks (Treiblmaier, 2019). This may help organizations establish a positive reputation and demonstrate environmental sustainability to clients, shareholders, and staff. Process innovation may not have a significant impact on environmental performance (Turulja & Bajgoric, 2019). New production procedures and technologies may cost and take time to pay off. Process innovation can lead to employee relocation and job losses, which can hurt the environment if not managed correctly. Depending on rules, economic conditions, and customer preferences, process innovation may impact environmental performance (Yousaf et al., 2021). Highly regulated enterprises may struggle to develop compliant manufacturing methods. Sustainable products may struggle in competitive marketplaces (Zailani et al., 2014).

Conclusions and Future Direction

The areas of sustainable business performance and green innovation technology have emerged. Several areas of future research recommendations are offered by current research (Table 4). These include the following:

Table 4. Future Direction.

Dimensions	Future Directions
Stakeholders Involvement	How do stakeholders demand eco-friendly products for sustainable business practices?
Organizational Culture	How do organizational cultures create an environment that is conducive to innovation and sustainability?
Adoption of New Technologies	Examine the connection between the capacity to innovate and the acceptance of new green technologies. Future studies can look at how businesses' capacity for innovation affects their capacity to create and use green technology, as well as how businesses might improve their capacity for innovation to promote sustainability.
Employer Branding	How might businesses utilize employer branding to draw in and keep human resources who are enthusiastic about sustainability, and how might this affect the uptake of green technology?
Digital Orientation	How can digital technologies aid in the adoption and use of green technology, as well as how might businesses adopt a digital mindset and orientation to promote sustainability?
Organizational Agility	What is the role of organizational agility, inventive capabilities, employer branding, and digital orientation on the adoption of new green technologies? How do these variables affect how quickly green technology is adopted across sectors and geographical areas, as well as how they might be used to this advantage?

Practical Implications

According to a systematic literature review, a dynamic and evolving correlation exists between product innovation and social performance. For example, a company that has successfully innovated a product will initially reap social

benefits; however, as the product gains wider adoption, these social benefits may become less pronounced due to increased demand and production (Ambec et al., 2013). As people cannot stop innovating, neither can businesses stop innovating to maintain their social performance and to be responsive to changing social and environmental demands. However, the relationship between product innovation and economic performance is not always crystal clear. For example, launching new items can be costly, and there is no guarantee that they will be successful. Therefore, companies need to regulate their efforts to develop new products, paying attention to both the potential benefits and related risks (Ayllón & Radicic, 2019; Dangelico, 2016). Also, external factors such as competition, regulations, and customer inclination can influence the nature of the impact of product innovation on economic success. It may be challenging for businesses to differentiate themselves and stand out with their products in a highly competitive world through innovation. Parekh et al. (2009) liken this to businesses facing legislative hindrances that limit their level of innovation or make it difficult for them to identify and respond to changing market trends (Jayashree et al., 2021).

Businesses can enhance their operations and manufacturing processes to become even competitive, create new jobs in the local economy. This can be used to achieve broader social and economic development objectives, thereby helping to reduce unemployment and poverty (Neri et al., 2021). For companies operating in heavily regulated industries, integrating new manufacturing techniques that align with regulations may be challenging. Additionally, customer preferences are not always aligned with eco-friendly production processes, and firms in a monopolistic competition may struggle to market sustainable offerings (Xie et al., 2019). Inventing or innovating products, businesses can reduce the environmental effects and enhance resource efficiency. Businesses can produce products that consume less energy, resources, or materials. New technology to fight pollution and climate change may result from product innovation. Product innovation can also change customer behaviour to adopt more sustainable products and from traditional practices (Ambec, 2013; Ardito et al., 2021). Eco-friendly products can drive up demand for sustainable products and services, encouraging customers to live more responsibly. It might encourage sustainable consumption and production. Product innovation and environmental performance tend to be far from transparent.

In recent years, organizations seeking to enhance their sustainability results have increasingly turned to the adoption of green technological innovations. This triple-bottom-line-focused systematic literature review aimed to consolidate the body of knowledge on the relationship between green technology innovation and sustainable business success. The review found a strong and favourable link between green technological innovation and successful sustainable business practices, with green products and green business practices having a significant impact on economic, social, and environmental performance. The adoption of green technological innovations has been shown to have a significant impact on the environmental aspect of sustainability, with green goods and processes resulting in decreased resource consumption, emissions, and waste generation. The adoption of green technological innovation has a positive impact on society as well, with firms reporting increased staff morale, enhanced consumer loyalty, and improved reputation. Ultimately, our comprehensive review suggests that businesses should adopt new green technologies to achieve success from both financial and environmental perspectives, considering the importance of dynamic industries both globally and locally.

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