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Impact of Green Product Innovation, Green Process Innovation, and Green Competitive Advantage on the Sustainable Performance of Garment Firms in Bangladesh: A Conceptual Framework

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Abstract

In recent years, green practices, crucial for ensuring sustainable performance in business activities, have gained special attention in academia and industry. Guaranteeing sustainable performance in the manufacturing industry, especially in the garment industry in Bangladesh, has been a significant concern for the government, policymakers, industrialists, academics, and all other stakeholders in the present society. Hence, understanding the factors contributing to enhancing the garment industry's sustainable performance is crucial. The current study aims to examine the relationships between green product innovation, green process innovation, and firms' sustainable performance in Bangladesh's garment industry. This study will also examine whether green competitive advantage mediates the abovementioned relationships. Based on previous studies and theories, namely natural resource-based view theory and stakeholder theory, this study proposes a conceptual framework and analyzes relationships between the chosen variables. This study has important implications for all policymakers and future researchers, as not many researchers used the theoretical framework to test the research model. This study draws a novel framework that illustrates the contribution of green competitive advantage to firms' sustainable performance by implementing green innovation practices in business operations. Furthermore, this study will help practitioners and academics better understand the influencing factors for enhancing and ensuring the sustainable performance of garment firms in Bangladesh.

Keywords: Green Product Innovation, Green Process Innovation, Green Competitive Advantage, Sustainable Performance, Garment Industry

Introduction

The long-term existence of our planet, human well-being, and human societies are under pervasive threat due to the present anthropogenic climate change worldwide (Bitire, 2023; Eng et al., 2023). Human society mainly depends on the environmental system and its services (Nakhle et al., 2024). However, various human activities change the climate negatively, which ultimately adversely affects the environment and biological system in multiple ways, like global warming, rising sea levels, and catastrophic weather incidents (Hsu & Sharma, 2023). Therefore, organizations must pay special attention to their business activities to produce eco-friendly products that balance environmental issues with human welfare (Hameed et al., 2024). Organizations should be concerned about environmental issues while setting their business policies and strategies due to the continuous global awareness of the environment (Mosgaard & Kristensen, 2023).

Considering the negative impact of global warming, caused by manufacturing organizations mainly, on human lives and society, the United Nations introduced sustainability solutions in their Environment and Development Conference held in Rio de Janeiro, Brazil, in 1992 that each country must achieve to protect the world from environmental degradation (UN, 1992). Again, to ensure environmental safety and better human lives, the United Nations proposed the Sustainable Development Goals (SDGs) Agenda (Agenda-2030), which acts as the road map for overcoming environmental, social, and economic challenges (Greenland et al., 2023). All countries worldwide accepted the UN's sustainable development goals agenda (Agenda-2030) to establish peace and harmony in this world. The agenda is an urgent action that needs to be implemented by both developing and developed countries (UN, 2024). Considering this agenda, eco-friendly business activities have become the main concern of all businesses in the highly industrialized and competitive business world to implement the UN's sustainability solutions (Wonglimpiyarat, 2024).

In this highly competitive business world, the manufacturing industry has been recognized as one of the crucial industries that plays a critical role in achieving better economic development and a standard of living (Haraguchi et al., 2017). This industry contributes significantly to economic growth and social welfare worldwide (Hossain et al., 2022), accounting for 16% and 23% of the global gross domestic production (GDP) and employment generation, respectively (WB, 2022). However, though manufacturing is the most significant driving industry in a country's economic development, irrespective of developed and developing countries, this industry is heavily responsible for environmental pollution (Bangladesh Economic Review, 2022; Raza & Hasan, 2022). Therefore, green manufacturing practices in this industry are indispensable for ensuring a sustainable environment worldwide.

As a manufacturing industry, the garment industry needs to concentrate on sustainability issues in its strategic decisions and operating levels because of the gradual importance of environmental and social issues, regardless of financial issues, in business operations. However, business owners are not interested in implementing sustainability principles in their business operations because of the dissimilar characteristics of

organizations (Broccardo et al., 2023). Therefore, previous scholars in different fields recommended the implementation of the sustainability pillars- economic, environmental, and social performance- in organizations' regular activities to ensure sustainable performance (Almeida & Wasim, 2023; Dalampira & Nastis, 2020).

Bangladesh's garment/apparel industry is not exempted from sustainability issues. This industry is liable for increasing the temperature (Acar et al., 2022; Seyam et al., 2023), polluting water and air (Indriana et al., 2022; X. Wang et al., 2023; Yang et al., 2022), which adversely affects and hampers the environment, society, and the quality of human lives (Alvarado et al., 2023; Fan et al., 2023; Fanse, 2022; Rani et al., 2021). Hence, this industry must focus on its environmental performance to preserve a better human society. Concerning this issue, various organizations, scholars, governments, and policymakers have repeatedly introduced environmental preservation policies and strategies in their business activities (Berg et al., 2021; BGMEA, 2020; Chowdhury et al., 2023; ILO, 2018; Islam & Halim, 2022; Khan & Roy, 2023; UNDP, 2021).

Bangladesh's garment industry is the second-largest in the world (Razzak, 2023). It plays a crucial role in Bangladesh's socio-economic development by earning foreign currency from exporting garment products globally (Salman et al., 2023). However, excessive chemical usage in the production process, defective production, inefficient transportation, and waste disposal systems made this industry the most polluting and unhealthy industry in Bangladesh (Billah et al., 2023). Hence, ensuring green or environmental practices in business operations in this industry is essential for achieving and retaining long-term environmental performance (Bangladesh Planning Commission, 2020; BGMEA, 2020, 2022). In this connection, The International Labour Organization (ILO), the USA, Canada, the Government of Bangladesh, the European Commission, and other stakeholders agreed with the continuous improvements in labor rights and factory safety in the garment industry in Bangladesh by ensuring the global standard in business operations which ultimately lead to attaining sustainable performance in the apparel industry of Bangladesh (Khan & Roy, 2023).

As an ongoing effort to establish sustainable performance in business organizations globally, environmentally friendly business activities have become critical in the era of a globalized and competitive business world (Rahman & Karim, 2021). Previous scholars pointed to many indicators contributing to ensuring sustainable performance. Critical factors contributing to sustainable performance include green innovation practices in business activities, like green product innovation and green process innovation (Aftab et al., 2022; Anu et al., 2023; Cheah et al., 2024; Din et al., 2024; Shafait & Huang, 2024; Yadav et al., 2024), and green competitive advantage (Din et al., 2024; Liem & Hien, 2024; Waqas et al., 2021). Therefore, a firm's performance can be improved by integrating its business activities with environmental concern (Hasan, 2019), which was repeatedly sought by different scholars and institutions worldwide (Obeidat et al., 2023; Saqib & Zhang, 2021). Besides, scholars opined that implementing economic, social, and environmental pillars of sustainability performance in firms' regular business operations is crucial to enhance and ensure firms' sustainable performance (Almeida & Wasim, 2023; Dalampira & Nastis, 2020). Firms' green practices, such as pollution prevention strategies, green innovation practices, and green environmental practices, can foster the sustainable performance of an organization (Hui et al., 2024; Sharma et al., 2021; Umar et al., 2022).

Green innovation is a critical issue that attracted the attention of various scholars, academics, and business individuals who incorporated this issue in their strategic business decisions to maintain a harmonious balance among the financial, social, and environmental performance of sustainability pillars (Maldonado-Guzmán et al., 2023). The word 'green innovation' refers to the significant improvement either in products or services by considering environmental issues to mitigate resource consumption, waste, pollution, and emissions (Al-Shboul, 2023; Zhou et al., 2023). In the literature, most of the scholars conceptualized and described the term 'green innovation' in two dimensions, namely green product innovation and green process innovation (Singh et al., 2020; Xie et al., 2019). Green product innovation concentrates on waste recycling, eco-friendly raw materials selection, and maintaining desired environmental standards (Chen et al., 2006), whereas green process innovation concentrates on reducing energy consumption and utilizing natural resources efficiently (Xie et al., 2019).

Previous scholars in the literature, like Abbas and Khan (2023); Afum et al. (2021); and Frare and Beuren (2022), identified how green product innovation can act as a critical predictor for ensuring firms' sustainable performance. Again, several researchers, like Dai et al. (2022); Rahman (2023); Le (2022); and Xu et al. (2023), explored the link between a firm's green product innovation and environmental performance. In addition, Xie et al. (2019); Wang & Ahmad (2024); Sarfraz et al. (2022); and Yadav et al. (2024), identified the critical impact of organizations' green process innovation in strengthening an organization's eco-performance. Numerous scholars have examined the effects of a firm's green process innovation on its long-term performance (Abbas et al., 2023; Almeida & Wasim, 2023). Their empirical findings revealed that there was a significant positive relationship between organizations' green process innovation and sustainable performance.

