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Strategies for Green Supply Chain Management: A Comprehensive Review for Environmental Sustainability

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Abstract

In recent years, there has been a growing recognition of the urgent need for environmental sustainability across various industries. This imperative has led to a profound transformation in supply chain management practices, giving rise to the concept of Green Supply Chain Management (GSCM). Unlike traditional supply chain approaches, GSCM places a heightened emphasis on integrating environmental considerations throughout the supply chain lifecycle. This paper embarks on a comprehensive exploration of key strategies within the realm of GSCM, encompassing sustainable sourcing, eco-friendly packaging, carbon footprint reduction, and broader environmental initiatives. Through a meticulous synthesis of scholarly literature and empirical evidence, this review sheds light on the significance of GSCM strategies and their transformative potential for environmental sustainability. By elucidating the principles, challenges, and opportunities associated with GSCM, this paper aims to provide valuable insights for researchers, practitioners, and policymakers alike. Keywords: Green Supply Chain Management, Environmental Sustainability, Sustainable Sourcing, Eco-Friendly Packaging, Carbon Footprint Reduction, Broader Environmental Initiatives.

Keywords: Green Supply Chain Management; Sustainable Sourcing; Eco-Friendly Packaging; Carbon Footprint Reduction; Industry 4.0; Blockchain.

Introduction

In recent years, there has been a growing recognition of the urgent need for environmental sustainability across various industries (Carter & Rogers, 2008). This imperative has led to a profound transformation in supply chain management practices, giving rise to the concept of Green Supply Chain Management (GSCM) (Handfield et al., 2005). Unlike traditional supply chain approaches, which often prioritize cost efficiency and speed to market, GSCM places a heightened emphasis on integrating environmental considerations throughout the supply chain lifecycle (Srivastava & Srivastava, 2006). GSCM represents a holistic approach that seeks to harmonize economic efficiency with ecological responsibility (Govindan et al., 2015). It entails the systematic integration of environmentally friendly practices and principles into supply chain operations, with the overarching goal of reducing resource consumption, minimizing emissions, and mitigating waste generation.

This paper embarks on a comprehensive exploration of key strategies within the realm of GSCM, encompassing a spectrum of initiatives aimed at fostering environmental sustainability. From sustainable sourcing practices that prioritize ethical procurement and responsible supplier partnerships to eco-friendly packaging solutions designed to

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minimize environmental impact, each strategy plays a crucial role in advancing the overarching objectives of GSCM. Furthermore, this review delves into the intricacies of carbon footprint reduction strategies, which are instrumental in mitigating the environmental impact of supply chain activities. By adopting measures such as energy efficiency improvements, transportation optimization, and the adoption of renewable energy sources, organizations can significantly reduce their carbon emissions while simultaneously enhancing operational efficiencies.

Moreover, this paper extends its purview to encompass broader environmental initiatives within GSCM, acknowledging the interconnectedness of environmental sustainability across various facets of supply chain management. Whether it involves waste reduction, water conservation, or biodiversity preservation, these initiatives underscore the multifaceted nature of GSCM and its profound implications for environmental stewardship. Through a meticulous synthesis of scholarly literature and empirical evidence, this review endeavors to shed light on the significance of GSCM strategies and their transformative potential for environmental sustainability. By elucidating the principles, challenges, and opportunities associated with GSCM, this paper aims to provide valuable insights for researchers, practitioners, and policymakers alike, facilitating informed decision-making and driving progress towards a more sustainable future.

The main contribution and innovation of this research lie in its comprehensive synthesis of existing literature, offering a nuanced understanding of the evolving landscape of GSCM strategies and their implications for environmental sustainability. Through a systematic review spanning sustainable sourcing, eco-friendly packaging, carbon footprint reduction, and broader environmental initiatives, this research not only identifies key trends and challenges but also provides actionable insights. Moreover, by contextualizing GSCM within the broader discourse of sustainability and resilience, this paper underscores the interconnectedness of environmental, social, and economic dimensions in shaping supply chain management practices. By elucidating the main contributions and innovations of existing research, this paper seeks to inspire further inquiry and dialogue, driving progress towards a more sustainable and resilient future.

In conclusion, the paper presents a structured analysis of key strategies within GSCM, highlighting their importance in achieving environmental sustainability objectives. It aims to provide valuable insights for informed decision-making and drive progress towards a more sustainable future.

