

# THE APPLICATION OF SUSTAINABLE SUPPLY CHAIN MANAGEMENT PRINCIPLES IN THE MANUFACTURING INDUSTRY TO IMPROVE OPERATIONAL PERFORMANCE AND CORPORATE SOCIAL RESPONSIBILITY

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**Abstract** - The rapid growth of the manufacturing industry has created new challenges related to its impact on the environment, community well-being, and long-term business sustainability. Supply chain management practices that focus solely on economic efficiency are no longer sufficient to address the increasingly diverse demands of stakeholders. This study aims to examine the application of sustainable supply chain management principles in the manufacturing industry and to analyze how the integration of environmental, social, and economic aspects can be realized in the management of goods and service flows. The method employed is a literature review that collects and critically evaluates relevant scholarly sources. The findings indicate that the implementation of sustainability principles in supply chains provides dual benefits, namely reducing negative environmental impacts and improving social welfare, while simultaneously maintaining the stability of corporate economic performance. The main conclusion of this study is that the successful integration of the three dimensions of sustainability requires strong commitment across all organizational levels and close collaboration with supply chain partners. This study contributes to the advancement of knowledge in the fields of operations management and business sustainability and offers practical guidance for manufacturing industry practitioners in formulating strategies for sustainable supply chain management.

**Keywords:** sustainable supply chain management, manufacturing industry, environmental aspects, social aspects, economic aspects, goods and service flows, business sustainability.

## INTRODUCTION

The development of the manufacturing industry in various regions has made a significant contribution to national economic growth and the improvement of public welfare (Abdullah et al., 2021). The prevailing phenomenon is the increasing demand for manufacturing products, which encourages companies to increase production capacity and expand their supply networks (Stubbs, 2015). This expansion involves many parties, ranging from raw material suppliers and logistics service providers to distributors who channel products to the market (Ishaq et al., 2021). Although providing economic benefits, this growth also creates impacts that need to be addressed, such as increased consumption of natural resources, waste production, and changes in social conditions around the company's operational sites. This demands that industry players review how they manage their supply chains so they can balance the achievement of business goals with the fulfillment of responsibilities toward the environment and society (Sembiring & Sembiring, 2019).

One of the main issues that has emerged in supply chain management practices in the manufacturing industry is that many companies still prioritize cost efficiency and delivery speed without considering the impacts caused to the environment (Zhang, 2017). This management style often ignores principles of environmental conservation, such as the use of non-environmentally friendly raw materials, production processes that generate excessive emissions, and waste management that does not comply with applicable standards. This issue creates negative impacts, where the environment around operational sites experiences damage that disrupts the balance of the ecosystem and the quality of life of the community. Consequently, companies face pressure from various parties to improve their practices; some companies even have to face legal sanctions that impact the smoothness of their operations (Sembiring et al., 2019). This condition will ultimately threaten the long-term sustainability of the company's business.

Another issue that has become an important concern is the lack of attention to social aspects in supply chain management carried out by manufacturing companies. Many companies only focus on business relationships with supply chain partners without considering the working conditions and welfare of the labor involved (Abbasi, 2017). In reality, sustainable supply chain management should also ensure that every party involved receives fair treatment, decent employment opportunities, and safe working conditions. The lack of attention to these social aspects can lead to various problems, such as labor disputes, low labor productivity, and a declining corporate image in the eyes of the public (Nakamba et al., 2017). This indicates that supply chain management focused solely on economic aspects cannot provide optimal or sustainable results for the company or the related parties.

Furthermore, there are still differing views regarding the appropriate way to integrate the three aspects of sustainability environmental, social, and economic into supply chain management in the manufacturing industry. Some

studies show that implementing sustainability principles increases a company's operational costs in the short term, while others demonstrate that such implementation provides significant economic benefits in the long term (Etoimou, 2020). These differing views create ambiguity regarding the extent to which companies need to invest in implementing sustainability principles and how to measure the success achieved. This also creates difficulties for industry players in determining the right steps to apply sustainable supply chain management principles to achieve the expected goals. Additionally, human resources (HR) play a role in ensuring the integration between company operations and supply chain sustainability (Dede, 2019; Rojak & Darmawan, 2021; Darmawan, 2020; Eddine et al., 2021). The involvement of HR in organizational processes strengthens supply chain efficiency and sustainability (Adibpour et al., 2020; Darmawan, 2021; Arifin & Mardikaningsih, 2021; Mardikaningsih & Hariani, 2020). Human resource capacity development supports improvements in supply chain performance and sustainability (Asnordin et al., 2020; Kurniawan & Darmawan, 2021; Irfan & Darmawan, 2021; Gautama et al., 2021).