Green competitive advantage is another crucial factor in understanding and explaining the environmental-related performance of an organization (Zhao & Zhou, 2023). The term 'green competitive advantage' was first introduced by Chen in 2011. Green competitive advantage refers to such a condition under which a firm holds some distinct positions in terms of environmental management and green innovation where its rival companies cannot easily imitate or copy its efficient green strategies (Chen, 2011). Chen (2011), accumulated the term 'competitive advantage' with green management and innovation and coined it as a green competitive advantage.

According to Aidara et al. (2021), and Mukhsin and Suryanto (2022), a firm can enhance its sustainable performance by achieving a green competitive advantage in terms of cost, innovation quality, image, managerial capabilities, etc. Green competitive advantage can strengthen the relationship between a firm's environmental practices and sustainable performance. Elidemir et al. (2020), recognized the necessity and challenges of gaining a green competitive advantage. Furthermore, Fatonah and Haryanto (2022), opined that organizations' green innovation, culture, market orientation, and behavior could foster a firm's green competitive advantage. Therefore, almost every organization's top priority is to attain a green competitive advantage, which is treated as the prerequisite of achieving a company's sustainable performance.

Green innovation is also deemed a critical factor in accelerating a firm's competitive advantage (Dang & Wang, 2022; Fatoki, 2021; Xin & Wang, 2023). Since green competitive advantage is related to green innovation (product and process) and sustainable performance, it can mediate the relationship between organizations' green product innovation, green process innovation, and sustainable performance. Furthermore, numerous scholars identified the mediating effect of competitive advantage between green innovation and the sustainable performance of a firm (Cantele & Zardini, 2018; Do & Nguyen, 2020; Saeidi et al., 2015), but no study revealed the mediation effect of green competitive advantage between the above-mentioned relationships. Therefore, the scarcity of research on the mediating effect of green competitive advantage in the relationship between green innovation and firms' sustainable performance, especially in the context of the apparel industry in Bangladesh, encouraged the current researchers to conduct this study.

Thus, considering the previous research findings, organizations and practitioners may consider it increasingly relevant to study the variables critically contributing to the enhancement of organizations' sustainable performance, especially in the context of the apparel industry in Bangladesh. Therefore, the current study focuses on the effects of green product innovation, green process innovation, and green competitive advantage on the sustainable performance of garment firms in Bangladesh.

Theoretical Framework

The current study's conceptual framework was based on some theories from which the dependent and independent variables were derived. The natural resource-based view (NRBV) theory (Hart, 1995) and the stakeholder theory (ST) (Freeman, 1984) formed the theoretical foundation for this study. According to Hart (1995), NRBV theory concentrates on leveraging a firm's internal and external natural resources to form its capabilities that can help organizations achieve strategic advantage over competitors and attain long-term success. This theory also explains that an organization's success depends on creating and utilizing its natural resources (Afum, Agyabeng-Mensah, Baah, Asamoah, et al., 2023). This theory further explains the impact of environmental business policies and strategies, like green product or process innovation, on an organization's valuable capabilities, which further improve the organization's environmental performance by creating a better green competitive position over competitors in the market (Hart & Dowell, 2011). Hence, according to the NRBV theory, a firm can possess a superior market position when its resources and capabilities are scarce, inimitable, valuable, environmentally friendly, and irreplaceable, which can enhance the firm's long-term performance (Barney, 1991).

Freeman's (1984), stakeholder theory explains how various stakeholders, such as customers, suppliers, co-workers, government, etc., influence business owners and policymakers in making organizational decisions that consider social and environmental obligations in addition to achieving financial objectives. According to Fontoura and Coelho (2022), the stakeholder theory is a complete framework that helps understand and manage reciprocal relationships between an organization's business and various stakeholders' interests by stating that each stakeholder influences and is influenced by each other with proper consideration of a firm's environmental and social obligations in its business operations. Thus, stakeholder theory explains the link between a company's relationship management strategy and stakeholders' interests, which ultimately lead business activities

toward sustainable performance (Freeman et al., 2021; Le et al., 2022). Finally, this study used the NRBV and ST theories to draw the current study's conceptual framework and explain the relationships between the understudy variables.

Literature Review and Hypotheses Development

The Relationship between Green Product Innovation and Sustainable Performance

According to Larbi-Siaw et al. (2022), green product innovation refers to introducing ecological products or upgrading existing products using environmentally friendly materials and elements that have less environmental impact. In recent years, organizations' green practices, such as green product innovation (GPDI), have been recognized as the critical measure of a company's environmental or sustainable performance (Sarfraz et al., 2022). Numerous scholars in the literature examined the relationship between green product innovation (GPDI) and firms' sustainable performance. For example, Fok et al. (2022) investigated the relationship between a firm's green practices, like green product innovation, and sustainable performance in the context of retail, healthcare, and manufacturing sectors in the southeast region of the USA. In this quantitative study, researchers collected data from 330 respondents who hold full-time managerial positions in organizations. Statistical analysis using SPSS and AMOS revealed a significant positive relationship between GPDI and firms' sustainable performance. Besides, Song et al. (2020) recognized GPDI as a critical determinant in achieving business sustainability performance. Similarly, Ma et al. (2018) explained how GPDI significantly contributes to achieving a firm's eco-performance by mitigating environmental deterioration. Therefore, organizations that create green products can reduce negative environmental effects, meet customer expectations, and improve resource efficiency (Larbi-Siaw et al., 2022). In contrast, Lewandowska et al. (2022) carried out another quantitative study on some European Union enterprises with the help of the community inventory survey method. Their Path Model analysis revealed a negative correlation between organizations' green innovation practices and environmental performance.

Maziriri and Maramura (2022), conducted another quantitative study in the context of small and medium-sized manufacturing enterprises in South Africa to investigate the relationship between green product innovation and organizational sustainable performance. A total of 321 directors were interviewed through a questionnaire on a 5-point Likert scale. Researchers applied the structural equational modeling (SEM) technique and tested hypotheses using statistical analysis. The research findings explored that GPDI positively and significantly influenced farms' sustainable performance. However, Andersén (2021), conducted another quantitative study among 305 respondents working in manufacturing industries, such as the chemical industry, rubber and plastic industry, non-metallic mineral products industry, metal products industry, and machinery and equipment industries, in Sweden to investigate the impact of green practices (green product innovation) on the sustainable performance of a firm. By applying the SEM technique and performing confirmatory factor analysis, researchers revealed no direct relationship between GPDI and firms' sustainable performance.

Furthermore, Afum et al (2023), investigated the relationship between GPDI and all dimensions of firms' sustainability performance (environmental, financial, and social dimensions) in the context of Ghanaian small and medium-sized enterprises (SMEs). A total of 248 top executives participated in the survey and provided their opinions on a structured

7-point Likert scale questionnaire. By applying the partial least squares structural equation modeling (PLS-SEM) technique and analyzing collected data with the help of SmartPLS software, researchers identified a positive relationship between GPDI and sustainable performance. Fontoura and Coelho (2022), administered another empirical study among 425 higher-level management staff (CEOs, CFOs, directors, senior technologists, etc.) in the context of electric logistics support organizations in Portugal to understand the relationship between green product development and firms' long-term performance. The research findings explored a significant positive relationship between green product development and firms' long-term performance. Contrarily, Cao et al. (2022), in another quantitative study on 211 small and micro enterprises in China, opined that organizations' green innovation played a positive role in enhancing sustainable performance only at the initial and mature stages of product development but not at the growth stage.

According to Le (2022), ensuring a firm's environmental performance by maintaining corporate social responsibilities has been deemed crucial in business activities, and the philosophy of environmentalism has gained special attention in the current competitive business world. Emphasizing the importance of green innovation practices in business operations in ensuring sustainable performance, Le (2022) operated a quantitative study on manufacturing firms in Vietnam by creating a framework that integrates corporate social responsibility (CSR), GPDI, and firms' sustainable performance. The empirical findings validated the positive correlation between GPDI and sustainable performance. Besides, in another study in China, Abid et al. (2022) also recognized the same relationship between green innovation and firms' ecological performance. However, Medina et al. (2022), in another empirical study among 214 respondents working in some South American manufacturing companies, pointed out a negative correlation between eco-product innovation and firms' sustainable performance. In a nutshell, it is clear from the aforementioned discussion that the relationship between GPDI and firms' sustainable performance is neither uniform nor consistent. Hence, it is imperative to investigate the link between green product innovation and firms' sustainable performance to clarify the inconsistent research findings.

