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RESEARCH ARTICLE

Impact of Green Supply Chain Management (GSCM) Practices on Economic Sustainability: The Mediating Role of Green Innovation (Special Reference to Katunayake Export Processing Zone)

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Abstract

Sustainability is one of the crucial factors in the modern world. Today world is facing lot of environmental problems like resource depletion, climate change, hazards and emissions etc. Sustainable solutions have become 'the way 'resolve these issues. Not only people also today businesses have responsibility to attempt to integrate sustainability into their processes. Therefore, this study is based on Green supply chain management practices and their impact on Economic sustainability with the mediating role of Green Innovation. This study presents a new approach to the Sri Lankan apparel industry and analyzes whether such practices have any impact of Economic sustainability. The lack of research attention has been given on the impact of GSCM practices on Economic Sustainability with the mediating effect of Green Innovation. Hence, the current research addresses the knowledge and empirical gap. Researcher used quantitative method in conducting this study. The data was collected from a sample of 208 respondents including the managerial and executive level of the Apparel Firms in the Katunayake Export Processing Zone. The collected data was analyzed by the Smart PLS software. According to the findings researcher drew a conclusion that there is a significant impact of GSCM Practices on Economic Sustainability. Meantime the results led to reveal that the relationship between GSCM practices and Economic Sustainability is partially mediated by Green Innovation.

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Keywords: *Apparel Industry, Economic Sustainability, Green Innovation, GSCM Practices.*

1. Introduction

As we advance towards sustainable performance in this VUCA environment, the concentration and application of green concepts become increasingly vital. At present, most organizations have focused more on supply chain operations in the environment, and with this, guided supply chain practices have led to the adoption of new modern green standards (Kazancoglu et al., 2020). Thus, in the twenty-first century, green supply chain management practices have piqued the interest of scholars and practitioners across a variety of industries worldwide. Companies have increasingly embraced techniques to tackle environmental challenges in their supply networks, rather than relying solely on research institutions (Cousins et al., 2019). To respond to customer demand for environmentally sustainable products and services, created through environmentally sustainable processes and in line with government environmental regulations, manufacturing companies have begun to employ green supply chain management (GSCM) practices (Jr et al., 2012).

More recently, due to sustainability issues, it has become a crucial factor in the manufacturing industry worldwide (Afum et al., 2020). According to Lakmali and Jayaratne (2018), with the national context, there are fewer studies available on Green Supply Chain Management (GSCM) practices. As Sri Lanka is still a developing country, it has traditionally placed greater emphasis on profit maximization, underscoring the need to demonstrate the benefits of adopting GSCM practices. Furthermore, Sarwar et al. (2021) emphasize that manufacturing industries, particularly the garment sector, make a substantial contribution to the Sri Lankan economy. In the apparel industry, it plays a pivotal role in export trade and provides significant employment opportunities. Consequently, the apparel sector holds a strategic position in the national economy, making it a priority area for integrating sustainable practices such as GSCM.

While global research has examined the strategic role of GSCM, few studies have empirically examined its direct and mediated influence on economic sustainability in developing economies such as Sri Lanka. In practice, in the Sri Lankan context, many apparel

manufacturers have yet to fully incorporate green innovations into their supply chain operations.

The Sri Lankan economy is heavily dependent on the garment manufacturing industry, which makes a substantial contribution to exports, foreign exchange earnings, direct investments, and employment opportunities (Weerakkody, 2021). According to the Sri Lanka Export Development Board (2023), 300 apparel manufacturers are operating in the country. A significant proportion of workers in Sri Lanka's Export Processing Zones (EPZs) are employed in globally integrated factories that are deeply embedded in international supply chains. In 2024, the export value of apparel reached US$5,152 million, with major markets including the United States, the United Kingdom, Italy, Germany, France, and Australia.

At present, Sri Lanka operates three major EPZs: Katunayake, Biyagama, and Koggala, along with three minor zones in Malwatte, Mirigama, and Wathulupitiwala (Weerakkody, 2021). The primary objective of these EPZs has been to attract foreign direct investment (FDI), diversify the industrial base, and strengthen manufactured exports in order to achieve long-term economic growth. Historically, EPZs, particularly the Katunayake zone, have contributed significantly to national export earnings and broader economic development goals.

