



SUSTAINABLE SUPPLY CHAIN PRACTICES IN REDUCING ENVIRONMENTAL IMPACT

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Abstract

The growing awareness of environmental concerns has led to the adoption of sustainable supply chain methods by enterprises, with the goal of reducing their ecological impact as much as possible. This study investigates the connection between environmentally responsible supply chain strategies and the degree to which they are successful in minimizing negative effects on the environment. The following are some of the key practices that are analyzed: energy efficiency, waste reduction, environmentally responsible sourcing, and the utilization of renewable resources. This research illustrates how these practices contribute not just to the preservation of the environment but also to economic advantages, such as cost savings and increased brand recognition. This is accomplished by reviewing case studies that span a variety of sectors. According to the findings, businesses that successfully implement sustainable supply chain policies have the potential to dramatically cut down on emissions of greenhouse gases and the depletion of useful resources. In addition, this paper analyzes the difficulties that are encountered while implementing these practices and provides strategic advice for businesses that are looking to include sustainability into their supply chain operations. In conclusion, the findings of this study highlight the critical role that sustainable supply chains play in attaining long-term sustainability in both the environment and the economy.

Keywords: Sustainable, Supply Chain, Reducing

Introduction

The growing concern about environmental degradation and climate change has forced businesses and governments alike to reevaluate their operating procedures in recent years. This is due to the fact that these issues have become increasingly urgent. In light of the fact that the supply chain is an essential part of the production and distribution processes, it has become a focus area for the implementation of sustainable practices. In order to achieve the goal of minimizing adverse effects on the environment while simultaneously improving economic performance, a sustainable supply chain incorporates environmental concerns into each and every stage of the supply chain, beginning with the procurement of raw materials and ending with the delivery of the product. The idea of sustainability involves a wide variety of behaviors, such as the utilization of renewable resources, the reduction of waste, the utilization of energy efficiency, and the utilization of environmentally acceptable sources of supply. It is possible for organizations to lessen their carbon footprint and make a contribution to the overall effort being made to address climate change

if they give these practices a higher priority. The move to sustainable supply chains, on the other hand, presents a number of substantial problems, such as the necessity for technological improvements, the difficulty of coordinating with a variety of stakeholders, and the consequences of cost. Although there are a number of obstacles to overcome, multiple studies have demonstrated that the advantages of implementing sustainable supply chain policies frequently exceed the disadvantages. Organisations that embrace sustainability not only improve their environmental performance but also acquire competitive benefits, such as increased brand loyalty, higher operational efficiency, and compliance with regulatory requirements. These advantages may be attributed to the environmental performance of the organisation. In this article, we will investigate the role that sustainable supply chain strategies have in lowering the impact that businesses have on the environment. It will investigate the different approaches that businesses use in order to incorporate sustainability into their supply chains and will carry out an analysis of case studies originating from a variety of industries in order to demonstrate the efficacy of these practices. At the end of the day, the objective is to give insights into how sustainable supply chain management may lead to both environmental and economic gains, stressing the significance of this aspect in the modern-day landscape of business.

Objectives of the Study

1. To identify and analyze key sustainable supply chain practices that contribute to reducing environmental impact.
2. To examine case studies of organizations successfully implementing these practices.
3. To evaluate the economic and environmental benefits associated with sustainable supply chains.

Background

The idea of sustainable supply chain management, often known as SSCM, has developed as a reaction to the rising awareness of the negative effects that conventional supply chain activities have on the environment. Throughout history, supply chains have mostly been concerned with optimizing efficiency and decreasing costs, frequently at the expense of environmental and social factors. Companies, on the other hand, have been forced to reevaluate their supply chain strategy as a result of the growing pressures that they are receiving from customers, regulatory agencies, and environmental organizations. Ecological, economic, and social sustainability are the three fundamental aspects that are included in the supply chain's definition of sustainability. The environmental element places an emphasis on the necessity of having as little waste as possible, lowering emissions, and making effective use of resources. While the social dimension focuses on ethical behaviors, such as fair work conditions and community participation, the economic dimension is concerned with the creation of value through the reduction of costs and the enhancement of profitability. Organizations that address all three of these pillars of sustainability are more likely to achieve comprehensive sustainability in their operations. These three pillars of sustainability are dependant on one another.

