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Green Supply Chain Practices and Their Influence on Organizational Sustainability: A Case Study in the Manufacturing Sector

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Abstract

This study aims to analyze the influence of Green Supply Chain Practices, Technological Innovation, Management Support, and Regulatory Pressure on Organizational Sustainability in the manufacturing sector. Data were obtained from 100 manufacturing companies through quantitative surveys which were then analyzed using the Structural Equation Modeling (SEM-PLS) method. The results showed that Green Supply Chain Practices and Management Support have a positive significant influence on Organizational Sustainability, indicating the importance of green practices and management support in promoting organizational sustainability. In contrast, Technological Innovation and Regulatory Pressure did not show a significant influence on organizational sustainability. This indicates that while innovative technologies and existing regulations play an important role, their impact on sustainability has not been significantly felt in the context of the manufacturing industry. This research contributes to the organizational sustainability literature by highlighting the importance of integrating green supply chain practices and strong management support to achieve sustainability in the manufacturing sector.

Keywords: Green Supply Chain, Technological Innovation, Management Support, Organizational Sustainability

Introduction

Amidst increasing global environmental awareness, organizations are prioritizing sustainability to remain competitive and meet stakeholder demands. This shift involves adopting an integrated strategy that encompasses environmental, social, and economic dimensions. Organizations are implementing Sustainable Green Management Systems (SGMS) to improve operational efficiency and reduce environmental impact. These systems promote environmental stewardship and social responsibility, aligning business objectives with sustainable practices (Sharma et al., 2024). The manufacturing sector is known to be one of the largest contributors to carbon emissions, industrial waste, and energy consumption. Therefore, transforming to a more sustainable business model is not only a strategic choice but also a necessity to survive in an increasingly competitive and highly regulated market. Companies are focused on reducing carbon emissions, enhancing corporate social responsibility, and ensuring ethical supply chains, which collectively enhance their market position (Nunes et al., 2024). A supportive organizational culture is critical to successful sustainability initiatives. Companies must foster a green culture and improve communication about sustainability goals to implement these initiatives effectively (Jaganjac et al., 2024). While this strategy presents significant

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opportunities for innovation and competitive advantage, challenges such as high upfront costs and complex stakeholder dynamics remain prevalent (Sharma et al., 2024).

The manufacturing sector is under increasing pressure to reduce its environmental impact by reducing carbon emissions, managing waste, and optimizing resource use. This shift is driven by the need for sustainable practices and compliance with regulatory frameworks. Implementing green management principles is critical to minimizing waste and maximizing energy efficiency. These principles advocate a comprehensive approach that integrates sustainability into organizational culture and management systems (Кулініч, 2024). The transition from green to sustainable manufacturing involves a strategic shift in practices and priorities. Effective transition management can improve business performance while positively impacting the environment (Rehman & Seth, 2024). Product Carbon Footprint (PCF) has become an important metric for manufacturers, influenced by regulatory requirements and consumer preferences. Companies are increasingly adopting Life Cycle Assessment methodologies to measure and manage their carbon emissions (Gutwald et al., 2024). Green Supply Chain Management (GSCM) has emerged as a key strategy for integrating sustainability principles into the entire product life cycle. GSCM encompasses efforts to minimize the environmental impact of each stage of the supply chain, from environmentally friendly raw material sourcing, energy-efficient and low-emission production processes, to distribution that reduces carbon footprint. Research shows a weak decoupling of carbon emissions from output growth in the Indian manufacturing sector, suggesting efforts towards cleaner production methods and increased energy efficiency (Sharma & Padhi, 2024). Green Supply Chain Management (GSCM) is a transformative approach that integrates environmentally friendly practices across the supply chain, from raw material sourcing to post-consumer management. This strategy not only addresses sustainability issues but also improves operational efficiency and corporate responsibility. GSCM combines green design, sustainable procurement, and waste reduction strategies, aiming to minimize environmental impacts across the supply chain (Li, 2024). Furthermore, GSCM also encompasses more effective waste management, including reuse and recycling of post-consumer products. GSCM implementation not only offers ecological benefits, but also improves operational efficiency, reduces long-term costs, and enhances the company's reputation in the eyes of increasingly environmentally conscious consumers and investors. Successful implementation requires collaboration among supply chain partners, overcoming challenges such as financial constraints and regulatory complexities (Sarin & Srivastava, 2024) (S, 2024). Adoption of green technologies and automation can

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significantly improve efficiency and reduce costs, driving a more sustainable supply chain (Study on Green Supply Chain Management, 2024) (S, 2024).

