Effectiveness of Green Supply Chain in Operations Management; Past Research and Future Agenda

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Abstract

The study aims to study the effectiveness of green supply chain in operations management and its impacts on organizational and environmental performances. An in-depth qualitative study approach was used by analyzing different research articles, how organizations can effectively use green supply chain in operations management. The findings of the study reveal that green supply chain increases the effectiveness of organizational and operational performance by introducing the sustainable products. Furthermore, the study advances the understanding of green supply chain management and its application to operations management. Organizations may enhance their supply chain strategy and their environmental performance by considering the efficacy of sustainable practices, which will provide them a competitive edge. The findings also shows that organization's may develop a more responsible and resilient supply chain by coordinating operations with sustainability goals, which will benefit not just their bottom line but also the environment and society at large.

Keywords: Green Supply Chain, Operations Management, Organizational Performance, Operational Efficacy, Sustainable Performance

Introduction

In recent years, environmental sustainability has gained a lot of attention in the field of manufacturing industries and operations management (Ye et al., 2023) which is also the agenda of sustainable development goals (SDGs). According to Sarkis et al. (2011), GSCM is the integration of ecological issues into supply chain management operations. Therefore, manufacturing companies are required to use GSCM practices due to environmental restrictions and consumer demand for products and services that must be produced using environmentally sustainable practices. While traditional supply chains are effective in terms of cost and time, they sometimes overlook environmental considerations. Businesses, however, are pushed to embrace more sustainable practices in the face of expanding environmental restrictions, changing customer tastes, and the urgent need to battle climate change (Naseer et al., 2023). Therefore, GSCM is considered as environmental innovation and organizations are continuously striving for reducing the environmental impacts and adopting the eco-friendly products to ensure the ethical sourcing and methods of production (Appiah et al., 2022). Organisations may gain operational efficiency to a more sustainable future by embracing sustainability concepts, while reducing the carbon footprints.

Moreover, adopting sustainable practices may have a significant positive impact on operations management, including lower energy use, better resource allocation, waste reduction, higher-quality products, and increased operational resilience (Akhtar et al., 2023). Organizations also prioritize sustainability and embrace green

innovation often experience improved stakeholder perceptions and enhanced brand reputation, leading to increased customer loyalty and trust (Sarkis et al., 2011). Despite the potential advantages of green sustainable innovation in operations management, its implementation can be challenging (Amjad et al., 2022). Supplier selection, economic considerations, technology resilience, sharing of data, and change management are frequent challenges for organizations. To address these issues, strategic planning, investments in green technology, supplier alliances, worker participation, and efforts towards continuous improvement are all necessary (Appiah et al., 2022). Furthermore, Zhu et al. (2012) found that there are major obstacles still need to be overcome for the adoption of GSCM. The main obstacles to undertaking the GSCM practices in an enterprise's business are, of course, several complexities and uncertainties. GSCM integrates personnel and concerns to address complexity and uncertainty.

Previous research has explored various aspects of green supply chain management in operations management. A lot of emphasis has lately been paid to "green supply chain management" in academia and business, with the goal of advancing theories and methods that support more environmentally and ecologically responsible projects (Huma et al., 2023). Previous research also shown that GSCM practices assist industrial organizations enhance their operational performance (Blome et al., 2014; Sarkis et al., 2011; Seuring & Müller, 2008). Moreover, Zhu and Sarkis (2004) invented the GSCM paradigms, and a lot of research scholars have contributed to them. Researchers now agree that the GSCP efforts are assisting the organization in achieving improved operational performances. But there aren't enough empirical research looking at how GSCM practices relate to functional performance (Huma et al., 2023). Therefore, there is still a need for further research to deepen our understanding on the effectiveness of green supply chain in operations management and its impact on organizational performance. Different theories have been addressed in order to examine the effectiveness of green supply chain in operation management.