Sustainable Supply Chain Management Practices:

Reducing carbon emissions through transportation optimization involves implementing strategies such as promoting public transportation, encouraging cycling and walking, optimizing vehicle routes to minimize fuel consumption, adopting electric and hybrid vehicles, and investing in infrastructure for alternative fuels such as hydrogen or biofuels. By implementing these strategies, carbon emissions can be reduced through transportation optimization. In addition, providing incentives for telecommuting and remote work can also

contribute to the reduction of emissions that are associated with transportation. Adoption of green energy sources in manufacturing processes The adoption of green energy sources in the manufacturing sector offers a multitude of benefits, including the reduction of greenhouse gas emissions, the reduction of long-term energy costs, the enhancement of energy security, and the achievement of sustainability goals. Solar energy, wind energy, hydroelectric power, biomass, and geothermal energy are some of the most important green energy sources for industry. When transitioning to renewable energy sources, it is common practice to make investments in infrastructure, technology, and regulatory support in order to allow the incorporation of clean energy throughout the manufacturing process.

Implementation of waste reduction and recycling programs:

Assessment: Evaluate the present patterns of waste creation, locate areas that may be improved, and establish objectives for the reduction of waste and the recycling of materials.

Education and Training: Employers, residents, and other stakeholders should be made aware of the significance of trash reduction and reprocessing through education. Offer instruction on the appropriate techniques for reusing materials and the strategies for managing trash.

Infrastructure: Set up infrastructure for waste collection, sorting, and recycling. This may include providing recycling bins, composting facilities, and hazardous waste disposal options.

Partnerships: In order to improve recycling and trash reduction initiatives, it is important to work together with local businesses, waste management organizations, and government authorities. You might want to think about forming partnerships with groups that can assist with the collecting and processing of garbage.

Monitoring and Reporting: Establish a method for monitoring the progress made toward the objectives of waste reduction. The creation of garbage, the rates of recycling, and any difficulties encountered during implementation should be monitored on a regular basis. Make a report on the accomplishments and areas that need improvement.

Incentives and Recognition: A number of incentives, such as awards for decreasing trash or improving recycling rates, should be made available in order to promote involvement in recycling programs. Those people or enterprises who have demonstrated waste reduction techniques that are excellent should be recognized.

Continuous Improvement: The waste reduction and recycling program should be reviewed and updated on a regular basis for the purpose of incorporating input, evolving legislation, and technological improvements in recycling. By adhering to these measures and keeping a commitment to sustainability, companies are able to successfully execute waste reduction and, afterward, repurpose items that were previously discarded.

Supplier collaboration for sustainability initiatives:

Working closely with suppliers to implement environmentally friendly practices, decrease carbon footprints, promote social responsibility, and boost overall sustainability throughout the supply chain is an example of what is meant by the term "supplier collaboration for sustainability initiatives." Sharing best practices, establishing shared objectives, carrying out audits, and providing incentives for sustainable behavior are all examples of what may be accomplished through cooperation. Companies have the potential

to make greater impact in tackling environmental and social concerns by forming partnerships with their suppliers. These partnerships may also establish long-term connections and facilitate innovation.

Comparative Analysis of Green Initiatives:

Nike: As part of its efforts to address environmental and ethical problems in its supply chain, Nike has been aggressively integrating supply chain management strategies. The corporation has made it a priority to improve working conditions in the factories that produce its products, as well as to reduce the amount of trash produced and the amount of energy that is consumed. In addition, Nike has formed agreements with its suppliers in order to emphasize the importance of transparency and environmental efforts.

Unilever: Sustainable business practices have been integrated into the supply chain management procedures of Unilever, a global corporation that specializes in consumer goods. Through the implementation of its Sustainable Living Plan, Unilever intends to further grow its supply chain across the value chain while simultaneously reducing its impact on the environment. A tight working relationship is maintained between the firm and its suppliers in order to enhance resource efficiency, decrease emissions, and encourage responsible procurement of raw materials.