Companies such as Tesla and Coca-Cola have enhanced their reputation and customer loyalty through sustainable practices (Sarin & Srivastava, 2024). In addition, GSCM adoption requires strong collaboration across the supply chain. Suppliers, distributors, and other stakeholders must align their sustainability goals with the core company. While GSCM offers many benefits, challenges such as initial investment costs and cultural resistance can hinder its adoption. Overcoming these barriers is critical to fostering a sustainable supply chain landscape. Organizations that adopt GSCM often experience reduced waste and lower operating costs (Sarin & Srivastava, 2024) (S, 2024). Companies such as Tesla and Coca-Cola have enhanced their reputation and customer loyalty through sustainable practices (Sarin & Srivastava, 2024). In practice, GSCM encompasses aspects such as the use of more environmentally friendly materials, energy optimization, waste reduction, and collaboration with suppliers who implement similar environmental standards. GSCM helps businesses meet environmental regulations, reducing the risks associated with non-compliance (A.Sukandi, 2024).

As environmental regulations at the national and international levels become increasingly stringent, manufacturing companies that ignore the importance of GSCM adoption risk facing fines, loss of operating licenses, or reputational damage with consumers. Implementing Green Supply Chain Management (GSCM) in the manufacturing sector of developing countries faces significant challenges, despite its recognized benefits. GSCM often requires large upfront investments in environmentally friendly technologies and processes, which can be a barrier for manufacturers in developing countries (Sarin & Srivastava, 2024). Key barriers include high upfront investment costs, inadequate technology, and resistance to change, which hinder the adoption of sustainable practices. Companies may struggle to justify these costs without immediate financial returns, leading to reluctance to adopt GSCM practices (Cheng, 2024). . Conversely, companies that are proactive in implementing green supply chain practices tend to gain more trust from stakeholders, access to new markets that are more sensitive to environmental issues, and opportunities to increase competitiveness in a sustainable manner. Many manufacturers do not have access to the advanced technologies required for effective GSCM implementation, limiting their ability to optimize resource use and minimize waste (Li, 2024)]. In addition, a lack of awareness and understanding of the benefits of GSCM can further entrench traditional practices, making change difficult (Feng et al., 2024). While these challenges are significant, they also present opportunities for strategic management and policy interventions to facilitate the transition to more sustainable manufacturing practices. The

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absence of technological infrastructure can hinder the integration of sustainable practices across the supply chain (Hussain, 2024). Cultural resistance within the organization can hinder the transition to GSCM, as employees may be hesitant to adopt new practices or technologies (Sarin & Srivastava, 2024). However, in the long run, implementing GSCM will not only help companies meet environmental regulatory standards but also improve overall organizational performance through cost reduction, increased efficiency, and value creation for all stakeholders. Companies that successfully implement GSCM tend to enjoy long-term benefits such as improved brand reputation, operational efficiency, and reduced regulatory risk..

Literature Review

Green Supply Chain Management (GSCM)

Green Supply Chain Management (GSCM) refers to the integration of environmentally friendly practices throughout the supply chain, from product design, raw material procurement, to waste management. According to Srivastava (2007), GSCM is a systematic effort to reduce or eliminate negative impacts on the environment through supply chain management practices. Research by Zhu and Sarkis (2004) shows that GSCM can include practices such as green procurement, waste reduction, recycling, and efficient energy management.

The implementation of GSCM in manufacturing organizations is often viewed as a strategic investment that not only reduces environmental impacts but also improves operational efficiency (Kumar et al., 2012). For example, the use of recyclable materials and reduced energy consumption in the production process can reduce long-term operational costs. In addition, research by Ahi and Searcy (2013) emphasizes that GSCM can also improve a company's reputation in the eyes of consumers who are increasingly concerned about sustainability issues.

Various studies have identified several important dimensions in GSCM, as explained by Zhu et al. (2005), namely: Green procurement, Prioritizing suppliers who implement environmentally friendly practices. Green manufacturing, Reducing waste and resource use in the production process. Green distribution, Optimizing transportation and logistics management to reduce carbon emissions. Reverse logistics, Facilitating the return of post-consumer products for recycling or reuse. Research by Sarkis (2012) found that adopting these dimensions can provide long-term benefits to companies in terms of cost efficiency and compliance with environmental regulations.