Ecological issues are incorporated into supply chain management through GSCM. This transformation and movement of products and services from raw material to end users, and the integration of those operations both inside and outside the company, are all included in the supply chain (Das et al., 2023). So, environmental issues including pollution, resource shortages, and climate change have increased awareness of the necessity for sustainable supply chain practices. In order to solve these issues and stay in line with changing regulatory requirements and stakeholder expectations, organizations are increasingly implementing GSCM strategies (Seuring & Müller, 2008). Similar to this, there are other levels at which GSCM may be seen, including internal and external GSCM viewpoints. Studies have shown that GSSM practices can lead to better environmental performance but the links are also dependent on firms capacity (Mallikarathna & Silva, 2019). The linkage between GSCM and other corporate environmental practices and economic performance has been investigated, but the results are also inconsistent. There has been little research into the relationship between GSCM and operational performance. For manufacturers who seek to justify the implementation of the GSPCM, this unclear connection between the use of GSPCM and the consequent increased performance, whether in terms of the environment, the economy, or operations, has turned into a barrier (Zhu et al., 2012). Although performance benefits are not always visible, prior research has confirmed a substantial direct relationship between GSCM and performance improvement (Zhu et al., 2008). According to these researches, Internal GSCM practices are more widely adopted than external GSCM practices, leading to imbalance in performance. Therefore, the imbalance between internal and external GSCM practices hinders performance improvement.

Numerous studies have shown the relationship between green supply chain and operations management (Abu Seman et al., 2019; Amjad et al., 2022; Das et al., 2023; Huma et al., 2023; Naseer et al., 2023; Ye et al., 2023). It is important to note that the GSCM has a significant impact on the environment in supply chain management operations, which may improve sustainability performance of organizations. Therefore, Green supply chain is closely related with operations management because it involves the integration of environmental considerations into its supply chain process (Das et al., 2023). The management of green supply chains is designed to integrate sustainability principles into different operating activities in order to attain the ecological objectives whilst maintaining their effectiveness. Achieving this requires reducing the carbon emissions, minimizing the waste generation through use of natural resources and adopting sustainability across the supply chain. The other way

around, operations management is about optimizing processes and resources at work in the making and delivery of goods or services (Amjad et al., 2022).

Moreover, the use of sustainable materials, recyclable packaging and energy efficient product design is promoted in the field of GSCM. At the design stage, operations managers may work together with product designers to incorporate ecological considerations into designs which produce sustainable and energy efficient products (Sarkis, Zhu, & Lie, 2011). Indeed, there are a number of practices in general that constitute GSCM. Several empirical studies have implemented internal environmental leadership, green buying, customer ecological cooperation, and reverse logistics. In general, the two disciplines of sustainability supply chains and operations management are connected to optimize processes in terms of minimizing environmental impacts and achieving stable results. Integrating green practice in operational management improves efficiency, reduces costs, promotes collaboration, enables monitoring of performance and helps to mitigate risks within the broader framework of a green supply chain. The successful implementation of green supply chain management requires a supportive organizational culture and strong leadership. By embracing sustainable practices in operations management, organizations can contribute to a more sustainable future while gaining a competitive edge in the marketplace. However, this research paper examines the different dimensions of operations management with a view to evaluating the effectiveness of Green Supply Chain Practices. The following dimensions are concerned with procurement and sourcing, production and manufacturing, logistics and transport or reverse logistics (Huma et al., 2023; Ye et al., 2023). The main purpose of the study is to investigate the effectiveness of green supply chain in operations management and its impact on organizational performance in past literature.

Aims and Objectives

The main aims and objectives of the study includes:

- To advance research in operations management to promote green supply chain practices.
- To investigate the effectiveness of green supply chain in operations management.
- To evaluate the impact of implementing green supply chain on organizational performance.

Scope (Need and Importance)

In today's corporate environment, the field of green supply chain management research within operations management is broad and vital. Planning, implementing, and optimizing environmentally friendly methods across the whole supply chain from locating raw materials to shipping finished goods to customers are all included in this discipline. The urgent environmental issues affecting our globe necessitate this kind of research. Due to causes such as contamination, depleted resources and global warming, there is a matter of urgency for all the corporations, governments and consumer actions to overcome the negative effects of industrial activities. Therefore, more and more, businesses are forced to adopt more environmentally friendly supply chains processes as a means to mitigate environmental footprint, reduce wastes, and protect nature.

Therefore, it is impossible to overestimate the significance of learning about green supply chain management for operations managers. Organizations may reap several significant advantages by incorporating environmental factors into their supply chain operations. First of all, they may improve their corporate reputation and sustainability credentials, which are becoming more and more crucial in luring eco-aware investors and customers. Second, by reducing energy use, improving resource efficiency, and lowering waste disposal expenses, implementing green supply chain techniques frequently results in cost savings. Third it prevents businesses from breaking the environment laws and standards in accordance with that it will diminish fine, litigation and loss of reputation in cases where organizations use such act illegal practices. the green supply chain.