The Relationship between Green Process Innovation and Sustainable Performance

Green process innovation is essential for enhancing a firm's green performance (Xie et al., 2019). According to Wong (2012), a firm's green process innovation (GPCI) is the degree to which it adopts environmentally friendly technologies, methods, and strategies to comply with environmental standards imposed by the business' personnel, society, or the market in which it operates its business activities. In other words, it is the practice that effectively and significantly mitigates environmental deterioration by efficiently utilizing resources throughout the whole operational process in organizations (Qi et al., 2010). Organizations' green process innovation significantly contributes to their ecological performance. Song and Yu (2018) recommended green processes and eco-behaviors to strengthen a firm's environmental performance. Additionally, Sarfraz et al. (2022) opined that organizations' GPCI ensures the improvement of business processes, which can enhance a firm's eco-performance. Hence, from the ecological paradigm, a firm's green innovation process can establish its competitiveness and sustainability performance in business operations, which was also recommended by Cherrafi et al. (2018) in another empirical study. Thus, green

efforts help organizations survive in this highly competitive business world and ensure business sustainability (Kuzma et al., 2020).

The relationship between green process innovation and firms' sustainable performance has been empirically investigated by various scholars (Lin et al., 2024; Shi et al., 2024). Numerous studies have reported a significant correlation between GPCI and firms' sustainable performance, whereas few studies have proved otherwise. For instance, Sarfraz et al. (2022) investigated the relationship between firms' green process innovation and sustainable performance within the context of manufacturing organizations in the Punjab province of Pakistan. Researchers collected data from 299 employees and analyzed them with the help of SmartPLS software, following the Structural Equation Modeling (SEM) approach. The research results approved a significant positive relationship between GPCI and firms' sustainable performance. Another empirical study by Shehzad et al. (2020) explained the essence of implementing green practices, such as green process innovation, within the organization to ensure firms' sustainable performance. However, the study by Zhao et al. (2022) among 291 frontline, middle, and upper-level employees working in some manufacturing and service companies in Pakistan identified mixed results, stating a significant positive relationship between eco-process innovation and companies' economic and environmental performance but no significant positive relationship between eco-process innovation and companies' social performance.

According to Luo et al. (2021), embracing eco-friendly techniques in the manufacturing process can yield firms' ecological performance. They also opined that green innovation is highly essential to enhance firms' environmental performance and profitability. Hence, adopting green production processes helps organizations ensure the sustainability of businesses. Considering the impact of green production processes on sustainable performance, Qing et al. (2022) conducted a study on 126 listed semiconductor IT organizations in China and explored the significant positive role of GPCI in ensuring companies' long-term performance. Moreover, another empirical study by Ch'ng et al. (2021) among 109 managerial-level employees working in local and foreign-owned technology companies operating in Malaysia explored a significant positive relationship between GPCI and firms' environmental performance. A two-stage analytical model, named measurement and structural models, was employed to obtain the results of this study. Researchers tested the hypotheses and revealed the results after analyzing the proposed model using the PLS-SEM technique.

Ullah et al. (2021) administered a quantitative study in the context of Pakistani manufacturing companies to recognize the impact of green process innovation on organizations' green performance. Their study findings also approved the positive effect of GPCI on a firm's sustainable performance. Furthermore, numerous empirical studies in literature, such as the study by Chiou et al. (2011) among 1569 companies from eight industries in Taiwan, the study by Almeida and Wasim (2023) among 249 employees working in manufacturing firms in Portugal and the United Kingdom, and the study by Johl and Toha (2021) in Malaysian public-listed energy companies, found a significant positive impact of GPCI on companies' sustainable performance. In contrast, Khairani and Cholid (2022) investigated the relationship between green innovation and sustainability performance by conducting a study in the Indonesian context and found a negative relationship between GPCI

and corporate sustainability performance. In sum, based on the literature discussed above, it is evident that the research findings regarding the correlation between green process innovation and firms' sustainable performance vary across different countries and contexts. Therefore, further investigation is required to better understand the correlation between GPCI and sustainable performance.

Green Competitive Advantage as a Mediator

This research explores the mediating role of green competitive advantage between green innovation (product and process) and sustainable performance. Generally, a mediating variable represents how the independent variable can influence the dependent variable (Baron & Kenny, 1986). While prior research explored green competitive advantage (GCA) as a mediator in various relationships, the interplay between GPDI, GPCI, and sustainable performance remains unexplored. GCA can be a critical predictor for achieving companies' sustainable performance. Existing literature recognized a positive association between green competitive advantage and firms' sustainable performance. To justify this association, Saputra et al. (2023) conducted a study among 287 respondents following an explanatory research approach within the context of the Indonesian manufacturing industry. Using the structural equation modeling technique and testing the research hypotheses, researchers suggested that GCA is critical for a company to ensure and improve its environmental performance. In another quantitative study among 294 respondents titled professors, managers, and supervisors of manufacturing firms in China, Waqas et al. (2021) identified a positive association between GCA and firms' sustainable performance. In addition, Ali et al. (2023) investigated the combined effect of GCA and corporate social responsibility on companies' sustainable performance. Researchers collected data from 289 respondents working in the construction industry in Pakistan and applied the PLS-SEM technique for statistical analysis. The research findings indicated that GCA and stakeholders' pressure positively influence firms' sustainable performance. Similarly, He and Wang (2023) investigated the combined effect of GCA, green HRM practices, and environmental sustainability on organizations' environmental performance. Based on the empirical findings, researchers concluded that creating a green competitive advantage for a business organization is essential for fostering its sustainable performance.

There was evidence in the literature that scholars considered GPDI and GPCI simultaneously as a full range of green innovation practices that play critical roles in creating and sustaining green competitive positions in the market. While GPDI emphasizes creating new or modified products, GPCI emphasizes introducing new technologies in the production system that mitigate the negative environmental impacts (Zameer et al., 2022). The extent literature explored the direct association between green product innovation and green competitive advantage. For instance, in the context of Ghanaian manufacturing SMEs, a study was undertaken by Afum et al. (2023) among 193 managers who had at least four years of experience in environmental management practices to examine the impact of GPDI practices on firms' capabilities of achieving superior competitive positions in the market by practicing green innovations. By applying the PLS-SEM approach, researchers tested the proposed hypotheses and revealed that firms' GPDI practices play a critical role in achieving a superior competitive position in the market through green practices. In another study, Li et al. (2024) also explored the exact role of green practices in GCA. Furthermore, considering the essence of green practices in the tourism and hospitality industry, Fatoki (2021) operated a study in

South Africa to investigate the link between GPDI and GCA and revealed a positive association between them.

According to Mustafa et al. (2023), in this highly competitive business world, organizations must possess unique capabilities and resources to hold a better competitive position. They rationalized their recommendation by administering an empirical study on SMEs in Pakistan. A total of 223 respondents provided their opinions on a seven-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). The statistical analysis using SPSS and SmartPLS showed that organizations' green capabilities, like GPDI, significantly influenced firms to achieve and sustain GCA, which might be the precondition of achieving firms' sustainable performance. Zameer et al. (2020) also explained how firms' green production can enhance and uphold their GCA. Besides, other researchers like Setyaningrum et al. (2023), Muisyo et al. (2022), Wang et al. (2021), and Baah et al. (2024) acknowledged the importance of green products, green creativity, and green ideas for gaining a better green competitive position over competitors in the present competitive business world.

With the aim of identifying the role of environmental orientation, like green process innovation, toward eco-performance for attaining the long-term goal of carbon neutrality, Zameer et al. (2021) undertook an empirical study among 294 managers of equipment manufacturing firms in China. Researchers collected data through a five-point Likert scale instrument with the help of WeChat and QQ applications. Statistical analysis, such as confirmatory factor analysis and hypothesis testing, explored the significant positive relationship between GPCI and GCA. In addition, Waqas et al. (2021) and Onbhuddha and Ogata (2023) also recommended introducing new environmentally friendly technologies and raw materials in the product system to reduce the negative impact of business activities on the environmental, which can lead to long-term firm performance.

Innovation in a company's existing manufacturing processes can play a key role in achieving corporate competitive advantage and environmental performance. Emphasizing the essence of the green manufacturing process to enhance firms' competitive position over rivals, Chiou et al. (2011) investigated the relationship between GPCI and green competitive advantage by conducting a quantitative study on some ISO 14000 certified manufacturing and service industries in Taiwan. Researchers collected data from 124 employees and carried out statistical analysis applying the SEM technique. The research findings confirmed the significant positive relationship between GPCI and GCA. In another study, Rehman et al. (2023) showed the evidence of how firms' digitalization and green factors might play a crucial role in attaining GCA. The said association was also empirically evidenced by Mustafa et al. (2023) and Fankhauser et al. (2013). Moreover, Ali et al. (2023) explained the combined effect of firms' green process and corporate social responsibilities on competitive advantage.