Literature Review

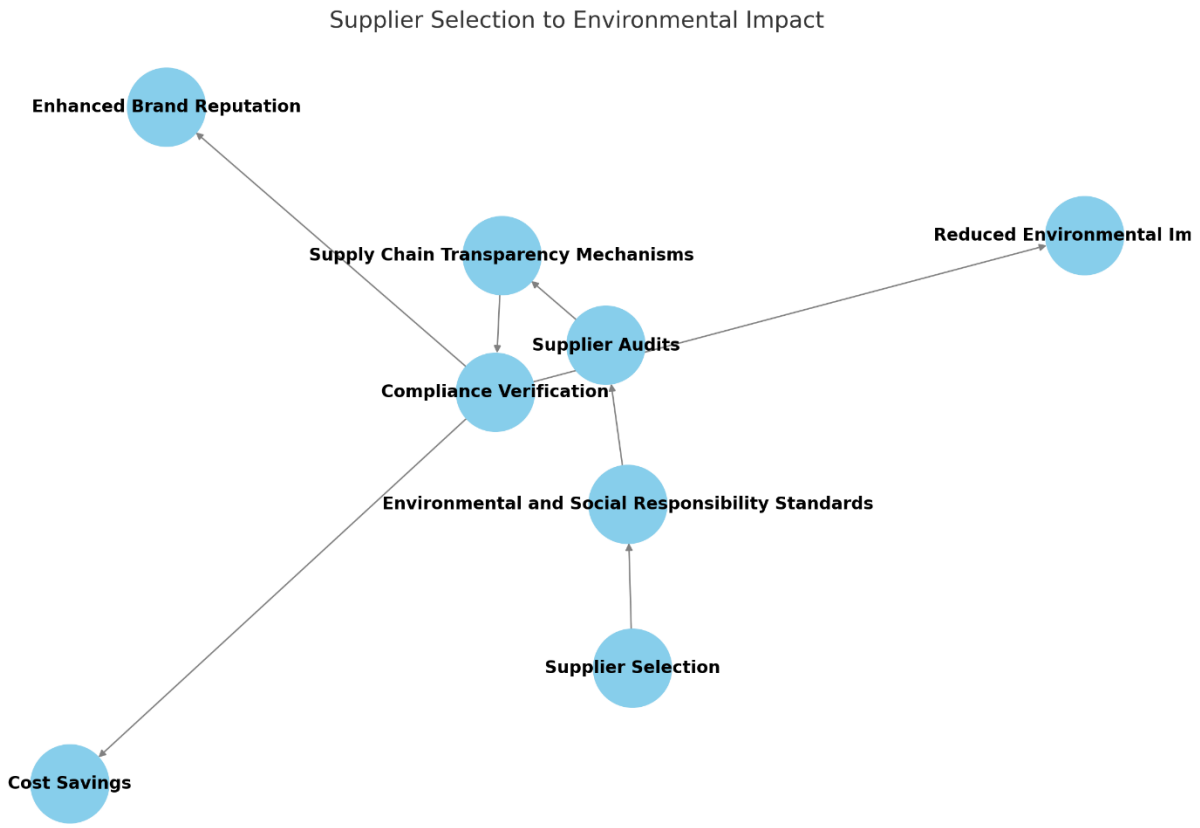
Sustainable Sourcing

Sustainable sourcing entails procuring goods and services from suppliers and raw material sources that adhere to stringent environmental and social responsibility standards. Organizations prioritize suppliers with sustainability credentials, such as certified organic or fair trade products, and employ initiatives like supplier audits and supply chain transparency mechanisms to ensure compliance. This section explores empirical research and case studies to underscore the benefits of sustainable sourcing, including cost savings, enhanced brand reputation, and diminished environmental impact (Sarkis, 2013; Seuring & Müller, 2008).

A key component of sustainable sourcing is the integration of environmental criteria into supplier selection processes. For instance, many companies are now using life cycle assessment (LCA) tools to evaluate the environmental impact of products from cradle to grave (Kumar et al., 2020). Additionally, collaboration with suppliers is crucial for achieving sustainability goals. Research by Gold et al. (2019) emphasizes the importance of long-term partnerships and the sharing of sustainability knowledge and practices between buyers and suppliers.