Literature Review

Supported Theories

Resource Based View (RBV) Theory of Competitive Advantage

The RBV theory proposed by Wernerfelt (1984) emphasis on the strategic management resources and abilities within an organization. It suggests that the use of unique and valuable resources can achieve a sustainable

competitive advantage. The RBV theory helps to explain how businesses can develop and use environmentally friendly sources and capacities in order to gain a competitive edge with regard to green supply chains and operations management (Huma et al., 2023; Naseer et al., 2023; Sabahi & Parast, 2022). Additionally, utilizing expertise in supply chain operations helps the organization accomplish its goals (Chen et al., 2023). Furthermore, competent supply chain management workers can increase the performance of the manufacturing chain, leading to an ongoing competitive edge (Jum'a et al., 2022). In order to achieve greater performance and sustainability, this theory focuses on the role of resources such as eco-friendly technologies, sustainable supply chain relationships or management of green knowledge.

Natural Resource Based View Theory

The natural resource-based view theory is the modified form of resource-based view and defined by its principle of the fact that in order to be competitive, firms are dependent on their relationship with nature and organizations take a keen interest in the environmental effect of firm resources (Chen et al., 2023). Moreover, NRBV theory aids in comprehending how organization's may use environmentally friendly resources and capabilities to improve their performance and sustainability results in the context of green supply chain and operations management.

Several studies conducted by researchers on the NRBV. Zeng, Xu, and Dong (2010) examine the connection between green supply chain management and organizations performance. According to the study, organizations' economic and environmental performance was favorably impacted by the availability and use of green resources, such as eco-friendly technology and sustainable supply chain connections.

Institutional Theory

Institutional theory was proposed by John Meyer and Brian Rowan (1970s) examines how organizations comply to and are impacted by their institutional environment's norms, values, and regulations. With the perspective of green supply chain and operations management, theory suggests that organizations adopt sustainable practices and initiatives not only because they are financially beneficial, but also because they are under pressure from stakeholders, regulations and societal expectations (Srivastava, 2007).

Stakeholder Theory

Stakeholder theory suggests that firms generate beneficial external effects when they influence both parties (stakeholders) internally. Outside factors drive organizations to implement green practices and reduce waste (Das et al., 2023). According to Sarkis et al., (2011), when stakeholders are taken care of, organizations' performance and financial health should improve. Furthermore, it has been proved that applying sustainable practices and with best stakeholder support may provide a firm with a competitive edge (Huma et al., 2023). Organizations should consider the interests and demands of diverse stakeholders and attempt to satisfy them. With the context of green supply chain and operations management, the theory emphasis on organizations should adopt sustainable practices to fulfil the expectations of stakeholders such as consumers, suppliers, workers, communities, and regulators (Pagell & Wu, 2009).

Resource Dependency Theory

The resource dependency theory, proposed by Pfeffer and Gerald (1978) suggests that competitiveness can be derived through the coordination of inter-organizational efforts. Because the risk element faced by enterprises has increased, organizations cannot rely just on internal sources to participate worldwide. All stakeholders in the supply chain must produce environmentally sustainable goods and services (Naseer et al., 2023). Moreover, the influence of environmental management systems (EMS) on business and environmental performance is investigated using RDT. It implies that organizations with effective EMS implementation utilize external connections with suppliers, regulators, and customers to obtain the resources and support required for successful green supply chain activities (Pagell & Wu, 2009).

Triple Bottom Line Theory

The theory emphasizes the integration of economic, social, and environmental factors, is extremely significant to green supply chain and operations management research. This idea recognizes that organizations should evaluate

their consequences on people, the environment, and profit in addition to financial performance. Additionally, the TBL approach provides a comprehensive framework for understanding the overall sustainability implications of supply chain operations within the perspective of Green Supply Chain Management.