Patagonia: To reduce the negative effects that its supply chain has on the environment, the outdoor gear manufacturer Patagonia has introduced supply chain management principles. Patagonia works with its suppliers to ensure that ethical labor standards are followed, reduce the amount of waste produced, and certify the responsible procurement of resources. In addition, the corporation is transparent with its customers regarding the company's attempts to reduce its environmental impact using its goods.

Interface: The global maker of modular carpet tiles known as Interface has been a pioneer in the implementation of sustainable business practices, including supply chain management (SSCM). In the context of its Mission Zero program, the corporation has established lofty objectives with the objective of achieving zero environmental footprint by the year 2020. Over the course of its supply chain, Interface collaborates closely with its suppliers to reduce the amount of trash produced, lower the amount of energy consumed, and obtain recycled materials.

Environmental Sustainability

According to Sajjad et al.'s 2020 research, environmental sustainability is defined as the deliberate utilization of natural resources and the conservation of the environment in order to fulfill the demands of the present generation without sacrificing the requirements of the generation that will come after us. When it comes to environmental sustainability, there is a substantial emphasis placed on minimizing the negative effects that supply chain operations have on the environment. This includes lowering emissions, minimizing waste, and supporting sustainable sourcing methods. It is argued by Karmaker et al. (2022) that environmental sustainability places a high emphasis on the preservation of resources, the preservation of biodiversity, and the preservation of sustainable agricultural and food systems. The use of renewable and clean energy, the promotion of energy efficiency, and the adoption of sustainable transportation systems are all things that environmental sustainability experts like Wu et al. (2018) are calling for in order to protect future generations. In order to accommodate the expanding urban population and economies, it is essential to implement sustainable urbanization, circular economies, and environmental education and awareness programs. Addressing the issue of environmental sustainability should be a collaborative effort by governments, businesses, communities, and individuals.

Social Sustainability

According to Mies and Gold (2021), social sustainability refers to the capacity of communities to fulfill both the current and the future demands of the community. These needs are intended to ensure social well-being, fairness, and equity. In full accord, Jamal and Higham (2020) make a passing reference to the fact that social sustainability necessitates equitable opportunity, coherence, diversity, and inclusion. The writers also emphasize the need of acknowledging and striking a balance between the mutual relationship with other elements that contribute to sustainability. According to Hartley et al.'s research from 2020, essential indicators of a socially sustainable community are social cohesiveness and safety, which are supported by community involvement and participation. One other thing that is essential to take into consideration is the fact that there is a rising understanding of the significance of social sustainability in the supply chain. This knowledge encompasses ethical labor practices, human rights, and community development. Therefore, it is necessary for communities and organizations to adopt a practice of social sustainability. It is also necessary to collaborate and interact with suppliers, consumers, regulators, and other stakeholders in order to achieve social sustainability. There is an increasing interest in investigating how to effectively develop partnerships and conduct collaborative efforts.

Economic Sustainability

An additional aspect of sustainable supply chain management is the balance of economic concerns with social and environmental sustainability. This includes the reduction of costs, the optimization of resources, and the development of long-term value. (Saeed & Kersten, 2019) The endeavors of economic sustainability are focused at supporting the long-term prosperity of the community as well as people via the equitable management and expansion of natural resources. According to Rajak et al. (2022), economic sustainability seeks to decrease environmental effect while simultaneously aiming to achieve economic development that is founded on innovation, entrepreneurship, and productivity. It is centered on the equal distribution of resources and the well-being of society, and it requires responsible investment, ethical business practices, excellent business practices, and fair trade. The reduction of operating expenses, as well as an improvement in productivity and efficiency, are all reasons why technological innovation is essential to the maintenance of a sustainable economy. In the globe over there, there is a growing realization of the importance of sustainable supply chain management in fostering sustainable development. As a result, a variety of methodologies and best practices are being created to assist businesses in putting into reality successful strategies for sustainable supply chain management. On the other hand, there are also substantial hurdles that must be overcome in order to adopt sustainable supply chain management. These problems include the complexity of global supply chains, the requirement for cultural and organizational change, and the requirement for collaboration among a number of different stakeholders.