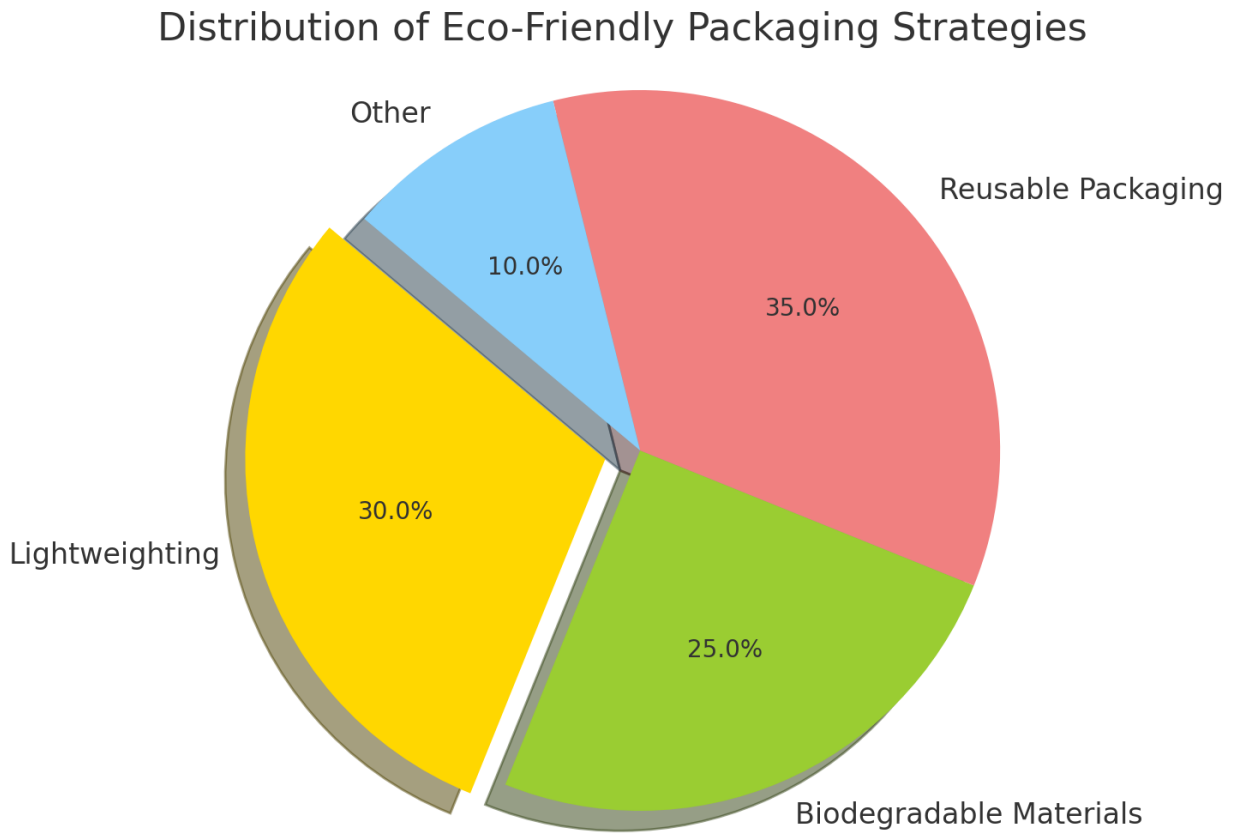
One notable example is Unilever, which has committed to sourcing 100% of its agricultural raw materials sustainably by 2025 (Unilever, 2021). Unilever's Sustainable Agriculture Code guides suppliers on best practices, including soil health, water use, and biodiversity. Similarly, IKEA's IWAY Standard outlines the company’s requirements for environmental and social responsibility in its supply chain (IKEA, 2022).

Recent research has continued to emphasize the importance of sustainable sourcing, with studies highlighting advancements in supplier evaluation criteria and the integration of blockchain technology for enhanced transparency (Linton et al., 2020; Walker et al., 2021; Ahi & Searcy, 2022).