Given the limited research in this area and the identified contextual gaps, this study focuses on three dimensions of Green Supply Chain Management (GSCM): green purchasing, green manufacturing, and green distribution. The research aims to examine how these practices affect the economic stability of apparel firms operating in the Katunayake Export Processing Zone, Sri Lanka.

1.1. Problem Statement

The Sri Lankan apparel industry makes a significant contribution to the national economy, employing over 350,000 individuals. According to Lakmali and Jayaratne (2018), highlighted that the industry provides a substantial number of career opportunities, thereby playing a vital role in socioeconomic development. However, the sector also generates considerable environmental challenges. It has been estimated that the apparel industry in Sri Lanka

produces between 19,000 and 38,000 tons of cutting waste annually, accounting for 10–20 percent of fabric consumption. Moreover, the textile industry is reported to consume large quantities of toxic substances (Weng et al., 2015). Despite this, many apparel organizations have yet to fully adopt environmentally sustainable practices (Jayarathna, 2016). Given the sector's high level of resource consumption and significant environmental impact, there is a pressing need for corporate responsibility to safeguard the environment (Lakmali & Jayaratne, 2018).

In this regard, GSCM practices offer a framework for integrating environmental considerations into supply chain operations (Yildiz Çankaya & Sezen, 2019). Such practices not only promote eco-friendly manufacturing but also reduce costs, improve efficiency, and ensure environmentally responsible product lifecycle management (Zaid et al., 2018). GSCM encompasses activities ranging from green purchasing to sustainable logistics, extending across suppliers, manufacturers, and customers (Lakmali & Jayaratne, 2018). Furthermore, the adoption of GSCM practices has been shown to have long-term organizational value and competitiveness (Ahmad et al., 2022).

GSCM practices not only help mitigate environmental impacts but also help organizations achieve several advantages when implemented in the apparel industry. Firstly, Green supply chain management practices enhance operational efficiency and reduce resource use by lowering energy consumption, reducing waste, and optimizing resource use. According to Ageron et al. (2012), proved it is a well-known truth that organizations engaging in manufacturing have recognized the value of SCM to increase their competitiveness, and that most businesses need to review the performance of their supply chains in order to progress toward efficient and effective supply chains. Secondly, GSCM practices help strengthen the organization's competitiveness and reputation by aligning with customers' demands for environmentally responsible products and processes. According to Yildiz Çankaya and Sezen (2019), green marketing practices enhance business reputation and image, increase sales, and positively impact economic performance. Thirdly, GSCM practices provide chances for innovation and access to new markets that prioritize sustainability (Sahoo & Vijayvargy, 2020). They are competing for faster economic growth, and as a result of strong industrial

growth, the economies are expanding. But according to Lintukangas et al. (2015), many studies have highlighted the limited number of theoretical foundations and perspectives on green supply chain practices. Also, Zaid et al. (2018) noted a gap between developed and developing countries, such as Sri Lanka, in studies on Green supply chain management practices and performance. Most studies are conducted in developed countries rather than in developing countries. According to Sarwar et al. (2021), the lack of studies on green supply chain practices stems from the fact that fewer industries in developing countries are implementing them. This gap hinders the understanding of the practical challenges, opportunities, and outcomes associated with green management practices in the Sri Lankan context.

According to Yildiz Çankaya and Sezen (2019), sustainability is defined as the ability to meet present needs without compromising future generations' ability to meet their own needs. Past literature has identified three dimensions of sustainability. There are economic, environmental, and social performances (Zaid et al., 2018). In these studies, mixed findings are reported across international and national contexts. Some past researchers have reported a positive relationship between GSCM practices and organizational performance. According to Lakmali and Jayaratne (2018), the primary goals of green supply chain management are that businesses can't survive without economic sustainability. But Sahoo and Vijayvargy (2020) reported that GSCM is significantly related to economic performance, whereas in some studies it is not. Additionally, Yildiz Çankaya and Sezen (2019) noted that GSCM practices will incur costs for organizations, as green purchasing increases operational costs, which in turn negatively impact economic performance. They investigated the impact of green supply chain management practices on economic sustainability in the Sri Lankan apparel sector.

1.2. Research Questions

01. Does GSCM Practices impact on Economic Sustainability in the apparel industry in the Export Processing Zone, Katunayake?