Importance of Sustainable Supply Chain Management in Today's Business

If an organization want to have a supply chain that is sustainable, it is necessary for the company to address environmental, social, economic, and legal concerns at each and every link in the supply chain. Through the implementation of a complete plan, this not only reduces the amount of trash produced and the impact on the environment, but it also improves working conditions, health and safety, and puts a stop to workplace abuse (Nilsson, 2021). In addition to ensuring environmental, economic, and social sustainability, a supply chain that assures ethical business practices is not only completely sustainable but also completely sustainable. Managing the negative environmental effect that normally results in inefficient supply chain

operations would be much simplified as a result of this. According to Sajjad et al.'s (2020) hypothesis, supply chains often need a significant amount of energy from the beginning to the end, considering that the manufacturing and transportation processes generate a significant amount of carbon emissions. According to Kazancoglu et al. (2018), in order to solve these difficulties, it is essential to ensure that the supply chain is sustainable in order to safeguard natural resources, commercial resources, and provide customers with ethical purchasing alternatives. As a consequence of the widespread dissemination of information on environmental sustainability, the vast majority of consumers all over the world have shown a preference for conducting business with companies that adhere to sustainable practices. Increasing the level of sustainability throughout supply chains is beneficial not just to the environment but also to other aspects of your company, the community, and individuals. As a result of governments, pressure groups, regulators, customers, and other private corporations demanding responsibility from private companies (Alzawawi, 2008; Zimon & Sroufe, 2018; Biswal & Muduli, 2017), sustainability is becoming an increasingly important consideration for organizations all over the world. Sustainable supply chain management helps businesses save money, which is in accordance with the concept of economic sustainability, which is supported by innovation and mechanization. Lower production costs, which translate into cheaper pricing for customers, are another benefit of sustainable supply chain management (Mastrocinque et al., 2022). In order for businesses to reduce their production costs, it is necessary for them to be able to replace the resources that they were using with other possibilities. Not only are these measures beneficial to the environment and the people who live there, but they also encourage the growth of commercial enterprises. According to Liu et al. (2023), sustainable supply chain management is becoming increasingly significant in the manufacturing industry of today. This is owing to the fact that it is necessary to meet regulatory requirements, satisfy customer expectations, increase reputation and brand value, and manage risk.

Sustainable Supply Chain Management and Reducing the Environmental Impact of Production and Distribution Processes

Sustainable supply chain management refers to the incorporation of environmentally responsible business practices across the entirety of the supply chain, beginning with the procurement of raw materials and ending with the distribution of completed goods to end users. A further definition of sustainable supply chain management is an approach to managing the flow of products and services from the point of origin to the point of consumption in a manner that reduces the negative impact that manufacturing and distribution operations have on the environment. In order to do this, it is necessary to take into account not only economic considerations, but also social and environmental characteristics. In order to achieve sustainable supply chain management, it is essential to lessen the negative effects that the manufacturing and distribution processes have on the overall environment. To continue to be competitive in today's world, manufacturers need to keep their material costs low while also adhering to local rules (Liu et al, 2023). This is necessary for them to avoid falling behind their competitors. Management of the supply chain that is sustainable may assist decrease the environmental effect of manufacturing and distribution operations in a number of different ways, including the following possibilities: Implementing environmentally responsible manufacturing methods may include the utilization of renewable energy sources, the reduction of waste and water consumption, and the utilization of materials and chemicals that are non-toxic. The replacement of obsolete machinery with alternatives that are more energy-efficient has the potential to achieve energy savings and a reduction in emissions of greenhouse gases. By optimizing transportation routes, both the amount of fuel used and the amount of carbon emissions would be reduced. Moving toward e-commerce and direct-to-consumer shipping might improve supply chain optimization and lessen