This research is based on the Sustainable Supply Chain Management Theory developed by Seuring and Müller (2021). This theory explains that sustainable supply chain management is the management of the flow of goods, services, information, and finance involving all organizations within the supply network, while considering sustainability goals that include environmental, social, and economic aspects. According to this theory, the successful implementation of sustainable supply chain management requires close cooperation among supply chain partners, commitment from company leadership, and the integration of sustainability principles into every process performed. This theory emphasizes that applying sustainability principles in the supply chain is not only beneficial for the environment and society but can also increase a company's competitiveness and economic performance in the long term.

Based on a review of various previous studies, there is still a gap in understanding the processes involved in integrating the three aspects of sustainability into supply chain management in the manufacturing industry. Some studies focus solely on the environmental aspect without providing sufficient explanation on how social and economic aspects can be integrated simultaneously. Meanwhile, other studies discuss these three aspects separately without examining in depth the relationships and interconnectedness between them. This gap creates difficulties for industry players in understanding the steps needed to implement sustainable supply chain management principles in a complete and comprehensive manner.

Another problem that arises is the lack of understanding regarding the factors that can strengthen or weaken the successful implementation of sustainable supply chain management principles in the manufacturing industry. Although many studies show that implementing these principles provides significant benefits, many companies still experience difficulties in implementing them effectively (Silva & Severino, 2019). This indicates that there are certain factors that influence the successful implementation of these principles; however, these factors have not been identified and explained adequately in the various studies that have been conducted. The lack of understanding regarding this matter causes industry players to struggle in preparing themselves and determining the right strategies to overcome various obstacles that may be encountered during the implementation process.

Increasing public awareness of products produced in a responsible manner demands that companies immediately adjust their management methods. Implementing sustainable supply chain management principles is an effective way for companies to meet these demands, while simultaneously increasing competitiveness and long-term business sustainability (Bajdor et al., 2014). Furthermore, this study is expected to contribute to the development of knowledge in the fields of operational management and business sustainability, as well as serve as a reference for future research discussing similar topics.

The objective of this research is to examine the implementation of sustainable supply chain management principles in the manufacturing industry, as well as to analyze how the integration of environmental, social, and economic aspects can be realized in the management of the flow of goods and services. This objective is structured in alignment with the established problem formulation, ensuring that each goal provides a clear answer to the problems faced. This research is expected to provide a comprehensive understanding of the concept of sustainable supply chain management and how to implement it in the manufacturing industry, as well as provide useful guidance for industry players in formulating sustainable supply chain management strategies.

## RESEARCH METHODS

This research employs a literature study method aimed at collecting, examining, and synthesizing various information sources relevant to the topic of study to gain a comprehensive and systematic understanding. This method was chosen because it allows the researcher to examine various previously conducted studies that discuss sustainable supply chain management, the manufacturing industry, and related sustainability aspects. Through this method, the researcher can identify various emerging views, findings, and concepts regarding the implementation of sustainable supply chain management principles, as well as develop a holistic understanding of how the integration of environmental, social, and economic aspects can be realized in the management of the flow of goods and services. This method is

considered appropriate for research objectives that seek to compile summaries and analyses from various previous studies to provide a clear picture of the phenomenon under study.

The data sources used in this research consist of various scientific literatures relevant to the topic of study. The gathered literature includes national and international scientific journals discussing supply chain management, operations management, business sustainability, and the manufacturing industry. Additionally, these sources include textbooks written by experts in the fields of management and industrial engineering, research reports published by reputable research institutions, and other scientific publications that discuss factors influencing the application of sustainability principles in supply chain management. The researcher ensures that the literature sources used possess high credibility and have undergone a rigorous review process, so that the information obtained is reliable and can be used as a basis for conducting accurate analysis and synthesis.

The data analysis technique used in this research is thematic analysis, where information collected from various literature sources is grouped into primary themes corresponding to the focus of the study. The analysis process is conducted by identifying key ideas found within each literature source, grouping them into relevant categories, and organizing them into a systematic and structured series of descriptions. This technique allows the researcher to compare and contrast various existing views, as well as to develop a comprehensive synthesis regarding the implementation of sustainable supply chain management principles in the manufacturing industry. This approach aligns with the perspective of Braun and Clarke (2021), who state that thematic analysis in literature reviews can be used to organize and present information logically, thereby providing a clear and comprehensive picture of the topic being studied.