02. Does Green Innovation mediate the relationship between GSCM Practices and Economic Sustainability?

1.3. Research Objectives

01. To investigate the impact of GSCM Practices on Economic Sustainability in the apparel industry in the Export Processing Zone, Katunayake.

02. To investigate the mediating effect of Green Innovation in the relationship between GSCM and Economic Sustainability.

1.4. Problem Justification

At present, most organizations are driving business to green their operations while promoting organizational sustainability (Vijayvargy et al., 2017). According to Rao (2007), and Shafique et al. (2017), before implementing GSCM practices, especially in Southeast Asia, there is a need to identify the relationship between GSCM practices and performance; hence, there is a need to conduct more GSCM research in other sub-regions as well. Previous empirical studies also emphasized a research gap in developing countries, as most studies on the relationship between GSCM and performance are conducted in developed countries (Yildiz Çankaya & Sezen, 2019).

The role of green innovations in achieving sustainable performance must be identified, as they are linked to the company's environmental management program and feed an organization's environmental performance (Weng et al., 2015). Moreover, green product and process innovation helps minimize the environmental impacts on the firm and enhances its financial and social performance through waste and cost savings (Weng et al., 2015). And also, Green innovation can play a critical role in achieving sustainable performance in businesses (Saqib & Zhang, 2021). Even the Chinese government has developed a policy mechanism to stimulate green innovation in the manufacturing industry to keep the economy on a long-term sustainable growth path (Sarwar et al., 2021). Therefore, the authors of this study specifically focused on the mediating effect of green innovation on the sustainable performance of manufacturing companies in Sri Lanka, as there are few empirical studies on this topic. Even

considering the study done by Abu Seman *et al. (2019)*, which has identified that there is a limited number of empirical evidences available in relation to the capability of GSCM in producing green innovation and enhancing the performance of the environment. Although they address environmental performance, the author in this research seeks to reveal the relationship between GSCM practices and a wide range of performance, as relevant to the contemporary economic crisis Sri Lanka has faced in recent years. Accordingly, both theoretical and practical justifications converge to emphasize the mediating importance of the green innovation.

2. Literature Review

2.1. Economic Sustainability

Economic performance can be measured both financially and non-financially (Sudusinghe & Seuring, 2020). In European evaluation approaches, three economic sustainability indicators are used: profitability, liquidity, and stability (Rao, 2007). Reduced costs, taxes, and fines resulting from the parent company adopting green practices indicate economic performance (Buckley, 2021). According to Das et al. (2021), a manufacturing company's ability to reduce penalties for energy use, waste management, waste discharge, and environmental hazards is a measure of its economic success. Improving economic performance takes into account both expected long-term financial success and reductions in operating costs. The constraints a sustainable society needs to place on economic growth are the subject of the economic component (Di Simone et al., 2022). GSCM practices help to increase economic profit by solving environmental problems (Das et al., 2021). According to Cardoni et al. (2020), the economic dimension is considered the primary factor of sustainability and affects the survival and competitiveness of smaller businesses.

Ensuring maximum benefit to the environment and the economy is the corporate goal of green supply chain management (Das et al., 2021). According to Di Simone et al. (2022), a positive relationship exists between firm innovation and the economic performance of sustainability. Also, this study found that economic sustainability has a positive impact on social, governance, and environmental issues, but with different effects. According to Cousins et al. (2019), highlighted GSCM practices can positively impact economic sustainability by using

fewer materials, but they can negatively impact economic performance through high-cost technologies. Also, Yildiz Çankaya and Sezen (2019) noted that GSCM practices positively and negatively affect economic sustainability.