environmental impact. This would be accomplished by addressing the issue of wasteful packaging and lowering the number of miles traveled by shipment. The implementation of more efficient production processes, the reduction of packaging, the optimization of transportation routes, and the utilization of cleaner energy sources are all ways in which sustainable supply chain management may contribute to the reduction of waste and emissions generated by the supply chain. Take use of sustainable materials: reducing the negative impact that manufacturing and distribution operations have on the environment may be accomplished by making use of ecologically friendly materials such as recycled or biodegradable packaging. Create environmentally responsible behaviors: The environmental effect of supply chain activities may be considerably mitigated by the use of practices such as recycling, cutbacks in water consumption, and reductions in energy consumption among others. Inspire your vendors to embrace environmentally responsible practices: Establishing collaborations with suppliers who have an emphasis on environmental responsibility and sustainability can be an effective way to contribute to the development of a supply chain that is more sustainable. Developing collaborations with suppliers who place an emphasis on environmental responsibility and sustainability is one way that sustainable supply chain management may contribute to the creation of a supply chain that is more suitable for sustainability. Just think about the product life cycle: There is the potential for an environmental effect at every stage of a product's life cycle, from the design phase to the disposal phase. By taking into account the entirety of a product's life cycle, from its conception to its disposal, sustainable supply chain management may contribute to the reduction of the environmental effect that is caused by the manufacturing and distribution processes. For this reason, it is essential to take into account the entirety of the life cycle when making judgments on manufacturing and distribution decisions. Track and report on the progress made: The environmental effect of supply chain activities should be measured and reported on a regular basis. This information may be used to identify areas that need improvement and to track progress towards achieving sustainability targets. Supply chain management that is sustainable and that reduces environmental effect are not only beneficial to the earth, but they are also beneficial to the companies that use them. Products that are sustainable and kind to the environment are becoming increasingly in demand among consumers, and businesses who adhere to these policies will experience a rise in customer loyalty and a better reputation for their brand. Additionally, some government agencies are increasingly mandating that businesses adhere to particular environmental standards, which may serve as an additional incentive for businesses to include environmentally responsible practices into their supply chain. In addition to the issues that have been described above, sustainable supply chain management necessitates a methodology that takes into account the environmental effect of each and every part of the supply chain, beginning with the raw materials and ending with the disposal of the product at the end of its useful life. Developing a more sustainable future requires the implementation of sustainable supply chain management as a key component. Companies are able to lessen their impact on the environment and establish a supply chain that is more sustainable if they go through the process of adopting sustainable practices and collaborating with suppliers that share similar principles. Through the implementation of sustainable practices and the collaboration with suppliers that share similar values, businesses have the ability to lessen their influence on the environment and build a future that is more sustainable.

Sustainable Supply Chain Management and Environmental Performance

When it comes to sustainability, the management and actions of an organization involve not only the incorporation of economic performance, but also environmental and social issues in the operations of the organization. Therefore, in addition to the economic components of the supply chain, the operational,