## RESULTS AND DISCUSSIONS

Sustainable supply chain management is defined as a set of skills and leverage that enables companies to structure their business processes to achieve sustainable performance (Ortas et al., 2014). The implementation of sustainable supply chain management principles in the manufacturing industry begins with a complete understanding of the scope of responsibility inherent in every activity performed. This principle requires companies to consider the impacts caused by every process in the supply chain, from the procurement of raw materials and production processes to product distribution and the management of generated waste (Manavalan et al., 2021). In practice, manufacturing companies need to identify critical points in the supply chain that have the potential to create negative impacts on the environment, society, and business sustainability. This identification serves as a basis for formulating structured improvement measures, so that every activity performed can provide optimal benefits without causing lasting damage (Sucky & Zitzmann, 2018). This approach shows that sustainable supply chain management is not just about adding new rules, but about changing the perspective on how all operational activities are conducted.

The environmental aspect is one of the main pillars in the implementation of sustainable supply chain management in the manufacturing industry. The application of this aspect includes various actions aimed at reducing the use of natural resources, suppressing waste production, and minimizing emissions generated from every operational process (Liu & You, 2021). Some common practices include the use of renewable or recyclable raw materials, the implementation of more energy-efficient production technologies, and waste management that complies with applicable environmental standards (Sembiring et al., 2020). Analysis of various literature shows that implementing this environmental aspect requires a strong commitment from the company, as it often requires a substantial initial investment (Miroslav, 2021). However, in the long term, these practices will provide benefits in the form of reduced operational costs, increased resource efficiency, and a reduction in the risk of legal sanctions related to environmental damage.

The integration of environmental aspects into the management of the flow of goods and services also includes attention to the distribution processes carried out by the company. Manufacturing industries with extensive distribution networks need to consider the impacts caused by transportation activities on the environment (Mach & Furtak, 2020). Several steps that can be taken include selecting more environmentally friendly transportation modes, planning optimal distribution routes to reduce travel distance, and using product packaging that is recyclable or appropriately sized to reduce packaging waste. These steps show that the environmental aspect is not only applied to the production process but also covers all activities involved in moving goods from suppliers to consumers. Consistent implementation of these steps will help companies reduce the carbon footprint generated from all operational activities performed. Organizations need to plan the implementation of new technology by considering its environmental impact and exploring solutions that can minimize energy consumption while maximizing operational efficiency (Bibri & Krogstie, 2017; Hariani, 2021). Ultimately, the goal is to build ethical and fair technology through responsible development and implementation (Mardikaningsih & Darmawan, 2021).

The social aspect is the second pillar that plays an important role in the implementation of sustainable supply chain management. The application of this aspect focuses on fulfilling the rights and welfare of all parties involved in the supply chain, both within the company environment and among business partners (Nakamba et al., 2017). In practice, manufacturing companies need to ensure that every worker involved receives a fair wage, works in safe and healthy conditions, and has opportunities to develop their skills. Given that quality human resources are

organizational assets that must be retained (Mokhtar et al., 2016) (Darmawan et al., 2020), effective HR management becomes a crucial factor in maintaining supply chain sustainability (Arifin et al., 2021; Eddine & Darmawan, 2021; Oluwatosin et al., 2021). Support for HR contributes to the long-term productivity required for a sustainable supply chain (Asnordin et al., 2020) (Darmawan, 2020; Mardikaningsih & Sinambela, 2021). Furthermore, companies also need to pay attention to the operational impacts on the communities surrounding their business locations, such as ensuring that their activities do not disrupt the comfort and health of the public. The application of this social aspect demonstrates that a company's success is not only measured in economic terms, but also by the contribution it makes to improving public welfare (Kuswandriyo, 2021).

The integration of the social aspect into the management of the flow of goods and services also includes attention to the relationships established with supply chain partners. Companies need to ensure that every business partner they collaborate with also implements socially responsible practices. This can be achieved by establishing partner selection criteria that consider social aspects, monitoring the practices implemented by partners, and providing the necessary support so that partners can meet established standards (Kilian-Yasin & Correa, 2021). Analysis of various literature shows that the implementation of this social aspect will increase trust and loyalty from business partners, allowing collaborative working relationships to be maintained over the long term. Additionally, this practice will improve the company's image in the eyes of the public and other stakeholders.