2.2. Green Supply Chain Management

The concept of "Green supply chain" was first proposed by the Manufacturing Research Consortium (MEC) at Michigan State University in the U.S. in 1996 (Lakmali & Jayaratne, 2018). Supply chain management has been the subject of much research over the decades. However, discussions of green supply chain management (GSCM) or sustainable supply chain management (SSCM) really began in the early 2000s (Sahoo & Vijayvargy, 2020). The construction of environmentally sustainable practices in the supply chain network raises the multidisciplinary nature of the "green supply chain" (Yildiz Çankaya & Sezen, 2019). In the last few decades, different definitions of GSCM have been proposed. Green supply chain management is an environmental concept that is becoming increasingly well-known in the modern world (Balon, 2020). GSCM is a process that ensures sustainability in terms of environmental and economic impacts, thereby increasing the organization's sustainability. GSCM also offers advanced sustainability benefits in the manufacturing industry (Das et al., 2021). According to Zaid et al. (2018), GSCM is a combination of environmental practices with SCM, including green manufacturing, green production, and green management of end-of-life. Also, Lakmali and Jayaratne (2018) mentioned the supply chain elements as purchasing, manufacturing, warehousing, distribution, and consumption to measure the adoption of GSCM practices. GSCM involves the purchasing function in activities such as material replacement, reduction, recycling, and reuse (Zhu et al., 2012). It is widely known as a key factor in promoting organizational sustainability (Das et al., 2021). The publication of GSCM practices involves four distinct phases. (1) The input stage, (2) the throughput stage, (3) the output stage, and (4) the end-to-start and inverse phase. In the input stage, include green purchases and green inbound logistics. Furthermore, in the next phase, it includes various types of green initiatives, such as green manufacturing, design for the environment, green environment, green building, and internal environmental management. The logistics stage includes green waste management, green transportation, green packaging, and green marketing. According to Boson et al. (2023), incorporating sustainability into traditional

supply chains by integrating environmental processes into manufacturing, operations, and end-of-life (e.g., reuse, recycle, reclaim, and degradable).

2.3. Green Purchasing

The integration of green purchasing with information systems and digital technologies further enhances its effectiveness. Advanced procurement systems enable organizations to monitor supplier environmental performance, track sustainability metrics, and ensure compliance with green purchasing policies (Rao, 2007). Digital platforms also facilitate communication and collaboration between buyers and suppliers, supporting data-driven decision-making and continuous improvement. These technological enablers strengthen transparency and accountability within green procurement processes (Hervani et al., 2005).

Moreover, green purchasing contributes to social sustainability by promoting ethical sourcing practices and improving labor conditions within supply chains. Environmentally responsible suppliers are more likely to adhere to social standards on worker safety, fair wages, and community engagement. By incorporating social and environmental criteria into purchasing decisions, organizations can address multiple dimensions of sustainability simultaneously. This integrated approach aligns with the broader objectives of sustainable supply chain management and corporate social responsibility (Ageron et al., 2012).

In summary, green purchasing serves as a critical driver of sustainability by influencing supplier behavior, promoting green innovation, and enhancing supply chain performance. Its strategic importance lies in its ability to integrate environmental considerations into procurement decisions while delivering economic and social benefits. By fostering collaboration, transparency, and continuous improvement among supply chain partners, green purchasing supports the achievement of long-term sustainability objectives. Consequently, green purchasing is not merely an operational activity but a strategic capability that significantly contributes to sustainable supply chain management and overall organizational performance.

2.4. Green Manufacturing

In developing economies, the adoption of green manufacturing is influenced by financial constraints, technological limitations, and managerial perceptions. The managers in developing countries often perceive green manufacturing as a costly and complex initiative rather than a strategic investment (Boson et al., 2023). However, increasing integration into global supply chains exposes firms to international environmental standards and sustainability expectations, compelling them to adopt greener production practices to remain competitive (Rao, 2007).

Collaboration across supply chain partners further strengthens the implementation of green manufacturing practices. Manufacturers increasingly work with suppliers to ensure the availability of environmentally friendly inputs and with customers to meet sustainability requirements. According to Lokeshwara et al. (2023), emphasized that the facilitates knowledge sharing and joint innovation, enabling firms to address environmental challenges collectively. According to Sarwar et al. (2021), argued t, they argued that green manufacturing initiatives enhance overall supply chain sustainability and create shared value among stakeholders.

2.5. Green Distribution and Packing

In global supply chains, green distribution and packaging are often driven by international customer requirements and sustainability standards. Export-oriented firms, particularly in developing countries, face pressure to meet environmental expectations imposed by multinational buyers. According to Cousins et al. (2019), compliance with green packaging and distribution standards facilitates access to global markets and strengthens competitive positioning. As sustainability becomes a key criterion in supplier evaluation, green distribution practices increasingly influence supply chain relationships and market opportunities (Zhu et al., 2017).