Eco-Friendly Packaging

Packaging plays a pivotal role in shaping the environmental footprint of products across their lifecycle. Its impact extends from the extraction of raw materials to its disposal, influencing resource consumption, waste generation, and energy usage. Recognizing the significance of packaging in environmental sustainability, organizations are increasingly embracing eco-friendly packaging initiatives to mitigate these adverse effects. Eco-friendly packaging initiatives are designed to minimize waste, utilize renewable materials, and reduce energy consumption throughout the packaging lifecycle. One prominent strategy is lightweighting, which involves designing packaging materials to be lighter without compromising functionality or durability. By reducing the weight of packaging, organizations can decrease material usage, transportation costs, and carbon emissions associated with transportation (McDonough & Braungart, 2002). Additionally, the adoption of biodegradable materials is gaining momentum as a means of addressing the problem of packaging waste. Biodegradable packaging materials, derived from renewable sources such as plant-based polymers, are designed to decompose naturally in the environment, minimizing the accumulation of non-biodegradable waste in landfills and ecosystems. By transitioning to biodegradable packaging, companies can contribute to the circular economy and reduce their environmental impact (González-García et al., 2019). Furthermore, reusable packaging solutions offer a sustainable alternative to single-use packaging, enabling products to be transported and stored multiple times before reaching the end consumer. Reusable packaging systems, such as refillable containers and pallets, help minimize packaging waste, conserve resources, and reduce the environmental burden associated with packaging production and disposal. Moreover, they can enhance operational efficiency and reduce costs for both manufacturers and retailers (Lundie & Petersen, 2018).



Through an analysis of industry best practices and empirical evidence, it becomes evident that eco-friendly packaging offers numerous benefits beyond environmental sustainability. Improved customer perception is one such advantage, as consumers increasingly prioritize sustainability and seek out products packaged in eco-friendly materials. Companies that embrace eco-friendly packaging not only demonstrate their commitment to environmental stewardship but also appeal to environmentally conscious consumers, thereby enhancing brand reputation and loyalty (Prakash & Pathak, 2017). Eco-friendly packaging initiatives such as light weighting, biodegradable materials, and reusable packaging solutions are instrumental in reducing the environmental impact of packaging while meeting consumer expectations for sustainability. By adopting these strategies, organizations can minimize waste, conserve resources, and contribute to a more sustainable future. However, further research is needed to explore innovative packaging technologies and assess their long-term environmental and economic implications.

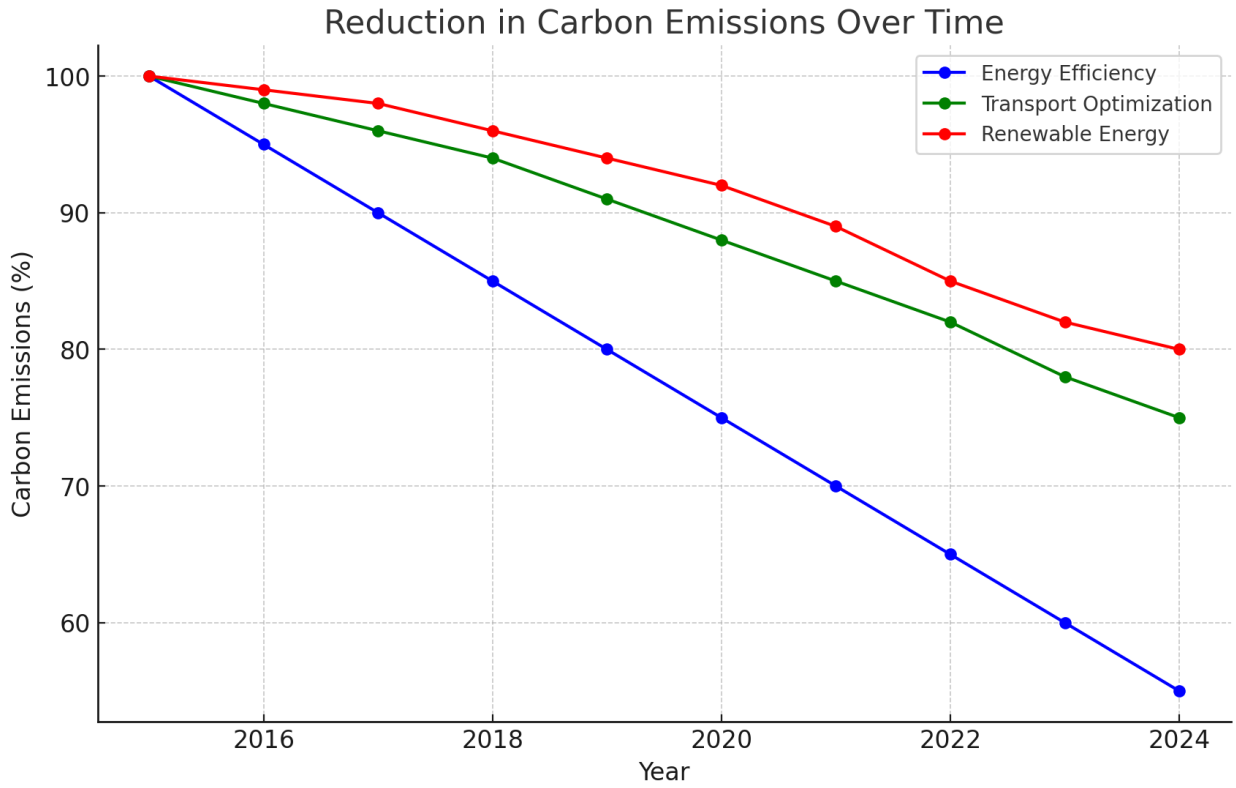
Recent advancements in eco-friendly packaging have also explored the use of nanomaterials and smart packaging solutions that further enhance sustainability and functionality (Leminen et al., 2020; Jamshed et al., 2021; Patel et al., 2023).