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Organizational Sustainability

Integrating sustainability into the supply chain not only increases regulatory resilience but also opens up new market opportunities and drives economic benefits. Research shows that sustainable supply chain practices (SSCP) significantly improve organizational performance, especially in manufacturing. SSCP positively affects economic performance, with social and environmental performance acting as mediators (Abuzawida et al., 2023). Organizational sustainability encompasses a company's ability to achieve economic, social, and environmental goals in a balanced manner (Elkington, 1998). This approach is known as the Triple Bottom Line (TBL), which includes financial performance, social responsibility, and environmental sustainability. In the manufacturing context, sustainability is increasingly important due to pressure from governments, consumers, and other stakeholders to implement greener operations (Hart & Milstein, 2003).

Companies that adopt green supply chain management (GSCM) practices report increased operational efficiency and reduced environmental impact, leading to better overall performance (Feng et al., 2024). Research by Seuring and Müller (2008) shows that companies that integrate sustainability into their supply chains tend to be more resilient to regulatory risks and have greater opportunities to access new markets. SSCP positively affects economic performance, with social and environmental performance acting as mediators (Abuzawida et al., 2023). In addition, improvements in energy efficiency and waste management can provide significant economic benefits to manufacturing companies. Integrating sustainability into the supply chain drives innovation and enhances brand reputation, which can lead to increased customer loyalty and market access (Makprang, 2024). Sustainable practices also reduce the risks associated with regulatory compliance, providing a competitive advantage in the marketplace.

Sustainability in the Context of the Manufacturing Sector

The manufacturing sector faces major challenges in terms of sustainability due to its high energy consumption and greenhouse gas emissions. According to a study by Kleindorfer et al. (2005), the implementation of GSCM in the manufacturing sector has the potential to improve sustainability performance by reducing carbon emissions and increasing resource efficiency. For example, the use of renewable energy in the production process can reduce dependence on fossil fuels and lower energy costs in the long run. Another study by Porter and van der Linde (1995) showed that environmental regulations can encourage innovation in the manufacturing sector, so that companies that invest in green technologies can create a competitive advantage.

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The Impact of GSCM on Organizational Sustainability

Several studies have shown a strong relationship between the implementation of GSCM and increased organizational sustainability. Carter and Rogers (2008) stated that GSCM not only has an impact on environmental performance but also improves the economic and social performance of the company. According to the study, companies that adopt GSCM tend to be more efficient in terms of resource management and have a greater opportunity to reduce operational costs. Zhu et al. (2013) emphasized that GSCM can also improve the social performance of organizations by creating a safer working environment, reducing worker health risks, and improving the company's image in the eyes of the public. In addition, companies that are proactive in GSCM practices often have an advantage in facing increasingly stringent environmental regulations, thereby reducing the risk of penalties and fines (Chiou et al., 2011).

Challenges in GSCM Implementation

Although the potential benefits of GSCM are clear, several studies have identified significant challenges in its implementation. In developing countries, high initial investment costs for green technologies and resistance from management are often major obstacles (Zhu et al., 2005). Research by Walker et al. (2008) showed that lack of government support, limited infrastructure, and low environmental awareness among stakeholders also slow down the adoption of GSCM. In addition, according to research by Hervani et al. (2005), lack of collaboration along the supply chain can hinder the effectiveness of GSCM. Suppliers and logistics partners who do not implement environmentally friendly practices can undermine a company's efforts to achieve comprehensive sustainability.

Methods

This study uses a qualitative approach method to analyze the influence of Green Supply Chain Management (GSCM) practices on organizational sustainability in the manufacturing sector. This approach was chosen to gain a deep understanding of GSCM implementation while measuring its impact empirically. The population in this study are manufacturing companies that have implemented GSCM practices in Indonesia. The research sample will be taken from manufacturing companies engaged in the electronics or automotive sectors, which have a significant role in resource use and carbon emissions. Sampling will be carried out using a purposive sampling technique, where companies are selected based on certain criteria, namely: The company has implemented GSCM practices for at least 3 years. While the variables used in this study are Independent Variables (Green Supply Chain Practices), Green Procurement, Green Manufacturing, Green Distribution, Reverse Logistics, Eco-design, Internal

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Environmental Management. And Dependent Variables (Organizational Sustainability), Economic Performance, Social Performance, Environmental Performance. and Mediating Variables (Optional), Technological Innovation. Management Support. Regulatory Pressure.

Results and Discussion

In general, these results indicate that the measurement model is reliable and valid, with strong indicators for each variable. However, perfect values (1,000) on several variables, such as Technological Innovation, Management Support, and Regulatory Pressure, need to be examined further because they may indicate an overfitting model or too limited measurement items.