Technological advancements further enhance the effectiveness of green distribution and packaging initiatives. Digital logistics platforms, real-time tracking systems, and data analytics enable firms to monitor transportation efficiency, optimize routes, and reduce fuel

consumption. When it comes to Yildiz Çankaya and Sezen (2019), they emphasize that technology-driven distribution planning improves environmental performance by enabling precise control over logistics operations. Similarly, innovations in packaging technologies support material reduction and improved recyclability, reinforcing sustainability outcomes.

2.6. Eco Design

Eco-design further supports collaboration across supply chains by encouraging coordination between designers, suppliers, and manufacturers. Sustainable product design often requires environmentally friendly materials and components, making supplier involvement essential. Agyabeng-Mensah et al. (2022) highlighted that supplier collaboration facilitates access to sustainable materials and innovative design solutions. Such collaboration enhances transparency and knowledge sharing, thereby improving sustainability performance across the supply chain (Ji et al., 2015).

2.7. Green Innovation

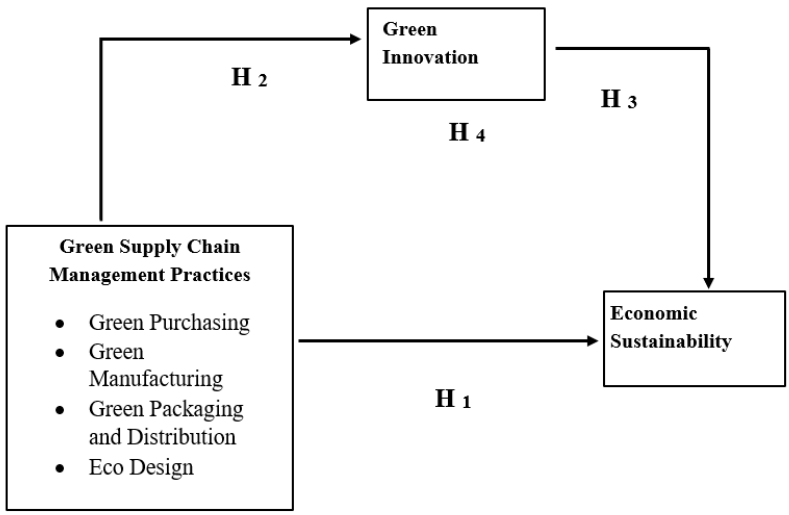
The term "green innovation" describes the creation of ecologically friendly goods and procedures (Saqib & Zhang, 2021). Nevertheless, innovations are always useful for business organizations to gain a competitive advantage, especially within this turbulent business environment. But green innovations are far beyond that, as it enable businesses to boost productivity and reinforce their core competencies, which may ultimately improve their economic performance (Wang & Wang, 2021). The importance of green innovation practices in industries has expanded as a result of growing social, economic, and environmental concerns also it helpful and effective in reducing the adverse effects of processing, production, and operations on the environment (Wang & Wang, 2021). The effective application of green innovations is useful to promote green concepts that provide solutions for issues associated with the protection of the environment (Afum et al., 2020). The more attention of manufacturers towards green innovations gain as it is beneficial for their long-term survival. As it provides new ideas, strategies, or technologies for the manufacturers in creating new products and the green innovation concepts are useful in the implementation of GSCM (Ageron et al., 2012).

3. Methodology

This study employs a quantitative approach and tests the hypothesis using statistical analysis. This approach is suitable since the study aims to measure relationships among Green Supply Chain Management (GSCM) practices, Green Innovation, and Economic Sustainability using structured questionnaires and statistical models. According to Rahmawati (2020), qualitative research is introduced as an "inquiry process of understanding based on distinct methodological traditions of inquiry that explores a human and social issues." The qualitative approach mainly uses numerical data and statistical analysis to evaluate hypotheses and make predictions. The mixed strategy combines both qualitative and quantitative methods to address specific research questions. The goal of mixed-method research is to collect both numerical and non-numerical data.

This research examines the impact of green supply chain management practices on Economic Sustainability, with green innovation as a mediating variable. Therefore, the researcher uses a qualitative approach.

Figure 1
Conceptual Framework



Note. Developed by the author (2025).

3.1. Research Hypothesis

01) H_1 - There is a significant impact of GSCM practices on Economic Sustainability

02) H_2 - There is a significant impact of GSCM practices on Green Innovation

03) H_3 - There is a significant impact of Green Innovation on Economic Sustainability.