The above-stated literature and discussion acknowledged the importance of green innovation practices, like GPDI and GPCI, for achieving a firm's GCA. It is also evidenced that firms' better competitive environmental position in the market or GCA can foster their sustainable performance. Literature also highlighted the scarcity of the mediating role of GCA in the relationship between GPDI, GPCI, and sustainable performance. Therefore, this study aims to examine the mediating role of GCA in the relationship between GPDI, GPCI, and sustainable performance in the context of the garment industry in Bangladesh.

Conceptual Framework

This study is fundamentally based on the assumption that a firm's sustainable performance is affected by its green innovation practices, such as green product innovation and green process innovation practices, in business operations. In this study, two determinants (green product innovation and green process innovation) are used as the independent variables. Besides, the dependent variable is sustainable performance, and the mediating variable is green competitive advantage. Based on the literature review and discussion above, a framework is conceptualized in Figure 1.

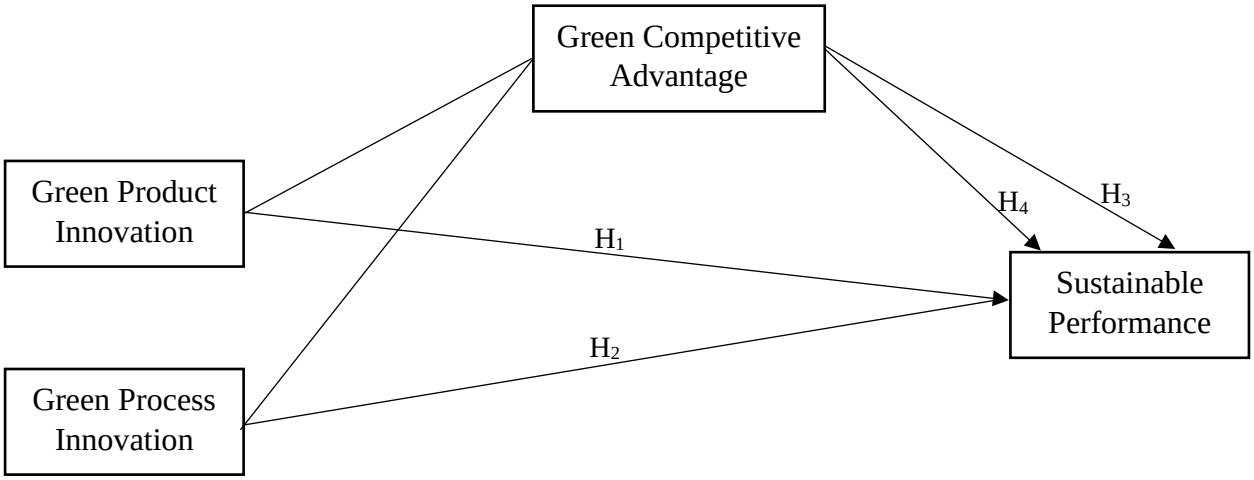

Figure 1: Conceptual Framework

Hypotheses Development

Based on the earlier literature and discussion mentioned above, the study proposes the following hypotheses:

H1: There is a significant relationship between green product innovation and firms' sustainable performance.

H2: There is a significant relationship between green process innovation and firms' sustainable performance.

H3: Green competitive advantage mediates the relationship between green product innovation and firms' sustainable performance.

H4: Green competitive advantage mediates the relationship between green process innovation and firms' sustainable performance.

Conclusion

Based on the preceding information, particularly the literature review, it is evident that there is an absence of a suitable framework for investigating the current subject matter, which is centered on green product innovation, green process innovation, green competitive advantage, and sustainable performance of garment firms in Bangladesh. As a result, the framework employed in this study contributes to the existing literature by examining the impact of green product innovation and green process innovation on firms' sustainable performance by considering the mediating role of green competitive advantage. Furthermore, the framework is anticipated to bridge the gap in the literature by presenting a novel model within the manufacturing sector, specifically in the apparel industry in Bangladesh. It is also expected that the anticipated findings of this study will help

organizations adopt green strategies and policies that will minimize the negative impact of business activities on environmental deterioration, leading to enhanced firms' sustainable performance by considering the favorable influence of green innovation practices in business operations. Incorporating organizational innovation factors like green product innovation and green process innovation may positively impact the enhancement of firms' sustainable performance in the manufacturing industry. Therefore, this study can benefit the Bangladeshi apparel industry by enhancing and upholding a superior competitive market position that can foster steady growth and sustainable performance.

In essence, this study will contribute significantly to the existing body of knowledge and provide valuable theoretical insight into how firms can achieve sustainable performance by introducing green products and processes in their business operations through the attainment of green competitive advantage. Furthermore, the outcomes of this study are expected to aid HR professionals, administrators, leaders, policymakers, and other stakeholders in recognizing the importance of promoting green product innovation, green process innovation, and green competitive advantage as strategies to enhance firms' sustainable performance in the respective field of study. The findings from this research could also offer valuable insights into green innovation practices within garment firms in Bangladesh. Adopting green practices in product and production systems in the garment industry can enhance firms' sustainable performance, which concentrates on social and environmental performance beyond financial performance.

References

Abbas, A., Luo, X., Shahzad, F., & Wattoo, M. U. (2023). Optimizing organizational performance in manufacturing: The role of IT capability, green supply chain integration, and green innovation. *Journal of Cleaner Production*, *423*. https://doi.org/10.1016/j.jclepro.2023.138848

Abbas, J., & Khan, S. M. (2023). Green knowledge management and organizational green culture: an interaction for organizational green innovation and green performance. *Journal of Knowledge Management*, *27*(7), 1852–1870. https://doi.org/10.1108/JKM-03-2022-0156

Abid, N., Ceci, F., Ahmad, F., & Aftab, J. (2022). Financial development and green innovation, the ultimate solutions to an environmentally sustainable society: Evidence from leading economies. *Journal of Cleaner Production*, *369*. https://doi.org/10.1016/j.jclepro.2022.133223

Acar, C., Dincer, I., & Mujumdar, A. (2022). A comprehensive review of recent advances in renewable-based drying technologies for a sustainable future. *Drying Technology*, *40*(6), 1029–1050. https://doi.org/10.1080/07373937.2020.1848858

Aftab, J., Abid, N., Sarwar, H., & Veneziani, M. (2022). Environmental ethics, green innovation, and sustainable performance: Exploring the role of environmental leadership and environmental strategy. *Journal of Cleaner Production*, *378*. https://doi.org/10.1016/j.jclepro.2022.134639

Afum, E., Agyabeng-Mensah, Y., Baah, C., Acquah, I. S. K., & Osei, M. B. (2023). Empirical evidence of SMEs' ecopreneurship posture, green competitiveness and community-based performance: the neglected missing linkages of green practices. *International Journal of Emerging Markets*. https://doi.org/10.1108/IJOEM-10-2021-1577

Afum, E., Agyabeng-Mensah, Y., Baah, C., Asamoah, G., & Yaw Kusi, L. (2023). Green market orientation, green value-based innovation, green reputation and enterprise social performance of Ghanaian SMEs: the role of lean management. *Journal of Business and Industrial Marketing*, *38*(10), 2151–2169. https://doi.org/10.1108/JBIM-03-2021-0169

Afum, E., Issau, K., Agyabeng-Mensah, Y., Baah, C., Dacosta, E., Essandoh, E., & Agyenim Boateng, E. (2023). The missing links of sustainable supply chain management and green radical product innovation between sustainable entrepreneurship orientation and sustainability performance. *Journal of Engineering, Design and Technology*, *21*(1), 167–187. https://doi.org/10.1108/JEDT-05-2021-0267

Afum, E., Zhang, R., Agyabeng-Mensah, Y., & Sun, Z. (2021). Sustainability excellence: the interactions of lean production, internal green practices and green product innovation. *International Journal of Lean Six Sigma*, *12*(6), 1089–1114. https://doi.org/10.1108/IJLSS-07-2020-0109

Aidara, S., Mamun, A. Al, Nasir, N. A. M., Mohiuddin, M., Nawi, N. C., & Zainol, N. R. (2021). Competitive advantages of the relationship between entrepreneurial competencies and economic sustainability performance. *Sustainability (Switzerland)*, *13*(2), 1–19. https://doi.org/10.3390/su13020864

Ali, A., Ma, L., Shahzad, M., Musonda, J., & Hussain, S. (2023). How various stakeholder pressure influences mega-project sustainable performance through corporate social responsibility and green competitive advantage. *Environmental Science and Pollution Research*. https://doi.org/10.1007/s11356-023-29717-w

Almeida, F., & Wasim, J. (2023). Eco-innovation and sustainable business performance: perspectives of SMEs in Portugal and the UK. *Society and Business Review*, *18*(1), 28–50. https://doi.org/10.1108/SBR-12-2021-0233

Al-Shboul, M. A. (2023). Fostering comparative advantage: the roles of data-driven competitive sustainability, green product innovation and green process innovation through moderated-mediation model. *Business Process Management Journal*. https://doi.org/10.1108/BPMJ-06-2023-0484

Alvarado, R., Cuesta, L., Işık, C., López-Sánchez, M., Flores-Chamba, J., & Rehman, A. (2023). Non-linear effect of manufacturing on an environmental pollution index in Latin America. *Environmental Science and Pollution Research*, *30*(32), 79171–79193.