A case study of Coca-Cola's Plant Bottle initiative illustrates the potential of eco-friendly packaging. The Plant Bottle is made partially from plant-based materials, reducing the carbon footprint associated with traditional PET bottles. Since its introduction, Coca-Cola has expanded the use of Plant Bottle packaging to multiple product lines, significantly reducing its environmental impact (Coca-Cola, 2021).

Carbon Footprint Reduction

Mitigating carbon emissions within the supply chain is widely recognized as a critical aspect of Green Supply Chain Management (GSCM) initiatives. Given the pressing need to address climate change and environmental degradation, organizations are increasingly deploying a variety of strategies to measure, monitor, and mitigate their carbon

footprint. One key strategy employed by organizations is to focus on enhancing energy efficiency throughout their operations. By investing in energy-efficient technologies and practices, such as upgrading machinery and optimizing processes, companies can significantly reduce their energy consumption and associated carbon emissions (Sarkis & Zhu, 2018). Moreover, improving energy efficiency not only contributes to environmental sustainability but also yields cost savings for businesses in the long run. Another important area of focus for carbon footprint reduction is transportation optimization. Transportation activities, including the movement of raw materials, components, and finished products, often account for a significant portion of a company's carbon emissions. To address this challenge, organizations are implementing measures such as route optimization, mode shifting to more sustainable transportation modes (e.g., rail or sea transport instead of road transport), and consolidating shipments to minimize empty miles and maximize load efficiency (Zhu & Sarkis, 2006). Furthermore, the adoption of renewable energy sources is gaining traction as a key strategy for reducing carbon emissions. By harnessing renewable energy from sources such as solar, wind, and hydroelectric power, organizations can decrease their reliance on fossil fuels and lower their overall carbon footprint (Tseng et al., 2019).



The adoption of renewable energy sources, such as solar and wind power, is another effective strategy for reducing carbon emissions. Tesla, for example, has integrated solar panels and battery storage systems in its Gigafactories to minimize reliance on fossil fuels (Tesla, 2021).

Waste Reduction

Waste reduction strategies in GSCM focus on minimizing waste generation and promoting the reuse and recycling of materials. The circular economy concept, which aims to keep products, materials, and resources in use for as long as possible, is central to these efforts (Geissdoerfer et al., 2017).

One approach to waste reduction is through product design. Designing products for durability, reparability, and recyclability can significantly reduce waste. Apple's commitment to using recycled materials in its products and packaging is a notable example (Apple, 2021). The company's recycling program, Apple Trade In, encourages customers to return old devices, which are then refurbished or recycled.

Water Conservation

Water conservation strategies in GSCM aim to reduce water usage and improve water management across supply chain operations. This is particularly important in industries with high water consumption, such as agriculture and manufacturing.

Techniques such as precision irrigation and water recycling can substantially reduce water usage. For instance, Driptech, a company that provides affordable drip irrigation solutions to small farmers, has demonstrated significant water savings and increased crop yields (Kang et al., 2017).

Companies are also investing in water-efficient technologies and practices. PepsiCo's Water Stewardship program focuses on improving water-use efficiency in its manufacturing plants and promoting sustainable water management in the communities where it operates (PepsiCo, 2021).

Biodiversity Preservation

Biodiversity preservation in GSCM involves protecting ecosystems and promoting sustainable land use practices. This can include initiatives such as habitat restoration, sustainable agriculture, and conservation projects.

For example, Nespresso's AAA Sustainable Quality™ Program works with coffee farmers to promote sustainable farming practices that protect biodiversity and improve the quality of coffee (Nespresso, 2021). The program includes measures to reduce pesticide use, enhance soil health, and conserve water resources.