04) H_4 – Green Innovation mediates the relationship between GSCM practices and Economic Sustainability

This study focuses on green supply chain management practices and their impact on economic sustainability in the apparel industry in the Export Processing Zone, Katunayake, Sri Lanka, with green innovation as a mediating factor. According to the Sri Lankan Export Development Board (EDB), there are 300 export-oriented apparel manufacturers in Sri Lanka, though this count does not include all apparel companies. The total number of apparel companies in Sri Lanka is 1070 (EDB, 2024). Among them, the population for this study comprises export-oriented apparel organizations operating in Katunayake EPZ, selected for their significant contributions to Sri Lanka's export earnings. In relation to the Katunayake EPZ, 15 apparel industries have been registered with the Export Development Board and BOI, Katunayake (BOI Katunayake Zone, 2024). Therefore, according to the Krejcie and Morgan (1970), table, 15 apparel companies were selected from the Katunayake EPZ. Here, the managerial and executive-level employees were selected because they possess the necessary knowledge and decision-making experience regarding supply chain and sustainability practices. Therefore, their responses provide reliable and informed data for this study. Thus, the researcher conducted a pilot study (Table 3.1) to calculate the population. There, the researcher found that about 520 managerial and executive-level employees are currently working across the 15 apparel industries. Therefore, the population for this study consisted of 520 management- and executive-level employees currently employed in the apparel industry at the Katunyake EPZ.

According to the researcher's information, the population is 520. When determining the sample number, the sample should be 222 according to Krejcie and Morgan's (1970), table. Since the researcher already knew the population, the absence of an accessible individual-

level sampling frame and practical constraints on directly reaching all members of the population limited the feasibility of probability sampling techniques.

4. Findings and Discussion

Based on the previous section, this section further discusses the research findings. This is based on theoretical perspective, empirical evidence and conceptual studies that are considered to be appropriate for this study. The discussion covers the two main objectives of the present study.

Objective 01: To investigate the impact of Green Supply Chain Management (GSCM) Practices on Economic Sustainability.

According to the structural model findings of this study, it is revealed that GSCM Practices have a significant positive impact on Economic Sustainability. The path coefficient for this relationship is 0.169, with a p-value of 0.002, indicating that the direct relationship is statistically significant.

These findings align with the work of Zhu et al. (2013), who argued that integrating environmental concerns into supply chain operations can lead to improved economic performance through waste reduction and efficiency. Furthermore, the results are consistent with the "Porter Hypothesis," which suggests that environmental regulations and practices can trigger innovation, eventually leading to a competitive advantage and better economic standing.

Based on the survey data collected for this research, it is evident that organizations implementing GSCM such as green procurement and eco-design experience long-term cost savings. The data suggests that while the initial investment in green practices might be high, the reduction in energy consumption and material waste significantly boosts the organization’s economic sustainability over time.

Objective 02: To investigate the mediating effect of Green Innovation (GI) in the relationship between GSCM Practices and Economic Sustainability (ES).

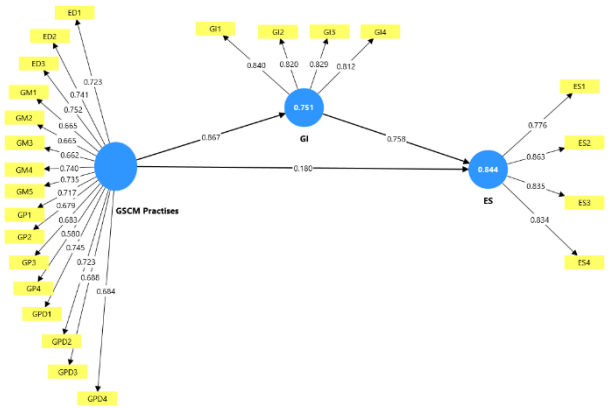
In the mediator analysis, the impact of GSCM Practices on Green Innovation was found to be exceptionally strong, with a path coefficient of 0.876. Additionally, Green Innovation showed a significant positive impact on Economic Sustainability with a coefficient of 0.770.

The results indicate that Green Innovation acts as a vital bridge between operational practices and economic outcomes. This is consistent with findings by Chen et al. (2006) and Li et al. (2017), who established that green product and process innovations are the primary drivers that translate environmental efforts into financial success.