Andersén, J. (2021). A relational natural-resource-based view on product innovation: The influence of green product innovation and green suppliers on differentiation advantage in small manufacturing firms. *Technovation*, *104*. https://doi.org/10.1016/j.technovation.2021.102254

Anu, Singh, A. K., Raza, S. A., Nakonieczny, J., & Shahzad, U. (2023). Role of financial inclusion, green innovation, and energy efficiency for environmental performance? Evidence from developed and emerging economies in the lens of sustainable development. *Structural Change and Economic Dynamics*, *64*, 213–224. https://doi.org/10.1016/j.strueco.2022.12.008

Baah, C., Agyabeng-Mensah, Y., Afum, E., & Lascano Armas, J. A. (2024). Exploring corporate environmental ethics and green creativity as antecedents of green competitive advantage, sustainable production and financial performance: empirical evidence from manufacturing firms. *Benchmarking*, *31*(3), 990–1008. https://doi.org/10.1108/BIJ-06-2022-0352

Bangladesh Economic Review. (2022). *Bangladesh Economic Review 2022*. https://mof.portal.gov.bd/sites/default/files/files/mof.portal.gov.bd/page/f2d8fabb_29c1_423a_9d37_cdb500260002/Chapter-8%20%28English-2023%29%20.pdf

Bangladesh Planning Commission. (2020). *Sustainable Development Goals-Bangladesh Progress Report 2020*. Bangladesh Government. https://info.undp.org/docs/pdc/Documents/BGD/SDGs-Bangladesh_Progress_Report%202020.pdf

Barney, J. (1991). Firm Resources and Sustained Competitive Advantage. *Journal of Management*, *17*(1), 99–120. https://doi.org/10.1177/014920639101700108

Baron, R. M., & Kenny, D. A. (1986). The Moderator-Mediator Variable Distinction in Social Psychological Research: Conceptual, Strategic, and Statistical Considerations. In *Journal of Personality and Social Psychology* (Vol. 51, Issue 6, pp. 1173–1182).

Berg, A., Chhaparia, H., Hedrich, S., & Magnus, K.-H. (2021). *What's next for Bangladesh's garment industry, after a decade of growth?* https://www.iafnet.com/2016_01_22/wp-content/uploads/2021/06/Whats-next-for-Bangladeshs-garment-industry_McKinsey-Highlighted.pdf

BGMEA. (2020). *BGMEA Sustainability Report 2020*. https://download.bgmea.com.bd/BGMEA%20Sustainability%20Report%202020.pdf

BGMEA. (2022). *The Apparel Story: What Awaits RMG Industry in 2022*. https://www.bgmea.com.bd/uploads/newsletters/appare-story-january-february-2022.pdf

Billah, M. M., Alam, S. S., Masukujjaman, M., Ali, M. H., Makhbul, Z. K. M., & Salleh, M. F. M. (2023). Effects of Internet of Things, supply chain collaboration and ethical sensitivity on sustainable performance: moderating effect of supply chain dynamism. *Journal of Enterprise Information Management*, *36*(5), 1270–1295. https://doi.org/10.1108/JEIM-06-2022-0213

Bitire, B. B. (2023). Appraisal of climate change mitigation and adaptation regulatory frameworks in Ethiopia and their congruency with the UN climate change convention. *International Journal of Climate Change Strategies and Management*, *15*(5), 638–651. https://doi.org/10.1108/IJCCSM-03-2022-0036

Broccardo, L., Truant, E., & Dana, L. P. (2023). The interlink between digitalization, sustainability, and performance: An Italian context. *Journal of Business Research*, *158*. https://doi.org/10.1016/j.jbusres.2022.113621

Cantele, S., & Zardini, A. (2018). Is sustainability a competitive advantage for small businesses? An empirical analysis of possible mediators in the sustainability–financial performance relationship. *Journal of Cleaner Production*, *182*, 166–176. https://doi.org/10.1016/j.jclepro.2018.02.016

Cao, Y., You, J., Shi, Y., & Hu, W. (2022). Studies on improving the performance of small and micro enterprises through green innovation. *Problemy Ekorozwoju*, *17*(1), 151–161. https://doi.org/10.35784/pe.2022.1.14

Cheah, J. S. S., Ng, C. H., Fianto, B. A., Teoh, A. P., Gan, C., & Anisha, A. I. I. N. (2024). Green innovation as a strategic imperative for sustainable business performance: Evidence from Malaysian industries during the COVID-19 pandemic. *Journal of Cleaner Production*, *470*. https://doi.org/10.1016/j.jclepro.2024.143355

Chen, Y. S. (2011). Green organizational identity: Sources and consequence. *Management Decision*, *49*(3), 384–404. https://doi.org/10.1108/00251741111120761

Chen, Y. S., Lai, S. B., & Wen, C. T. (2006). The influence of green innovation performance on corporate advantage in Taiwan. *Journal of Business Ethics*, *67*(4), 331–339. https://doi.org/10.1007/s10551-006-9025-5

Cherrafi, A., Garza-Reyes, J. A., Kumar, V., Mishra, N., Ghobadian, A., & Elfezazi, S. (2018). Lean, green practices and process innovation: A model for green supply chain performance. *International Journal of Production Economics*, *206*, 79–92. https://doi.org/10.1016/j.ijpe.2018.09.031

Chiou, T. Y., Chan, H. K., Lettice, F., & Chung, S. H. (2011). The influence of greening the suppliers and green innovation on environmental performance and competitive advantage in Taiwan. *Transportation Research Part E: Logistics and Transportation Review*, *47*(6), 822–836. https://doi.org/10.1016/j.tre.2011.05.016

Ch'ng, P. C., Cheah, J., & Amran, A. (2021). Eco-innovation practices and sustainable business performance: The moderating effect of market turbulence in the Malaysian technology industry. *Journal of Cleaner Production*, *283*. https://doi.org/10.1016/j.jclepro.2020.124556

Chowdhury, Md. K. H., Siraj, Md. T., Islam, N., Payel, S. B., & Biswas, D. (2023). Developing a Sustainable Environmental Management Plan: A Case Study of a Readymade Garment Factory. *Proceedings of the International Conference on Industrial Engineering and Operations Management Manila, Philippines*. https://www.researchgate.net/publication/369094183_Developing_a_Sustainable_Environmental_Management_Plan_A_Case_Study_of_a_Readymade_Garment_Factory

Dai, X., Siddik, A. B., & Tian, H. (2022). Corporate Social Responsibility, Green Finance and Environmental Performance: Does Green Innovation Matter? *Sustainability (Switzerland)*, *14*(20). https://doi.org/10.3390/su142013607

Dalampira, E.-S., & Nastis, S. A. (2020). Back to the future: Simplifying Sustainable Development Goals based on three pillars of sustainability. *International Journal of Sustainable Agricultural Management and Informatics*, *6*(3), 226–240. https://doi.org/10.1504/IJSAMI.2020.112089

Dang, V. T., & Wang, J. (2022). Building competitive advantage for hospitality companies: The roles of green innovation strategic orientation and green intellectual capital. *International Journal of Hospitality Management*, *102*. https://doi.org/10.1016/j.ijhm.2022.103161

Din, A. U., Yang, Y., Yan, R., Wei, A., & Ali, M. (2024). Growing Success with Sustainability: The Influence of Green HRM, Innovation, and Competitive Advantage on Environmental Performance in the Manufacturing Industry. *Heliyon*, e30855. https://doi.org/10.1016/j.heliyon.2024.e30855