In green supply chain management, a number of studies have been carried out on the application of TBL theory. Govindan et al. (2015) explored the relationship between Green Supply Chain Practices and triple bottom line results. Their research showed that implementing green supply chain practices has a favorable impact on an organization's economic, environmental, and social performance. In assessing the effectiveness of green supply chains, this study pointed to the importance of having a good understanding of the TBL dimensions. In addition, studies by Zhu et al. (2012) investigate the effects of green supply chain management practices on manufacturing companies' triple bottom line performance. The study's findings showed that companies using green supply chain practices had better financial results, had less of an impact on the environment, and had better social outcomes. Integrating environmental sustainability into supply chain management has received a lot of attention in recent years. Green supply chain management, as well as sustainable supply chain management, focuses on incorporating environmental considerations throughout the supply chain. The objective of this literature review is to investigate the current body of research on the efficacy of establishing a green supply chain in operations management and its impact on organizational performance.

Critical Success Factors

Green Supply Chain and Environmental Performance

Throughout the supply chain process, green supply chain management emphasizes numerous environmental aspects. In order to construct a sustainable supply chain, (Zhu et al., 2012) underline the adoption of green supply chain practices that has been proven to improve environmental performance, support sustainability objectives, and reduces organizations' environmental footprints. Similarly, Sarkis et al. (2011) stress the need of operations management in developing green manufacturing processes and installing energy-efficient technology to reduce environmental consequences.

There are number of studies conducted on the relationship between GSCM and environmental performance. In the context of industrial organizations, (Pagell & Wu, 2009) investigated the effect of GSCM practices on environmental performance. According to the study's findings, GSCM practices helped organizations enhance their environmental performance. In particular, the study demonstrated a significant relationship between green procurement, green operation and environmental performance indicators such as reduced energy use, waste production and emissions. Zhu et al. (2012) conducted another research in the textile industry who investigated the relationship between green supply chain management practices and environmental performance. According to the study, industries who used GSCM practices, such as waste management, eco-design, and green buying, performed better in terms of the environment. The study made clear how important it is to incorporate the sustainable practices across the supply chain in order to obtain favorable environmental effects. According to Abu Seman et al. (2019), the overall view is that implementation of green supply chain practices can contribute to improving the performance of the environment. Organizations can achieve environmental objectives and contribute to sustainability targets by adopting green procurement strategies, optimizing the manufacturing process for reducing waste and emissions, carrying out energy efficient transport and effective management of reverse logistics.

Green supply chain and Green Innovation

Currently, the world is facing environmental challenges like climate change, depletion of natural resources, carbon emission gases etc. that needs to be addressed. In this way, green supply chain and green innovation are two interrelated concepts focusing on the mutual goal of promoting environment sustainability in the organizations. These two concepts are addressed by evolutionary approach (Nelson & Winter, 1992) and innovation through co-creation model (Prahalad & Ramaswamy, 2004). Both ideas suggested that in order to meet the high demands from outside elements, particularly those from government regulations and regulators, the interaction between participants involved in the firms' supply chain process will lead to greater environmental innovation.

Moreover, the term "green supply chain management" refers to a variety of methods used to minimize the overall supply chain's negative environmental effects. Sustainable procurement, ecological design, green manufacturing, green logistics and reverse logistics are also part of this. It is possible for organizations to optimize the use of resources, minimize waste generation and reduce greenhouse gas emissions across their supply chain through these practices. By driving demand for sustainable technologies, materials and practices, green supply chain practice creates an enabling environment for green innovation (Abu Seman et al., 2019). Green innovation is described as the environmental innovation of practices, processes, management, and marketing that has emerged from the implementation of GSCM, resulting in an improvement in corporate environmental performance (Abu Seman et al., 2019; Chen et al., 2023; Wacker & Samson, 2021; Zhu et al., 2012). Green innovation is critical to driving sustainability and tackling environmental issues. Organizations may create and implement sustainable solutions that improve resource efficiency, minimize pollution, and help contribute to a more environmentally friendly future by incorporating environmental concerns into the innovation process. By adopting the sustainable practices and promoting green innovation, we can overcome the challenges and create a more sustainable and resilient future for all. Furthermore, it is thought that green innovation will continuously provide opportunities to innovate at each level of the supply chain in order to obtain a competitive edge and reduces environmental impacts in the industry area (Abu Seman et al., 2019).