According to the analytical results, the p-values for both the direct and indirect paths are less than 0.05. Therefore, following the standard mediation criteria, it can be concluded that Green Innovation partially mediates the relationship between GSCM Practices and Economic Sustainability. This suggests that while GSCM practices can directly improve economic stability, the effect is vastly amplified when these practices lead to the development of innovative green technologies or processes.

The researcher identified that organizations that do not just comply with environmental standards but innovate within them for example like by developing new recyclable packaging or energy-efficient manufacturing and it report much higher levels of economic resilience. Consequently, in all objectives the researcher desired to explore were successfully met.

Figure 2
Structural Equation Model



Note. Developed by the author using Smart PLS based on the Field Survey conducted in 2025/2026.

5. Summary and Conclusion

The objective of this study was to examine the relationship between Green Supply Chain Management (GSCM) practices and Economic Sustainability in apparel organizations in the Katunayake Export Processing Zone, with Green Innovation as a mediating variable. To achieve this objective, primary data were collected through a structured questionnaire administered to 202 managerial and executive-level employees representing apparel manufacturing organizations within the zone.

The findings of the study reveal that Green Supply Chain Management practices, namely Green Purchasing, Green Manufacturing, Green Distribution and Packaging, and Eco-design, have a significant and positive relationship with Economic Sustainability. Furthermore, the results confirm a strong positive relationship between GSCM practices and Green Innovation, as well as between Green Innovation and Economic Sustainability. These results satisfy the assumptions required for mediation analysis and validate the study's proposed conceptual framework.

Regression analysis supported all the hypothesized relationships, confirming that GSCM practices significantly influence Economic Sustainability both directly and indirectly. The mediation analysis further established that Green Innovation partially mediates the relationship between GSCM practices and Economic Sustainability. This indicates that while GSCM practices independently enhance economic sustainability, their impact is strengthened when organizations adopt green innovation initiatives. Therefore, Green Innovation serves as an important mechanism through which GSCM practices contribute to improved economic outcomes in apparel manufacturing firms.

When examining individual GSCM practices, the study found that Green Purchasing and Eco-design have a statistically significant and positive impact on Economic Sustainability. Specifically, Green Purchasing practices such as eco-labelling, supplier collaboration for environmental objectives, and suppliers' internal environmental management contribute to

cost efficiency, resource optimization, and long-term economic benefits. These findings are consistent with Sarwar et al. (2021), who identified a positive relationship between green purchasing and economic sustainability through improved supply chain integration and cost management.

Regarding Eco-design, the study provides important contextual insights. While prior studies (Herath & Rajumesh, 2022) have reported mixed or even negative impacts of eco-design on economic sustainability, the present study finds a positive and significant impact in the Sri Lankan apparel industry context. Eco-design practices such as material reduction, reuse, and recovery-oriented product design, and avoidance of hazardous materials were found to enhance profitability through material savings, reduced input costs, and improved competitiveness. This positive effect may be attributed to increasing resource scarcity, rising input costs, and growing pressure from international buyers, which make eco-design a cost-effective and strategically beneficial practice for apparel manufacturers in the Katunayake Export Processing Zone.

Overall, the findings suggest that adopting Green Supply Chain Management practices is no longer optional but a strategic necessity for apparel organizations aiming to achieve economic sustainability. Although Sri Lankan apparel firms are still at varying stages of green implementation, increasing regulatory requirements, international buyer expectations, and environmentally conscious consumer demand are likely to accelerate the adoption of GSCM practices. By integrating Green Innovation into their supply chain strategies, apparel manufacturers can enhance both their environmental responsibility and economic performance, thereby achieving sustainable competitive advantages.

5.1. Implifications

The study's results on the impact of green supply chain management practices on economic sustainability, with the mediating role of green innovation, in apparel organizations in the Katunayake Export Processing Zone will be more essential, both theoretically and practically, for the parties directly engaged in this research area. Few studies have been conducted in depth to identify the impact of green supply chain management practices on economic

sustainability in the apparel sector. Therefore, this research fulfilled the gap in previous research. Also, this research helps apparel sector organizations understand the importance of green supply chain management practices and economic sustainability.