Do, B., & Nguyen, N. (2020). The links between proactive environmental strategy, competitive advantages and firm performance: An empirical study in Vietnam. *Sustainability (Switzerland)*, *12*(12). https://doi.org/10.3390/su12124962

Elidemir, S. N., Ozturen, A., & Bayighomog, S. W. (2020). Innovative behaviors, employee creativity, and sustainable competitive advantage: A moderated mediation. *Sustainability (Switzerland)*, *12*(8). https://doi.org/10.3390/SU12083295

Eng, N., Troy, C. L. C., & Bortree, D. S. (2023). Symbolic and substantive legitimation: examining corporate commitments to sustainable development goal 12. *Journal of Communication Management*. https://doi.org/10.1108/JCOM-06-2022-0075

Fan, W., Wang, F., Liu, S., Chen, T., Bai, X., & Zhang, Y. (2023). How does financial and manufacturing co-agglomeration affect environmental pollution? Evidence from China. *Journal of Environmental Management*, *325*. https://doi.org/10.1016/j.jenvman.2022.116544

Fankhauser, S., Bowen, A., Calel, R., Dechezleprêtre, A., Grover, D., Rydge, J., & Sato, M. (2013). Who will win the green race? In search of environmental competitiveness and innovation. *Global Environmental Change*, *23*(5), 902–913. https://doi.org/10.1016/j.gloenvcha.2013.05.007

Fanse, T. S. (2022). Resilient and Sustainable Methodology – A Green Manufacturing Project Approach. *International Journal of Research in Engineering, Science and Management*, *5*(5). https://www.ijresm.com

Fatoki, O. (2021). Environmental orientation and green competitive advantage of hospitality firms in south africa: Mediating effect of green innovation. *Journal of Open Innovation: Technology, Market, and Complexity*, *7*(4). https://doi.org/10.3390/joitmc7040223

Fatonah, S., & Haryanto, A. T. (2022). Exploring market orientation, product innovation and competitive advantage to enhance the performance of SMEs under uncertain events. *Uncertain Supply Chain Management*, *10*(1), 161–168. https://doi.org/10.5267/j.uscm.2021.9.011

Fok, L., Zee, S., & Morgan, Y. C. T. (2022). Green practices and sustainability performance: the exploratory links of organizational culture and quality improvement practices. *Journal of Manufacturing Technology Management*, *33*(5), 913–933. https://doi.org/10.1108/JMTM-11-2021-0439

Fontoura, P., & Coelho, A. (2022). How to boost green innovation and performance through collaboration in the supply chain: Insights into a more sustainable economy. *Journal of Cleaner Production*, *359*. https://doi.org/10.1016/j.jclepro.2022.132005

Frare, A. B., & Beuren, I. M. (2022). The role of green process innovation translating green entrepreneurial orientation and proactive sustainability strategy into environmental performance. *Journal of Small Business and Enterprise Development*, *29*(5), 789–806. https://doi.org/10.1108/JSBED-10-2021-0402

Freeman, R. E. (1984). *Strategic Management: A Stakeholder Approach*. Cambridge University Press.

Freeman, R. E., Dmytriyev, S. D., & Phillips, R. A. (2021). Stakeholder Theory and the Resource-Based View of the Firm. *Journal of Management*, *47*(7), 1757–1770. https://doi.org/10.1177/0149206321993576

Greenland, S. J., Saleem, M., Misra, R., Nguyen, N., & Mason, J. (2023). Reducing SDG complexity and informing environmental management education via an empirical six-dimensional model of sustainable development. *Journal of Environmental Management*, *344*. https://doi.org/10.1016/j.jenvman.2023.118328

Hameed, T., Alemayehu, F. K., & Kumbhakar, S. C. (2024). Green innovation in Norwegian firms: Navigating the complexity of productivity and performance. *Technological Forecasting and Social Change*, *209*. https://doi.org/10.1016/j.techfore.2024.123786

Haraguchi, N., Cheng, C. F. C., & Smeets, E. (2017). The Importance of Manufacturing in Economic Development: Has This Changed? *World Development*, *93*, 293–315. https://doi.org/10.1016/j.worlddev.2016.12.013

Hart, S. L. (1995). A Natural Resource-Based View of the Firm. *Academy of Management Review*, *20*(4), 966–1014.

Hart, S. L., & Dowell, G. (2011). A natural-resource-based view of the firm: Fifteen years after. *Journal of Management*, *37*(5), 1464–1479. https://doi.org/10.1177/0149206310390219

Hasan, Z. (2019). *Moderating Role of Quality Governance Between Green Marketing Strategies and Organizational Performance in Malaysia* [Doctoral Dissertation, Universiti Putra Malaysia]. UPM e-THESES. http://ethesis.upm.edu.my.ezadmin.upm.edu.my/id/eprint/14661/1/GSM%202019%2025%20T.pdf

He, R., & Wang, X. (2023). Enhancing industrial environmental performance: interplay among environmental sustainability, green HRM, and green competitive advantage. *Environmental Science and Pollution Research*, *30*(46), 103073–103086. https://doi.org/10.1007/s11356-023-29513-6

Hossain, M. E., Rej, S., Saha, S. M., Onwe, J. C., Nwulu, N., Bekun, F. V., & Taha, A. (2022). Can Energy Efficiency Help in Achieving Carbon-Neutrality Pledges? A Developing Country Perspective Using Dynamic ARDL Simulations. *Sustainability (Switzerland)*, *14*(13). https://doi.org/10.3390/su14137537

Hsu, J. L., & Sharma, P. (2023). Disaster and risk management in outdoor recreation and tourism in the context of climate change. *International Journal of Climate Change Strategies and Management*, *15*(5), 712–728. https://doi.org/10.1108/IJCCSM-10-2021-0118

Hui, L., Luo, Z., Liu, K., & A, S. (2024). Impact of pollution prevention practices and green environmental practices on sustainable performance: Empirical evidence from Chinese SMEs. *Environmental Research*, *255*. https://doi.org/10.1016/j.envres.2024.118991

ILO. (2018). *The collapse of Rana Plaza in The Sustainability Compact for the Bangladesh Ready-Made Garment Sector*. https://www.ilo.org/wcmsp5/groups/public/---asia/---ro-bangkok/---ilo-dhaka/documents/publication/wcms_658138.pdf

Indriana, I., Ismail, N. A., & Rahmat, S. R. (2022). The Effect of Agriculture, Manufacturing and Transportation on Environmental Quality in Indonesian Selected Provinces. *Journal of Sustainability Science and Management*, *17*(2), 187–204. https://doi.org/10.46754/jssm.2022.02.014

Islam, T., & Halim, Md. A. (2022). Impact of ready-made garments (RMG) industries and sustainability: Perspective of the pandemic period in developing country. *Cleaner Engineering and Technology*, *11*, 100567. https://doi.org/10.1016/j.clet.2022.100567

Johl, S. K., & Toha, M. A. (2021). The nexus between proactive eco-innovation and firm financial performance: a circular economy perspective. *Sustainability (Switzerland)*, *13*(11). https://doi.org/10.3390/su13116253

Khairani, S., & Cholid, I. (2022). Environmental performance as a mediating variable relationship between green process innovation and eco-efficiency on corporate sustainability of smes in South Sumatera. *Jurnal Ekonomi, Keuangan Dan Manajemen*, *18*(18), 268. https://doi.org/10.29264/jinv.v18i0.11261

Khan, M. R., & Roy, S. K. (2023). Do primary HR functions model work in emerging economies? Sustainable compact perspective for Bangladeshi RMG industry. *Review of International Business and Strategy*, *33*(2), 328–341. https://doi.org/10.1108/RIBS-04-2021-0065

Kuzma, E., Padilha, L. S., Sehnem, S., Julkovski, D. J., & Roman, D. J. (2020). The relationship between innovation and sustainability: A meta-analytic study. *Journal of Cleaner Production*, *259*. https://doi.org/10.1016/j.jclepro.2020.120745

Larbi-Siaw, O., Xuhua, H., Owusu, E., Owusu-Agyeman, A., Fulgence, B. E., & Frimpong, S. A. (2022). Eco-innovation, sustainable business performance and market turbulence moderation in emerging economies. *Technology in Society*, *68*. https://doi.org/10.1016/j.techsoc.2022.101899

Le, T. T. (2022). How do corporate social responsibility and green innovation transform corporate green strategy into sustainable firm performance? *Journal of Cleaner Production*, *362*. https://doi.org/10.1016/j.jclepro.2022.132228

Le, T. T., Vo, X. V., & Venkatesh, V. G. (2022). Role of green innovation and supply chain management in driving sustainable corporate performance. *Journal of Cleaner Production*, *374*. https://doi.org/10.1016/j.jclepro.2022.133875