Green Supply Chain and Corporate Social Responsibility (CSR)

Green Supply Chain and Corporate Social Responsibility provides an interconnected relationship focusing on common objective of promoting sustainability and ethical business practices. It is consistent with the wider CSR framework by focusing on sustainable supply chain management, which takes care of environmental considerations in relation to the production process. Organizations have shown their commitment to protecting the environment through implementation of sustainable procurement practices, introduction of ecofriendly production methods and promotion of responsible logistics and transport management (Govindan et al., 2015). Furthermore, the interests of different stakeholders are addressed and taken into account by GSC as well as CSR. The management of Green Supply Chains requires collaboration between suppliers, clients and others in order to enhance the promotion of sustainable practices (Zhu et al., 2007). Moreover, Green supply chain management aids businesses in adhering to moral and legal standards relating to environmental sustainability, which is a key component of CSR. Organizations show their dedication to moral behavior by following environmental laws, using sustainable sourcing methods, and assuring ethical waste management. Green supply chain and corporate social responsibility emphasizes the ethical business practices and the sustainability in organizations. By integrating supply chain practices, organizations may strengthen stakeholder connections and uphold their CSR obligations.

GSCM, Operational efficacy and Cost Effectiveness

Several studies have looked at how green supply chain management affects efficiency in operation and cost-effectiveness. Pagell and Wu (2009) discovered that organizations that adopted sustainable practices had higher process efficiency, lower resource consumption, and higher cost savings. Organizations may optimize their operations and reduce waste creation by using lean manufacturing concepts and waste reduction techniques, resulting in cost savings and increased operational efficiency (Appiah et al., 2022). Furthermore, Seuring & Müller (2008) emphasize the possibility for supplier collaboration to create cost-effective green supply chain practices through collaborative environmental improvement projects.

Green Supply Chain and Product Design

The relationship among green supply chain and product design is very important while studying the effectiveness of sustainable practices in operations management. Both concepts are interrelated with the aim of reducing environmental impacts through the whole life cycle of products. Green supply chain management involves the process of implementing sustainable practices throughout the whole supply chain, from procurement to end-of-life disposal. Sustainable product design is concerned with developing goods that have a lower environmental effect, require less resources, and are readily recyclable or disposable. Different research studies have highlighted the importance of implementing green supply chain and product design practices to attain the sustainability goals.

Blome et al. (2014) has underlined the positive relationship between green supply chain management and sustainable product design in order to share its contribution towards improving environmental performance. Another study conducted by (Zhu et al., 2008) recognizes that there is a positive impact on the environmental performance of the whole supply chain by applying sustainable product design principles in its earliest stages of product development. Moreover, Product quality and customer happiness may both be influenced by green supply chain management. Organizations may produce eco-friendly goods with increased features such as recyclability, durability, and decreased environmental effect by incorporating environmental concerns into product design and development (Mallikarathna & Silva, 2019). These researches provide the relation between green supply chain and product design and highlights the incorporation of sustainable deigns practices into larger GSCM strategy.

Organizational Performance and Stakeholders Perception with GSCM

The adoption of a green supply chain has wider effects on stakeholder perception and organizational performance. Sustainable supply chain practices have a favorable impact on both financial performance and market competitiveness (Pagell & Wu, 2009). Organizations may boost their reputation, draw in eco-conscious clients, and strengthen stakeholder relations by aligning with sustainability objectives (Sarkis et al., 2011). Furthermore, observing environmental laws and standards can help to ensure legal compliance and lessen the harm to one's reputation that comes with environmental problems (Huma et al., 2023).

Research Methodology

Qualitative Research and Data Analysis

The methodology we used in this paper is qualitative approach which involves the study of previous literature reviews. The study period included by the papers used is from January 2008 to February 2023. A complete understanding of the dynamics, trends, and changes relevant to the current research issue was achieved by using a 15-year timeframe. By using university credentials, we gather data by searching keywords like green supply chain, operations management, organizational performance and sustainable performance to seek articles relevant to our research topic from well-known academic databases; Taylor and Francis, Emerald Insight, ResearchGate, Springer, Elsevier and Wiley Online through different Journals including Journal of cleaner production, Journal of Supply chain management, Total Quality Management and Business Excellence and Journal of Environmental Science and Pollution Research. So, that we sought to narrate important developments, trends, and learnings that arose in the field of green supply chain management in operation management throughout the previous 10 years by looking through papers released during this period. This amount of time permits a thorough review of relevant articles, studies, reports, and other materials that strengthen our analysis and facilitate the derivation of important findings." We also examined the variables in relation to operations management and green supply chain as part of the methodology. Environmental and organizational performance, green innovation, product design, corporate social responsibility, operational efficacy, and cost effectiveness are just a few of the relevant topics covered in this literature process.