From a theoretical perspective, this study makes a substantial contribution to the existing literature on green supply chain management and sustainability by empirically examining the relationship between green supply chain management practices and economic sustainability, while explicitly incorporating green innovation as a mediating variable. Previous studies in this domain have predominantly focused on the environmental or social dimensions of sustainability, often treating economic outcomes as secondary or indirect consequences. By contrast, this study positions economic sustainability as a central outcome variable, thereby extending sustainability research beyond its traditional environmental focus.

5.2. Avenues for the Further Research

This study only reflects four green supply chain management practices. Therefore, Future researchers can carry out to identify other variables that impact of Economic sustainability. Also, Sustainability has three pillars. Among these three pillars this study focused only economic sustainability. Therefore, Future researchers can be carried out research other two pillars or overall sustainability. Also, can be considered all manufacturing organizations in Sri Lanka. Furthermore, there are still uncertainties about the impact of specific green supply chain management performance impacts on sustainability. As well as the most relevant performance measures for evaluating the internal and external elements of GSCM implementation Herath and Rajumesh (2022) propose avenues for future research, considering technological advancements, emerging trends that could enhance the economic benefits of Green supply chain management practices.

Building on the scope of the current study, future researchers are encouraged to expand the range of green supply chain management practices examined. While this research focused on selected dimensions, other practices such as green logistics, reverse logistics, green warehousing, supplier environmental collaboration, and sustainable sourcing strategies may provide additional insights into how organizations enhance economic sustainability.

Including a broader set of practices could lead to a more comprehensive understanding of green supply chain management and its multidimensional effects on organizational performance (Zhu et al., 2017).

Future research can also extend the scope of sustainability outcomes beyond economic sustainability to include environmental and social sustainability. Since sustainability is widely recognized as a triple bottom line concept, examining all three pillars simultaneously would provide a more holistic assessment of the effectiveness of green supply chain management practices (Yildiz Çankaya & Sezen, 2019). Studies that integrate economic, environmental, and social performance measures may better capture trade-offs and synergies among sustainability dimensions, offering more balanced insights for both academics and practitioners (Cardoni et al., 2020).

Additionally, future studies could consider different industrial sectors to improve the generalizability of findings. Expanding the research to include manufacturing industries such as food and beverage, electronics, rubber, ceramics, and chemical manufacturing could reveal sector-specific differences in the adoption and impact of green supply chain management practices. Such comparative studies would allow researchers to assess whether the relationships identified in the apparel sector are consistent across industries or influenced by operational complexity, regulatory pressure, or market dynamics (Afum et al., 2020).

From a methodological perspective, future researchers may employ longitudinal research designs to capture changes over time. Since green supply chain initiatives and green innovation often require long-term investment and gradual implementation, longitudinal studies could provide deeper insights into causal relationships and long-term sustainability outcomes. This approach would help overcome the limitations of cross-sectional studies and offer a more dynamic understanding of sustainability performance (Saqib & Zhang, 2021).

Furthermore, qualitative or mixed-method approaches could complement quantitative findings by providing deeper contextual insights. Interviews, case studies, and focus group discussions with managers, suppliers, and policymakers could help explore underlying motivations, barriers, and organizational capabilities associated with green supply chain

management implementation. Such approaches may uncover nuanced factors such as leadership commitment, organizational culture, and stakeholder engagement that are difficult to capture through survey-based methods alone (Lambrechts et al., 2019).

Future research may also explore additional mediating or moderating variables that influence the relationship between green supply chain management practices and sustainability outcomes. Variables such as organizational learning, technological capability, environmental regulation intensity, or corporate social responsibility orientation could be incorporated to enhance the explanatory power of research models. Investigating these factors would contribute to a more refined theoretical understanding of sustainability-driven supply chain strategies (Pintuma & Aunyawong, 2021).

Moreover, as highlighted by Herath and Rajumesh (2022), technological advancements and emerging trends present promising avenues for future research. The role of digital technologies such as Industry 4.0, artificial intelligence, block chain, and big data analytics in enhancing green supply chain performance warrants further investigation. Examining how these technologies facilitate transparency, efficiency, and innovation could provide valuable insights into maximizing the economic and sustainability benefits of green supply chain management practices.

Overall, these future research directions highlight the need for broader, deeper, and more integrated investigations into green supply chain management and sustainability. Addressing these avenues will not only enrich academic literature but also provide actionable insights for organizations and policymakers striving to achieve sustainable and competitive supply chains.

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