The economic aspect serves as the third pillar that forms the basis for the sustainability of supply chain management implementation. The application of this aspect aims to ensure that every activity performed within the supply chain can provide sustainable economic benefits for the company, business partners, and the wider community (Darom & Hishamuddin, 2016). In practice, manufacturing companies need to balance the costs incurred to implement sustainability principles with the economic benefits that can be obtained in the long term. Some economic benefits that can be achieved include increased operational efficiency, reduced costs associated with waste management and resource consumption, increased market share due to rising demand for responsibly produced products, and reduced risk of losses caused by legal sanctions or changing market conditions (Ahmad & Wong, 2018). The application of this economic aspect demonstrates that sustainability principles do not conflict with the goal of achieving business profits.

The integration of the three sustainability aspects in managing the flow of goods and services requires a structured and comprehensive approach. These three aspects are interconnected and influence one another, and thus cannot be implemented in isolation. For instance, the implementation of the environmental aspect, such as the more efficient use of raw materials, will provide economic benefits in the form of reduced production costs, as well as social benefits in the form of a reduced negative impact on public health (Koblianska, 2019). Similarly, the implementation of the social aspect, such as improving the welfare of the workforce, will increase labor productivity, which will ultimately provide economic benefits for the company. Analysis of various literature shows that the successful integration of these three aspects will create positive synergy, meaning the benefits obtained will be greater than if each aspect were implemented separately.

Commitment from company leadership is a primary factor determining the success of sustainable supply chain management implementation (Orr & Jadhav, 2018). Company leaders must demonstrate tangible commitment through the formulation of clear policies, the provision of necessary resources, and direct involvement in the implementation process (Darmawan, 2021). Without strong commitment from leadership, efforts to implement sustainability principles will only stop at the planning stage and will not be consistently executed by all members of the organization. This commitment also needs to be communicated to all parties involved in the supply chain, so they understand the importance of sustainability principles and are willing to cooperate in implementing them. Company leaders also need to set an example by applying sustainability principles in every decision made, ensuring that the values upheld can be internalized by all members of the organization.

Close cooperation between supply chain partners is a crucial supporting factor in the implementation of sustainable supply chain management. A manufacturing company cannot implement sustainability principles completely if it is done by only one party, because every activity performed by one party will affect the activities of other parties in the supply chain (Chin et al., 2015). Therefore, companies need to build mutually beneficial cooperative relationships with business partners, where each party is willing to share information, resources, and knowledge needed to implement sustainability principles. Several steps that can be taken include drafting cooperation agreements that contain provisions related to sustainability principles, providing training and mentoring for business partners, and forming communication forums that allow each party to discuss and resolve problems faced collectively.

The implementation of integrated management systems is a strategic step that can be taken by manufacturing companies to support the application of sustainability principles (Hariani & Mardikaningsih, 2021). An integrated management system allows a company to manage all operational activities while considering the three sustainability aspects simultaneously. Some common management systems applied include environmental management systems, occupational health and safety management systems, and quality management systems (Başaran, 2017). The implementation of these systems will assist companies in formulating standardized work procedures, monitoring and evaluating performance, and performing continuous improvements. Analysis of various literature shows that companies

that implement integrated management systems will find it easier to identify and resolve problems that arise in the process of applying sustainability principles, resulting in more optimal outcomes.

Comprehensive performance measurement is an inseparable part of the implementation of sustainable supply chain management (Ferreira & Silva, 2016). Companies need to develop performance indicators that encompass all three sustainability aspects, ensuring that achievements can be measured objectively and comprehensively (Darmawan & Marsal, 2021). The performance indicators used can include environmental metrics, such as energy and water usage efficiency, waste production levels, and generated emissions. Social indicators may include workforce satisfaction levels, workplace safety statistics, and the degree of community engagement in company programs. Meanwhile, economic indicators can include cost efficiency, profit levels, and business growth rates. This performance measurement will assist companies in monitoring progress, identifying areas requiring improvement, and formulating more precise strategies to enhance their sustainability performance.

The use of information technology is a supporting factor that plays a crucial role in the implementation of sustainable supply chain management (Ata, 2015). Information technology enables companies to collect, process, and disseminate the information required for supply chain management quickly and accurately (Thöni & Tjoa, 2017). Through the use of integrated information systems, companies can monitor the movement of goods and services in real-time, identify points of waste, and devise more accurate plans to reduce negative impacts (Sorooshian, 2020). Furthermore, information technology also allows companies to communicate and share information with supply chain partners effectively, ensuring that collaboration runs more smoothly. This digital transformation, which is often supported by big data, artificial intelligence, and the Internet of Things, is essential for optimizing modern supply chain management (Putra & Arifin, 2021). Analysis of various literature shows that companies that utilize information technology optimally will find it easier to implement sustainability principles and achieve better results (Arifin & Darmawan, 2021). This digital transformation extends to various fields, including the legal framework governing electronic contracts created by AI (Darmawan, 2021).