In order to get significant insights from the gathered documents, a structured systematic approach is used for the analysis. Depending on our research we conducted the analysis by using software tool i.e. Mendeley. The Mendeley allowed us to do bibliometric analyses on our data, which included evaluating who the major authors were in our dataset, which journals were relevant to our study, and whether patterns might be noticed in publications over time. Additionally, we may track down a variety of other important types of information to determine which works have had the most influence by utilizing Mendeley's citation and reference extraction tools. Mendeley's collaborative capabilities made it easier for team members to communicate and work together during the analysis, enabling the smooth exchange of ideas, criticism, and notes. Because of the collaborative atmosphere, the analytical process was more thorough and efficient, which allowed us to extract valuable insights and conclusions from the literature.

Moreover, we developed the fact sheet of selected articles (see Table 1). The research paper followed the guidelines and principles of the APA (American Psychological Association) citation style to properly cite and reference the sources used in the literature review. In-text citations were used to attribute specific ideas and

findings to their respective authors, while the reference list at the end of the paper provided a comprehensive list of all the cited sources.

Discussion

The study examined the effect of green supply chain in operations management that enhances the organizational and environmental performance. This study was specifically aimed to ascertain the relationship of green supply chain, operations management, environmental and organizational performance. The organizations are required by the new environmental concerns to continually develop their supply chain's green capabilities and implement sustainable green practices in order to improve their environmental performance. Previous studies have extensively examined the effectiveness of green supply chain practices in operations management. Studies have highlighted the significant impact of adopting sustainable practices on operational performance and environmental outcomes. For example, research by Sarkis and Zhu (2018) found that organizations implementing green supply chain initiatives achieved improvements in cost reduction, resource efficiency, and customer satisfaction. Similarly, Mallikarathna and Silva (2019) emphasized the role of green supply chain management in enhancing operational performance and competitive advantage. These studies provide valuable insights into the benefits and effectiveness of integrating sustainability principles into supply chain operations. We also found that manufacturing firm-based samples have been a big part of the green supply chain. However, because the samples used in the qualitative approach restricted the findings' generalizability, more diverse populations should be considered for future research (Chen et al., 2023).

Moreover, adopting green supply chain practices significantly improved the state of the environment. Organizations who implemented waste reduction strategies, used eco-friendly technology, and engaged in responsible sourcing exhibited decreases in carbon emissions, waste creation, and resource use. This demonstrates how successful green supply chains are in fostering environmental sustainability**.** The results and findings of the study also revealed that successful green supply chain efforts rely on active stakeholder participation and collaboration. Sustainable activities that included suppliers, customers, and other important stakeholders yielded greater results. Collaboration enabled information exchange, creativity, and the creation of long-term solutions, which resulted in enhanced operational performance and environmental outcomes. These findings are consistent with various theories including the research conducted by different scholars (Huma et al. (2023); Naseer et al. (2023); and Sabahi and Parast (2022) on the resource-based view of competitive advantage by showing how businesses may take use of special and valuable resources, such environmentally friendly technology and sustainable supply chain partnerships, to obtain a competitive edge in green supply chains highlighting the importance of RBV in elucidating how resources function in attaining sustainable performance outcomes. Moreover, by utilizing stakeholders' theory provide understanding on importance of stakeholder interaction in promoting the adoption of sustainable practices and cutting waste in supply chain operations consistent with prior studies in green supply chain by Das et al. (2023) and Sarkis et al. (2011). In addition, our findings are consistent with the study of Govindan et al. (2015), shows that a company may improve its triple bottom line performance and get superior financial, environmental, and social results by implementing green supply chain practices

Study also found that implementing green supply chain practices provides organizations with a competitive edge. Those who adopted sustainability as a strategic objective were better positioned to fulfil customer demand for environmentally friendly products and services. Furthermore, sustainable practices led to brand improvement, customer loyalty, and access to new markets, giving organizations a competitive advantage in the marketplace.