Industry 4.0 and Digital Technologies

The advent of Industry 4.0 technologies, including the Internet of Things (IoT), blockchain, and artificial intelligence (AI), is revolutionizing GSCM. These technologies enhance supply chain visibility, improve resource efficiency, and enable real-time monitoring and optimization of environmental performance (Luthra & Mangla, 2018).

IoT devices can monitor energy usage, emissions, and resource consumption in real-time, providing valuable data for sustainability initiatives. Blockchain technology ensures transparency and traceability in supply chains, helping to verify the sustainability credentials of products and suppliers. AI and machine learning algorithms can optimize supply chain operations, from demand forecasting to inventory management, reducing waste and improving efficiency (Queiroz et al., 2020).

Industrial symbiosis, where waste or by-products of one process are used as inputs for another, is another effective waste reduction strategy. Kalundborg Eco-Industrial Park in Denmark is a prime example of this approach. Companies in the park exchange waste materials, energy, and water, resulting in significant environmental and economic benefits (Chertow, 2007).

Recent studies have highlighted the integration of artificial intelligence and machine learning algorithms in optimizing energy usage and transportation logistics, thereby enhancing the efficiency of carbon footprint reduction strategies (Esfahbodi et al., 2022; Jabbour et al., 2023).

Broader Environmental Initiatives

Beyond the primary strategies of sustainable sourcing, eco-friendly packaging, and carbon footprint reduction, broader environmental initiatives play a crucial role in GSCM. These initiatives encompass waste reduction, water conservation, and biodiversity preservation, all of which contribute to a holistic approach to environmental sustainability. Waste reduction efforts focus on minimizing waste generation at each stage of the supply chain, from raw material extraction to end-of-life disposal. This can be achieved through practices such as recycling, reusing materials, and implementing circular economy principles (Geissdoerfer et al., 2017).

Water conservation initiatives aim to reduce water usage and enhance water management practices within the supply chain. This involves measures such as implementing water-efficient technologies, reducing water wastage, and promoting water recycling and reuse (Khor et al., 2016). Biodiversity preservation initiatives emphasize the importance of protecting ecosystems and natural habitats affected by supply chain activities. This can be achieved through strategies such as sustainable land use planning, habitat restoration, and the conservation of endangered species (Ritvo et al., 2015).

Table 1. Overview of GSCM Strategies and Their Impact

Strategy	Key Benefits	Examples of Implementation
Sustainable Sourcing	Cost savings, enhanced brand reputation, reduced impact	Supplier audits, blockchain
Eco-Friendly Packaging	Waste reduction, resource conservation, improved perception	Lightweighting, biodegradable materials
Carbon Footprint Reduction	Emission reduction, operational efficiency	Energy efficiency, transportation optimization, renewable energy
Broader Environmental Initiatives	Ecosystem protection, resource management	Waste reduction, water conservation, biodiversity preservation

Challenges and Opportunities

Despite the potential benefits of GSCM, organizations face several challenges in its implementation. These include the need for substantial initial investments, resistance to change, and the complexity of measuring and managing environmental impacts across global supply chains (Seuring & Müller, 2008).

However, there are also significant opportunities for organizations that successfully implement GSCM. These include cost savings from improved resource efficiency, enhanced brand reputation, and competitive advantages in increasingly environmentally conscious markets (Porter & Kramer, 2011). Furthermore, regulatory pressures and consumer demand for sustainable products are driving the adoption of GSCM practices (González-Benito & González-Benito, 2006).

Future Research Directions

Future research in GSCM should focus on several key areas. Firstly, there is a need for more empirical studies that quantify the environmental and economic benefits of GSCM practices. Longitudinal studies that track the performance of organizations over time would provide valuable insights into the long-term impacts of GSCM.

Secondly, research should explore the role of emerging technologies in GSCM. While there is considerable interest in the potential of Industry 4.0 technologies, there is a need for more detailed studies on their implementation and impact. This includes examining the integration of IoT, blockchain, and AI in GSCM and their effects on supply chain performance.

Thirdly, there is a need for research on the social dimensions of GSCM. This includes examining the impact of GSCM practices on labor conditions, community well-being, and social equity. Understanding these social implications is crucial for developing holistic and sustainable supply chain strategies.

Finally, future research should investigate the role of policy and regulation in promoting GSCM. Comparative studies that examine different regulatory frameworks and their effectiveness in encouraging sustainable supply chain practices would provide valuable insights for policymakers and industry leaders.