Lewandowska, M. S., Gołębiowski, T., & Rószkiewicz, M. (2022). Eco-innovation, International Competitiveness and Economic Performance of European Union Enterprises: Triangle Approach. *European Research Studies Journal*, *XXV* (1), 635–645. https://orcid.org/0000-0002-5778-8009

Li, W., Waris, I., & Bhutto, M. Y. (2024). Understanding the nexus among big data analytics capabilities, green dynamic capabilities, supply chain agility and green competitive advantage: the moderating effect of supply chain innovativeness. *Journal of Manufacturing Technology Management*, *35*(1), 119–140. https://doi.org/10.1108/JMTM-07-2023-0263

Liem, V. T., & Hien, N. N. (2024). The impact of managers' attitudes towards environmental management accounting and green competitive advantage in Vietnam manufacturers. *Heliyon*, e33565. https://doi.org/10.1016/j.heliyon.2024.e33565

Lin, J., Zeng, Y., Wu, S., & Luo, X. (Robert). (2024). How does artificial intelligence affect the environmental performance of organizations? The role of green innovation and green culture. *Information and Management*, *61*(2). https://doi.org/10.1016/j.im.2024.103924

Luo, Y., Salman, M., & Lu, Z. (2021). Heterogeneous impacts of environmental regulations and foreign direct investment on green innovation across different regions in China. *Science of the Total Environment*, *759*. https://doi.org/10.1016/j.scitotenv.2020.143744

Ma, Y., Yin, Q., Pan, Y., Cui, W., Xin, B., & Rao, Z. (2018). Green product innovation and firm performance: Assessing the moderating effect of novelty-centered and efficiency-centered business model design. *Sustainability (Switzerland)*, *10*(6). https://doi.org/10.3390/su10061843

Maldonado-Guzmán, G., Garza-Reyes, J. A., & Pinzón-Castro, S. Y. (2023). Green innovation and firm performance: the mediating role of sustainability in the automotive industry. *Management of Environmental Quality: An International Journal*. https://doi.org/10.1108/MEQ-02-2023-0058

Maziriri, E. T., & Maramura, T. C. (2022). Green Innovation in SMEs: The Impact of Green Product and Process Innovation on Achieving Sustainable Competitive Advantage and Improved Business Performance. *Academy of Entrepreneurship Journal*, *28*(1), 1–14.

Medina, H. R. B., Guevara, R., Campoverde, R. E., & Paredes-Aguirre, M. I. (2022). Eco-Innovation and Firm Performance: Evidence from South America. *Sustainability (Switzerland)*, *14*(15). https://doi.org/10.3390/su14159579

Mosgaard, M. A., & Kristensen, H. S. (2023). From certified environmental management to certified SDG management: new sustainability perceptions and practices. *Sustainable Futures*, *6*. https://doi.org/10.1016/j.sftr.2023.100144

Muisyo, P. K., Qin, S., Ho, T. H., & Julius, M. M. (2022). The effect of green HRM practices on green competitive advantage of manufacturing firms. *Journal of Manufacturing Technology Management*, *33*(1), 22–40. https://doi.org/10.1108/JMTM-10-2020-0388

Mukhsin, M., & Suryanto, T. (2022). The Effect of Sustainable Supply Chain Management on Company Performance Mediated by Competitive Advantage. *Sustainability (Switzerland)*, *14*(2). https://doi.org/10.3390/su14020818

Mustafa, K., Hossain, M. B., Ahmad, F., Ejaz, F., Khan, H. G. A., & Dunay, A. (2023). Green human resource management practices to accomplish green competitive advantage: A moderated mediation model. *Heliyon*, *9*(11). https://doi.org/10.1016/j.heliyon.2023.e21830

Nakhle, P., Stamos, I., Proietti, P., & Siragusa, A. (2024). Environmental monitoring in European regions using the sustainable development goals (SDG) framework. *Environmental and Sustainability Indicators*, *21*. https://doi.org/10.1016/j.indic.2023.100332

Obeidat, S. M., Abdalla, S., & Al Bakri, A. A. K. (2023). Integrating green human resource management and circular economy to enhance sustainable performance: an empirical study from the Qatari service sector. *Employee Relations*, *45*(2), 535–563. https://doi.org/10.1108/ER-01-2022-0041

Onbhuddha, R., & Ogata, S. (2023). The influence of stakeholder on a company's sustainable practice: Insights from the Japanese perspective. *Journal of Cleaner Production*, 140402. https://doi.org/10.1016/j.jclepro.2023.140402

Qi, G. Y., Shen, L. Y., Zeng, S. X., & Jorge, O. J. (2010). The drivers for contractors' green innovation: An industry perspective. *Journal of Cleaner Production*, *18*(14), 1358–1365. https://doi.org/10.1016/j.jclepro.2010.04.017

Qing, L., Chun, D., Dagestani, A. A., & Li, P. (2022). Does Proactive Green Technology Innovation Improve Financial Performance? Evidence from Listed Companies with Semiconductor Concepts Stock in China. *Sustainability (Switzerland)*, *14*(8). https://doi.org/10.3390/su14084600

Rahman, M. (2023). The virtuous circle between green product innovation and performance: The role of financial constraint and corporate brand. *Journal of Business Research*, *154*. https://doi.org/10.1016/j.jbusres.2022.09.001

Rahman, M. S., & Karim, M. M. (2021). Investigating the Relationship between Green Supply Chain Management and Organizational Performance: An Empirical Study from Bangladeshi Perspective. *International Journal of Supply Chain Management*, *10*(5). https://www.researchgate.net/publication/357477787

Rani, L., Thapa, K., Kanojia, N., Sharma, N., Singh, S., Grewal, A. S., Srivastav, A. L., & Kaushal, J. (2021). An extensive review on the consequences of chemical pesticides on human health and environment. *Journal of Cleaner Production*, *283*. https://doi.org/10.1016/j.jclepro.2020.124657

Raza, M. Y., & Hasan, M. M. (2022). Estimating the multiple impacts of technical progress on Bangladesh's manufacturing and industrial sector's CO2 emissions: A quantile regression approach. *Energy Reports*, *8*, 2288–2301. https://doi.org/10.1016/j.egyr.2022.01.005

Razzak, M. R. (2023). Mediating effect of productivity between sustainable supply chain management practices and competitive advantage: evidence from apparel manufacturing in Bangladesh. *Management of Environmental Quality: An International Journal*, *34*(2), 428–445. https://doi.org/10.1108/MEQ-01-2022-0022

Rehman, S. U., Giordino, D., Zhang, Q., & Alam, G. M. (2023). Twin transitions & industry 4.0: Unpacking the relationship between digital and green factors to determine green competitive advantage. *Technology in Society*, *73*. https://doi.org/10.1016/j.techsoc.2023.102227

Saeidi, S. P., Sofian, S., Saeidi, P., Saeidi, S. P., & Saaeidi, S. A. (2015). How does corporate social responsibility contribute to firm financial performance? The mediating role of competitive advantage, reputation, and customer satisfaction. *Journal of Business Research*, *68*(2), 341–350. https://doi.org/10.1016/j.jbusres.2014.06.024

Salman, S., Ahmed, T., Taqi, H. Md. M., Frederico, G. F., Dip, A. S., & Ali, S. M. (2023). An integrated approach to explore the barriers to lean manufacturing in the context of the COVID-19 pandemic: implications for sustainability. *International Journal of Industrial Engineering and Operations Management*. https://doi.org/10.1108/ijieom-02-2023-0027

Saputra, K. A. K., Subroto, B., Rahman, A. F., & Saraswati, E. (2023). Mediation Role of Environmental Management Accounting on The Effect of Green Competitive Advantage on Sustainable Performance. *Journal of Sustainability Science and Management*, *18*(2), 103–115. https://doi.org/10.46754/jssm.2023.02.008

Saqib, Z. A., & Zhang, Q. (2021). Impact of sustainable practices on sustainable performance: the moderating role of supply chain visibility. *Journal of Manufacturing Technology Management*, *32*(7), 1421–1443. https://doi.org/10.1108/JMTM-10-2020-0403

Sarfraz, M., Ivascu, L., Abdullah, M. I., Ozturk, I., & Tariq, J. (2022). Exploring a Pathway to Sustainable Performance in Manufacturing Firms: The Interplay between Innovation Capabilities, Green Process and Product Innovations and Digital Leadership. *Sustainability (Switzerland)*, *14*(10). https://doi.org/10.3390/su14105945