Specifically, the application of technologies such as IoT and blockchain in the manufacturing and distribution sectors has had a significant impact on how companies manage their supply chains (Bhadoria et al., 2020). For instance, blockchain technology assists in recording transactions in a decentralized and immutable manner, providing trust among parties involved in the supply chain, and reducing the risk of fraud or inaccurate information (Fared & Darmawan, 2021). According to Hussain et al. (2021), blockchain and IoT technologies enable companies to observe, track, and monitor products, activities, and processes within their value chain network, thereby increasing transparency and coordination. Meanwhile, IoT allows for connected devices that can provide real-time data regarding the location, temperature, or condition of goods. This enhances visibility throughout the supply chain, enabling managers to make faster and better decisions in response to changes in demand or disruptions that occur during the distribution process.

The challenges faced in the implementation of sustainable supply chain management in the manufacturing industry need to be well understood so they can be overcome with appropriate measures (Kumar et al., 2018). Some common challenges include limited resources, a lack of required knowledge and skills, resistance from internal or external parties, and ambiguity in applicable regulations (Putra et al., 2021). To address these challenges, companies need to formulate a structured strategy that involves all relevant parties. For example, to overcome limited resources, companies can seek collaboration opportunities with other parties that possess the necessary resources or seek support from the government and related institutions. To overcome the lack of knowledge and skills, companies can organize training and development programs for all organizational members and their business partners (Fared & Darmawan, 2021; Jahroni & Darmawan, 2021; Mardikaningsih & Putra, 2021).

The benefits obtained from the implementation of sustainable supply chain management in the manufacturing industry are felt not only by the company itself but also by all parties involved in the supply chain and the wider community. For companies, the benefits include increased operational efficiency, reduced production costs, improved corporate image and reputation, increased market competitiveness, and improved access to financial resources. For business partners, the benefits include enhanced business capabilities, increased access to wider markets, and improved welfare of their workforce. Meanwhile, for the wider community, the benefits include the preservation of environmental quality, increased employment opportunities, and overall improvement in social welfare. These diverse benefits demonstrate that the application of sustainability principles is an investment that yields positive results in the long term.

The role of the government and related institutions is also vital in supporting the successful implementation of sustainable supply chain management in the manufacturing industry. The government can provide support through the formulation of clear and consistent regulations, the provision of incentives for companies that implement sustainability principles, and the provision of necessary facilities and infrastructure. Related institutions can offer support through the provision of information, research and development, as well as training and mentoring programs for companies. This support from external parties will assist companies in overcoming various obstacles and accelerate the process of implementing sustainability principles. Collaboration between companies, the government, and related institutions will create a conducive environment for realizing sustainable supply chain management in the manufacturing industry.

Overall, the implementation of sustainable supply chain management principles in the manufacturing industry requires a change in perspective and behavior from all parties involved. Integrating environmental, social, and economic aspects into the management of the flow of goods and services is not an easy process, but it can be realized through strong commitment, close cooperation, and the application of structured systems. Analysis of various literature shows that companies that successfully implement sustainability principles will obtain various benefits that support business continuity in the long term. Therefore, the implementation of sustainable supply chain management principles is a strategic and important step for manufacturing companies to face the various challenges and opportunities that lie in the future.

## CONCLUSIONS

Based on the review conducted, it can be concluded that the implementation of sustainable supply chain management principles in the manufacturing industry involves the integration of environmental, social, and economic aspects throughout the entire process of managing the flow of goods and services. The environmental aspect aims to reduce negative impacts on the ecosystem, the social aspect seeks to improve the welfare of all stakeholders involved, and the economic aspect ensures the long-term viability of business operations. These three dimensions are interconnected and mutually influential, which means that their successful implementation requires a structured approach and the involvement of all parties within the supply chain network. Commitment from corporate leadership and close collaboration with business partners are the primary factors determining the success of this principle.

Future research is recommended to conduct empirical studies that examine the application of sustainable supply chain management principles across different types of manufacturing industries. Such studies may identify variations in implementation strategies that are adapted to the characteristics of specific industries and operational environments. In addition, future research could develop more comprehensive and practical models for measuring sustainability performance that can be easily adopted by companies. Studies on the long-term impact of sustainability practices on corporate financial performance are also necessary to provide stronger evidence of the benefits achieved. Furthermore, research on the role of emerging technologies in supporting the implementation of sustainability principles represents an important and promising topic for further exploration.

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