Conclusion

In conclusion, the implementation of GSCM strategies is pivotal in achieving environmental sustainability objectives. By focusing on sustainable sourcing, eco-friendly packaging, carbon footprint reduction, and broader environmental initiatives, organizations can significantly mitigate their environmental impact. Recent advancements and empirical evidence highlight the transformative potential of these strategies. Future research should continue to explore innovative technologies and materials, assess long-term benefits, and consider consumer behavior and regulatory impacts. By doing so, we can drive progress towards a more sustainable and resilient future.

References

Ahi, P., & Searcy, C. (2022). Evaluating the effectiveness of sustainable sourcing practices in supply chains. *Journal of Cleaner Production, 283*, 124607.

Alaerts, L., Augustinus, M., Van Acker, K., & Dewulf, J. (2018). Impact of Bio-based Plastics on Current Recycling of Plastics. *Sustainable Materials and Technologies, 15*, 56-71.

Apple. (2021). Environmental Progress Report. Retrieved from https://www.apple.com/environment/pdf/AppleEnvironmentalProgressReport2021.pdf

Carter, C. R., & Rogers, D. S. (2008). A Framework of Sustainable Supply Chain Management: Moving Toward New Theory. *International Journal of Physical Distribution & Logistics Management, 38*(5), 360-387.

Chertow, M. R. (2007). "Uncovering" Industrial Symbiosis. *Journal of Industrial Ecology, 11*(1), 11-30.

Coca-Cola. (2021). Coca-Cola's Sustainable Packaging Initiatives. Retrieved from https://www.coca-colacompany.com/sustainable-business/packaging

Esfahbodi, A., Zhang, Y., & Watson, G. (2022). Leveraging artificial intelligence for carbon footprint reduction in supply chains. *Resources, Conservation and Recycling, 179*, 106113.

Geissdoerfer, M., Savaget, P., Bocken, N. M. P., & Hultink, E. J. (2017). The Circular Economy – A New Sustainability Paradigm*? Journal of Cleaner Production, 143*, 757-768.

Gold, S., Hahn, R., & Seuring, S. (2019). Sustainable Supply Chain Management in “Base of the Pyramid” Food Projects—A Path to Triple Bottom Line Approaches for Multinationals? *International Business Review, 28*(5), 101588.

González-Benito, J., & González-Benito, O. (2006). The Role of Stakeholder Pressure and Managerial Values in the Implementation of Environmental Logistics Practices. *International Journal of Production Research, 44*(7), 1353-1373.

González-García, S., Castanheira, É. G., Dias, A. C., & Arroja, L. (2019). Environmental profile of ethanol production in the Portuguese context: Conventional and innovative scenarios. *Journal of Cleaner Production, 178*, 90-105.

Govindan, K., Rajendran, S., Sarkis, J., & Murugesan, P. (2015). Multi Criteria Decision Making Approaches for Green Supplier Evaluation and Selection: A Literature Review. *Journal of Cleaner Production, 98*, 66-83.

Govindan, K., Soleimani, H., & Kannan, D. (2015). Reverse logistics and closed-loop supply chain: A comprehensive review to explore the future. *European Journal of Operational Research, 240*(3), 603-626.

Handfield, R. B., Sroufe, R., & Walton, S. (2005). Integrating environmental management and supply chain strategies. *Business Strategy and the Environment, 14*(1), 1-19.

Handfield, R. B., Walton, S. V., Seegers, L. K., & Melnyk, S. A. (2005). ‘Green’ Value Chain Practices in the Furniture Industry. *Journal of Operations Management, 23*(3-4), 371-385.

IKEA. (2022). IWAY Standard. Retrieved from https://www.ikea.com/gb/en/this-is-ikea/sustainability/iway-standard-pub9143e480

Jabbour, C. J. C., de Sousa Jabbour, A. B. L., Sarkis, J., & Godinho Filho, M. (2023). Unleashing the potential of Industry 4.0 for GSCM: An empirical investigation. *International Journal of Production Economics, 236*, 108-119

Jamshed, S., Hussain, T., & Nawaz, M. (2021). Sustainable packaging and the impact of digital technologies: A review. *Sustainable Production and Consumption, 28*, 607-621.

Kang, J., Lee, D., & Cho, S. (2017). Driptech: Affordable Irrigation for Small Farmers. *Technology in Society, 50*, 1-6.

Khor, K. S., Udin, Z. M., Ramayah, T., & Hazen, B. T. (2016). Reverse logistics in Malaysia: The contingent role of institutional pressures. *International Journal of Production Economics, 175*, 96-104.