Setyaningrum, R. P., Kholid, M. N., & Susilo, P. (2023). Sustainable SMEs Performance and Green Competitive Advantage: The Role of Green Creativity, Business Independence and Green IT Empowerment. *Sustainability (Switzerland)*, *15*(15). https://doi.org/10.3390/su151512096

Seyam, S., Dincer, I., & Agelin-Chaab, M. (2023). Environmental impact assessment of a newly developed solid oxide fuel cell-based system combined with propulsion engine using various fuel blends for cleaner operations. *Sustainable Materials and Technologies*, *35*. https://doi.org/10.1016/j.susmat.2022.e00554

Shafait, Z., & Huang, J. (2024). Examining the impact of sustainable leadership on green knowledge sharing and green learning: Understanding the roles of green innovation and green organisational performance. *Journal of Cleaner Production*, *457*. https://doi.org/10.1016/j.jclepro.2024.142402

Sharma, S., Prakash, G., Kumar, A., Mussada, E. K., Antony, J., & Luthra, S. (2021). Analysing the relationship of adaption of green culture, innovation, green performance for achieving sustainability: Mediating role of employee commitment. *Journal of Cleaner Production*, *303*. https://doi.org/10.1016/j.jclepro.2021.127039

Shehzad, K., Xiaoxing, L., Sarfraz, M., & Zulfiqar, M. (2020). Signifying the imperative nexus between climate change and information and communication technology development: a case from Pakistan. *Environmental Science and Pollution Research*, *27*(24), 30502–30517. https://doi.org/10.1007/s11356-020-09128-x

Shi, R., Gao, P., Su, X., Zhang, X., & Yang, X. (2024). Synergizing natural resources and sustainable development: A study of industrial structure, and green innovation in Chinese region. *Resources Policy*, *88*. https://doi.org/10.1016/j.resourpol.2023.104451

Singh, S. K., Giudice, M. Del, Chierici, R., & Graziano, D. (2020). Green innovation and environmental performance: The role of green transformational leadership and green human resource management. *Technological Forecasting and Social Change*, *150*. https://doi.org/10.1016/j.techfore.2019.119762

Song, W., Wang, G. Z., & Ma, X. (2020). Environmental innovation practices and green product innovation performance: A perspective from organizational climate. *Sustainable Development*, *28*(1), 224–234. https://doi.org/10.1002/sd.1990

Song, W., & Yu, H. (2018). Green Innovation Strategy and Green Innovation: The Roles of Green Creativity and Green Organizational Identity. *Corporate Social Responsibility and Environmental Management*, *25*(2), 135–150. https://doi.org/10.1002/csr.1445

Ullah, H., Wang, Z., Mohsin, M., Jiang, W., & Abbas, H. (2021). Multidimensional perspective of green financial innovation between green intellectual capital on sustainable business: the case of Pakistan. *Environmental Science and Pollution Research*, *29*(4), 5552–5568. https://doi.org/10.1007/s11356-021-15919-7

Umar, M., Khan, S. A. R., Zia-ul-haq, H. M., Yusliza, M. Y., & Farooq, K. (2022). The role of emerging technologies in implementing green practices to achieve sustainable operations. *TQM Journal*, *34*(2), 232–249. https://doi.org/10.1108/TQM-06-2021-0172

UN. (1992, July 31). *A new blueprint for international action on the environment*. https://www.un.org/en/conferences/environment/rio1992

UN. (2024, August 17). *The 17 Goals*. https://sdgs.un.org/goals

UNDP. (2021). *A Pathway to Manage Private Sector Impact on Bangladesh National Priority Indicators (NPIs) & Sustainable Development Goals (SDGs)*. https://www.undp.org/bangladesh/stories/undp-and-bgmea-launch-rmg-sector-sustainability-report-pathway-manage-private-sector-impact-bangladesh-national-priority

Wang, M., Li, Y., Li, J., & Wang, Z. (2021). Green process innovation, green product innovation and its economic performance improvement paths: A survey and structural model. *Journal of Environmental Management*, *297*. https://doi.org/10.1016/j.jenvman.2021.113282

Wang, X., Zhang, R., Gong, Z., & Chen, X. (2023). Impact of blockchain on the green innovation performance of enterprises under the policy uncertainty. *Industrial Management and Data Systems*. https://doi.org/10.1108/IMDS-02-2023-0071

Wang, Y. Z., & Ahmad, S. (2024). Green process innovation, green product innovation, leverage, and corporate financial performance; evidence from system GMM. *Heliyon*, *10*(4), e25819. https://doi.org/10.1016/j.heliyon.2024.e25819

Waqas, M., Honggang, X., Ahmad, N., Khan, S. A. R., & Iqbal, M. (2021). Big data analytics as a roadmap towards green innovation, competitive advantage and environmental performance. *Journal of Cleaner Production*, *323*. https://doi.org/10.1016/j.jclepro.2021.128998

WB. (2022, January 21). *Manufacturing, value added (% of GDP), Employment in industry (% of total employment) (modeled ILO estimate)*. https://data.worldbank.org/indicator/NV.IND.MANF.ZS

Wong, S. K. S. (2012). The influence of green product competitiveness on the success of green product innovation: Empirical evidence from the Chinese electrical and electronics industry. *European Journal of Innovation Management*, *15*(4), 468–490. https://doi.org/10.1108/14601061211272385

Wonglimpiyarat, J. (2024). Achieving the United Nations sustainable development goals – innovation diffusion and business model innovations. *Foresight*. https://doi.org/10.1108/FS-11-2023-0233

Xie, X., Huo, J., & Zou, H. (2019). Green process innovation, green product innovation, and corporate financial performance: A content analysis method. *Journal of Business Research*, *101*, 697–706. https://doi.org/10.1016/j.jbusres.2019.01.010

Xin, C., & Wang, Y. (2023). Green intellectual capital and green competitive advantage in hotels: The role of environmental product innovation and green transformational leadership. *Journal of Hospitality and Tourism Management*, *57*, 148–157. https://doi.org/10.1016/j.jhtm.2023.10.001

Xu, J., Yu, Y., Zhang, M., & Zhang, J. Z. (2023). Impacts of digital transformation on eco-innovation and sustainable performance: Evidence from Chinese manufacturing companies. *Journal of Cleaner Production*, *393*. https://doi.org/10.1016/j.jclepro.2023.136278

Yadav, S., Samadhiya, A., Kumar, A., Luthra, S., Kumar, V., Garza-Reyes, J. A., & Upadhyay, A. (2024). The interplay effects of digital technologies, green integration, and green innovation on food supply chain sustainable performance: An organizational information processing theory perspective. *Technology in Society*, *77*. https://doi.org/10.1016/j.techsoc.2024.102585

Yang, Z., Xiong, Z., Xue, W., & Zhou, Y. (2022). The Impact of Pollution Fee Reform on the Emission of Water Pollutants: Evidence from Manufacturing Enterprises in China. *International Journal of Environmental Research and Public Health*, *19*(17). https://doi.org/10.3390/ijerph191710660

Zameer, H., Wang, Y., Vasbieva, D. G., & Abbas, Q. (2021). Exploring a pathway to carbon neutrality via reinforcing environmental performance through green process innovation, environmental orientation and green competitive advantage. *Journal of Environmental Management*, *296*. https://doi.org/10.1016/j.jenvman.2021.113383

Zameer, H., Wang, Y., & Yasmeen, H. (2020). Reinforcing green competitive advantage through green production, creativity and green brand image: Implications for cleaner production in China. *Journal of Cleaner Production*, *247*. https://doi.org/10.1016/j.jclepro.2019.119119

Zameer, H., Wang, Y., Yasmeen, H., & Mubarak, S. (2022). Green innovation as a mediator in the impact of business analytics and environmental orientation on green competitive advantage. *Management Decision*, *60*(2), 488–507. https://doi.org/10.1108/MD-01-2020-0065

Zhao, L., Gu, J., Abbas, J., Kirikkaleli, D., & Yue, X. G. (2022). Does quality management system help organizations in achieving environmental innovation and sustainability goals? A structural analysis. *Economic Research-Ekonomska Istrazivanja*. https://doi.org/10.1080/1331677X.2022.2100436

Zhao, Y., & Zhou, H. (2023). Remanufacturing vs. greening: Competitiveness and harmony of sustainable strategies of supply chain under uncertain yield. *Computers and Industrial Engineering*, *179*. https://doi.org/10.1016/j.cie.2023.109233

Zhou, S., Tiruneh, W. A., & Legese, M. A. (2023). The effect of corporate social responsibility on environmental performance: the mediating role of green innovation and green human resource management. *International Journal of Emerging Markets*. https://doi.org/10.1108/IJOEM-02-2022-0211