environmental, and social aspects of the supply chain are also included in the performance metrics of the sustainable supply chain. According to the findings of a large number of studies, environmental practices in supply chain management have an impact on the financial, operational, and environmental performance of an organization. They are seen as excellent corporate citizens, which grants them access to significant resources and has the potential to make them more successful than their competitors. Companies that support social and environmental norms in their supply chains are considered to be good corporate citizens. According to Baliga et al.'s research from 2020, enhanced social sustainability practices have made it easier for organizations to acquire social legitimacy, which has resulted in an environment that is more favorable for business and greater financial returns. According to Dzikriansyah et al. (2023), environmental performance is the ecological consequence that results from a company's commitment to preserving and improving the environment. There is the potential for the organization to reduce the amount of waste that is produced in the areas of air, liquid, and solid waste, as well as the consumption of poisonous and hazardous products, and the number of environmental accidents that occur. Among the environmental performance characteristics, two examples include a decrease in the number of environmental accidents and a reduction in the amount of poisonous or hazardous materials that are used. According to Dzikriansyah et al. (2023), they also reduced the amount of energy that was used, the consumption of hazardous or toxic materials, the amount of air pollutants, the amount of solid and liquid waste, and the number of environmental incidents that occurred. In prior conversations, it was discovered that environmentally responsible management of supply chains may greatly increase environmental performance when implemented. Through the use of environmentally responsible supply chain management, environmental performance may be greatly enhanced (Dzikriansyah et al, 2023). The link between intellectual capital and environmental performance, however, appears to be somewhat tempered by green supply chain management, according to several research (Khan et al., 2021; Dzikriansyah et al, 2023). The adoption of a variety of green supply chain management methods, such as eco-design and green purchasing, has a negative influence on environmental performance, particularly economic performance. Additionally, Khan and Qianli (2017) discovered that the numerous GSCM activities, such as eco-design and green buying, are not the most relevant indicators in forecasting the success of a business. The key impetus for companies that are interested in implementing sustainable supply chain management systems is the desire to improve their performance. According to Feng et al. (2018), it is reasonable to assume that implementing environmental management strategies would result in improved company performance. The relationship between environmentally responsible supply chain management practices and efficient operations has become an increasingly important topic of discussion in both academic theory and business practice. According to Feng et al. (2018), businesses that are successful in managing environmental concerns are able to increase their competitiveness and provide new chances to increase the value of their core business efforts for their customers. However, as was mentioned earlier, the empirical data on the connection between sustainable supply chain management and performance enhancement is still conflicting, contradictory, and unclear (Feng et al, 2018). Numerous empirical studies have been conducted to investigate the impact that sustainable supply chain management has on the performance of companies. According to Feng et al. (2018), sustainable supply chain management methodologies are gaining more and more recognition as comprehensive and methodical ways to obtaining greater performance in terms of both operations and the environment. Through collaboration across departments, suppliers, and customers, the supply chain is able to detect and manage environmental concerns, which ultimately results in a reduction in the amount of damage done to the environment. Using eco-design and eco-packaging, the supply chain may work together to reduce waste and emissions in the manufacturing and transportation

processes, as well as in the products themselves (Feng et al, 2018). This can be accomplished by adopting environmentally friendly packaging and design. The positive association that exists between certain sustainable supply chain management traits and environmental performance. Furthermore, Zailani et al. (2012) found that the utilization of environmentally friendly packaging resulted in a considerable improvement in environmental performance. Environmental performance was improved as a consequence of sustainable supply chain management in general, particularly as a result of customer collaboration on environmental concerns. According to the findings of this research (Feng et al., 2018), the term "sustainable supply chain management" refers to a wider variety of processes.

Conclusion

Given the growing number of environmental problems that our world is now experiencing, there has never been a time when the urgent need for sustainable practices in supply chain management has been more vital than it is today. The findings of this study have shed light on the crucial role that sustainable supply chain strategies play in reducing the negative impact that enterprises have on the environment while simultaneously bringing economic advantages to those businesses. Companies have the ability to not only reduce their ecological footprint but also improve their operational efficiency and brand reputation by incorporating environmentally friendly procurement practices, waste reduction strategies, energy efficiency measures, and the utilization of renewable resources. The findings from a variety of case studies reveal that businesses operating in a wide range of sectors are effectively implementing sustainable practices, which are producing favorable results in terms of decreased emissions of greenhouse gases, enhanced usage of resources, and cost savings. The aforementioned instances provide credence to the idea that sustainability is not only a compliance need but rather a strategic advantage in the contemporary market, which is fiercely competitive. Nevertheless, the move to sustainable supply chains is not simple and does not come without its difficulties. There are a number of factors that might impede development, including high initial costs, complexity in implementation, inadequate experience, and reluctance to change. In order to overcome these obstacles, organizations need to both acknowledge them and devise comprehensive methods to overcome them. Companies are able to overcome these challenges and successfully incorporate sustainable practices into their operations if they cultivate a culture of sustainability, make investments in staff training, and work together with their suppliers. In conclusion, sustainable supply chain management is crucial for organizations that want to succeed in a world that is becoming increasingly ecologically sensitive. Organizations have the opportunity to contribute to a healthy world while simultaneously attaining long-term economic success if they declare their commitment to sustainable practices. Sustainability in supply networks will only continue to become more important as stakeholders continue to demand greater responsibility and transparency from the supply chain organizations. In light of this, it is of the utmost importance for enterprises to embrace sustainability not only as a passing fad, but rather as an essential component of their operational strategy. This will ensure a more sustainable future for future generations.

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