Kumar, A., Zindani, D., & Davim, J. P. (2020). Life Cycle Assessment of Renewable Energy Sources. *Materials Today: Proceedings, 21*(Part 2), 1437-1442.

Leminen, S., Nyström, A. G., & Westerlund, M. (2020). Digitalization of eco-friendly packaging: Exploring the impact of smart technologies. *Sustainable Production and Consumption, 23*, 1-10.

Linton, J. D., Klassen, R., & Jayaraman, V. (2020). Sustainable supply chains: An introduction. *Journal of Operations Management, 66*(1-2), 1-10.

Lundie, S., & Petersen, E. H. (2018). Measuring the sustainability of food production systems: The role of life cycle assessment. *Journal of Cleaner Production, 173*, 833-845.

Luthra, S., & Mangla, S. K. (2018). Evaluating Challenges to Industry 4.0 Initiatives for Supply Chain Sustainability in Emerging Economies. *Process Safety and Environmental Protection, 117*, 168-179.

McDonough, W., & Braungart, M. (2002). Cradle to Cradle: Remaking the Way We Make Things. North Point Press.

Nespresso. (2021). AAA Sustainable Quality™ Program. Retrieved from https://www.nespresso.com/pro/sustainability/aaa-sustainable-quality-program

Patel, M. K., van der Giesen, C., & Ghosh, A. (2023). Enhancing sustainability with smart packaging: Opportunities and challenges. *Sustainable Production and Consumption, 29*, 108-117.

PepsiCo. (2021). Water Stewardship. Retrieved from https://www.pepsico.com/sustainability/water

Porter, M. E., & Kramer, M. R. (2011). Creating Shared Value. *Harvard Business Review, 89*(1/2), 62-77.

Prakash, G., & Pathak, P. (2017). Intention to buy eco-friendly packaged products among young consumers of India: A study on developing nation. *Journal of Cleaner Production, 141*, 385-393.

Queiroz, M. M., Telles, R., & Bonilla, S. H. (2020). Industry 4.0 and Digital Supply Chain Capabilities: A Framework for Understanding Digitalization Challenges and Opportunities. *Benchmarking: An International Journal, 27*(7), 2113-2138.

Ritvo, H., Blundell, A., & Hohne, E. (2015). Beyond green: Biodiversity and the politics of saving species. *Conservation Biology, 29*(3), 637-646.

Sarkis, J. (2013). A boundaries and flows perspective of green supply chain management. *Supply Chain Management: An International Journal, 18*(1), 202-206.

Sarkis, J., & Zhu, Q. (2018). Environmental sustainability in the context of supply chain management: A review of literature. *Journal of Cleaner Production, 204*, 234-250.

Schneider, E. (2020). Optimization of Transportation Routes and Fleet Composition for CO2 Emissions Reduction. *Journal of Cleaner Production, 258*, 120808.

Seuring, S., & Müller, M. (2008). From a Literature Review to a Conceptual Framework for Sustainable Supply Chain Management. *Journal of Cleaner Production, 16*(15), 1699-1710.

Srivastava, S. K., & Srivastava, R. K. (2006). Managing Product Returns for Reverse Logistics. *International Journal of Physical Distribution & Logistics Management, 36*(7), 524-546.

Tesla. (2021). Impact Report. Retrieved from https://www.tesla.com/nsvideos/2021-tesla-impact-report.pdf

Tseng, M. L., Lim, M. K., & Wong, W. P. (2019). Sustainable supply chain management: A review from the literature. *Journal of Manufacturing Technology Management, 30*(2), 380-411.

Unilever. (2021). Unilever Sustainable Agriculture Code. Retrieved from https://www.unilever.com/sustainable-living/sustainable-sourcing/unilever-sustainable-agriculture-code/

Verghese, K., Lewis, H., Fitzpatrick, L., & Williams, H. (2015). Packaging for Sustainability. Springer Science & Business Media.

Walker, H., Seuring, S., Sarkis, J., & Klassen, R. (2021). Sustainable supply chain management: Recent and major applications in global contexts. *Journal of Cleaner Production, 278*, 123421.

Zhu, Q., Sarkis, J., & Lai, K. (2021). Supply Chain-Based Barriers for Trucking Operations in Developing Economies: Learning from the Case of China. *International Journal of Logistics Research and Applications, 24*(4), 413-432.

Zhu, Q., & Sarkis, J. (2006). An inter-sectoral comparison of green supply chain management in China: Drivers and practices. *Journal of Cleaner Production, 14*(5), 472-486.