1. Relationship between Green Supply Chain Practices and Organizational Sustainability (Significant)

The relationship between Green Supply Chain Practices and Organizational Sustainability is very significant and positive. With a coefficient of 0.817 and a p-value of 0.000, we can conclude that the implementation of green supply chain practices has a strong influence on organizational sustainability. The better a company manages its supply chain by paying attention to environmental aspects, the higher the level of sustainability that can be achieved. This is in line with previous studies showing that green supply chain practices not only reduce environmental impacts, but also improve operational efficiency and the company's reputation in the long term.

2. Relationship between Technological Innovation and Organizational Sustainability (Not Significant)

These results indicate that Technological Innovation does not have a significant effect on Organizational Sustainability. With a p-value of 0.845, we cannot reject the null hypothesis (no effect). This may be because technological innovation in the manufacturing sector may not have been fully integrated into the company's sustainability strategy, or perhaps because the innovation has not developed enough so that its impact on sustainability has not been felt significantly. This condition indicates that the application of innovative technology in organizations needs to be further optimized to achieve sustainability.

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3. M1 on Organizational Sustainability (Not Significant)

This relationship is not significant, indicating that the first mediator (M1) does not have enough influence on organizational sustainability. This mediator may not have been optimized or its relevance to organizational sustainability is low. Further evaluation is needed to understand why this variable does not have a significant impact in the model.

4. M2 on Organizational Sustainability (Not Significant)

The second mediator (M2) also does not show a significant effect on Organizational Sustainability. This result indicates that the second mediation path is not strong enough to explain the variability of organizational sustainability. This mediator may not be relevant in the research context or has not been well integrated into the organization's sustainability strategy.

5. M3 on Organizational Sustainability (Not Significant)

The negative coefficient on the third mediator (M3) indicates that this variable may even have a negative effect on Organizational Sustainability, although it is not statistically significant. Although the effect is small, the presence of a negative relationship may indicate conflict in the implementation of strategies related to this mediator. However, because this result is not significant, further investigation is needed into the role of this mediator.

6. Management Support on Organizational Sustainability (Significant)

This result indicates that management support has a significant and positive effect on Organizational Sustainability. With a p-value of 0.000 and a t-statistic of 3.632, management support is an important factor in achieving organizational sustainability. Management that supports and is actively involved in sustainability strategies can encourage the implementation of environmentally friendly practices and better operational efficiency. This result is also consistent with previous studies that emphasize the importance of leadership and management support in directing organizational sustainability initiatives.

7. Regulatory Pressure on Organizational Sustainability (Not Significant)

Regulatory pressure does not have a significant effect on Organizational Sustainability. With a very small coefficient (0.002) and a p-value of 0.970, regulatory pressure does not seem to contribute enough to influencing organizational sustainability in the manufacturing sector.

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This could mean that companies in this sector have not fully responded to regulatory pressure with real actions that contribute to sustainability or that existing regulations are not strong enough to encourage behavioral changes in organizations.

Conclusion

This study examines the influence of Green Supply Chain Practices, Technological Innovation, Management Support, and Regulatory Pressure on Organizational Sustainability in the manufacturing sector. Based on the results of the data analysis, the following are the main conclusions of this study:

1. Green Supply Chain Practices have a significant positive influence on organizational sustainability. The implementation of green supply chain practices has been shown to improve organizational sustainability through more efficient resource management, reduced environmental impact, and improved corporate reputation. This shows the importance of companies to continue to adopt sustainable practices in their supply chains.
2. Management Support has also been shown to have a significant and positive influence on organizational sustainability. Strong support from management is essential in driving sustainability initiatives, including in the implementation of green supply chains. Actively involved management can provide strategic and operational impetus for the successful implementation of sustainability strategies.
3. Technological Innovation does not show a significant influence on organizational sustainability. These results indicate that although technology can be an important factor in increasing efficiency, its implementation has not directly affected sustainability in the organizations studied. This may be due to the early stages of technology adoption, lack of integration with sustainability strategies, or challenges in implementing innovation in the industry.
4. Regulatory Pressure also does not show a significant effect on organizational sustainability. This result indicates that existing regulations may not provide a strong enough impetus to encourage companies in the manufacturing sector to implement more effective sustainability strategies. Overall, this study confirms that organizational sustainability in the manufacturing sector is highly dependent on the implementation of green supply chain practices and support from management. Technological innovation and regulatory pressure need to be enhanced in this context to make a more meaningful contribution to organizational sustainability. This study provides insights for companies in the manufacturing industry to

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focus more on sustainable practices and the importance of management support in implementing sustainability strategies.

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