Ultimately, the findings of this study will advance our understanding of green supply chain management and its function in operations management. organizations may enhance their supply chain strategy and their environmental performance by considering the efficacy of sustainable practices, which will provide them a competitive edge. Organizations may develop a more responsible and resilient supply chain by coordinating operations with sustainability goals, which will benefit not just their bottom line but also the environment and society at large.

Conclusion

The efficacy of green supply chain practices in operations management is a critical subject in today's global corporate business. This research paper has offered a thorough investigation of the topic, looking at how GSM and operations management are related, as well as the variables and theories that have been used to study the green supply chain and its effects on managerial decision-making. However, with the extensive literature review, it is concluded that GSC practices lead to better environmental sustainability, operational efficiency, cost reduction, and stakeholder interactions. Moreover, initiatives to adopt a green supply chain need to be strategically integrated, stakeholders must be included, performance must be measured, suppliers must work together, there must be continual improvement, there must be cooperation with regulatory agencies, and there must be good communication.

Overall, we conclude that, for organizations to promote environmental sustainability, operational efficiency, and competitive edge, the efficacy of green supply chain practices in operations management is critical. A more sustainable and robust business environment will be made possible by ongoing research and the effective use of green supply chain strategies.

Managerial Implications

Green supply chain practices should be deliberately included into managers' operations management plans. In order to achieve this, it is necessary to coordinate sustainability goals with overarching business goals and to make sure that green activities are integrated across the whole supply chain, from sourcing through manufacturing, transportation, and reverse logistics. Organizations may enhance operational performance and environmental consequences by integrating sustainability into the strategic decision-making process. Moreover, in order to manage a green supply chain, managers should promote a culture of innovation and constant development. Organizations may foster innovation and preserve a competitive edge by empowering staff to suggest and execute sustainable practices, investing in the study and development of eco-friendly technology, and keeping up with market trends and best practices. Green supply chain strategies should be reviewed and updated often to maintain their effectiveness and conform to shifting market conditions.

Limitations and Future Research

Although, the study has several limitations in it. First, only qualitative approach is used in this research. Research is conducted on the analysis of different research articles and give insight into the effectiveness of green supply chain in operations management. Future studies should conduct quantitative approach in order to get clear and generalizable results of green supply chain in operations management. As, this research is qualitative and lacks the theoretical model, future researchers should consider others factors and develop a hypnotized theoretical model. However, industry-specific research can give more in-depth insights into how well green supply chain practices work in various industries. Businesses in sectors like manufacturing, retail, healthcare, or transportation could have particular difficulties or possibilities that call for specialized research. Moreover, Green supply chain activities' long-term effects on operational performance and sustainability outcomes can also be captured by longitudinal studies. A more thorough understanding of the success of sustainable practices will be provided by comprehending the dynamics and changes over time. The social and economic consequences of green supply chain practices should be investigated in future study. By investigating how green supply chain management affects employee happiness, consumer perception, brand value, and financial performance may give a comprehensive knowledge of the larger implications of green supply chain management.

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Table 1

Topic	Authors/ Years	Journal/ Database	Methodology	Results/Findings	Future Implications	Gap Found	Keywords
Alignment of green supply chain strategies and operations from a product perspective	Ying Ye, Kwok Hung Lau, Leon Teo, 2023	International Journal of Logistics Management ***Emerald***	This study used an exploratory in-depth case study conducted with one of the largest Chinese electronics manufacturers that is considered a leading GSCM adopter in the industry, to understand how the company adopts green supply chain practices across its multiple product lines.	The findings of the study show that businesses can build different green focuses across GSCM elements of green operation, green relationship management and green product design to form diverse hybrid strategic solutions. They include green control, lean, agile and clean innovation while taking consideration of supply chain type and product lifespan. A taxonomy of four key GSCM strategic combinations is proposed based on the findings. The strategies align with green demand and supply chain characteristics balancing a series of business competitive objectives in terms of reducing pollution and waste, improving green cost efficiency, enhancing green demand innovation and building green service effectiveness	This study has a few limitations. Firstly, the findings and conclusion are based on one exploratory case study despite the fact the case company is an earlier adopter and typical exemplar in GSCM in China and embedded multiple unit analysis is employed. This study believe that theoretical replication of this research could be improved by exploring empirically a wider sample of companies in future. Secondly, the study examines only the GSCM practices in the electronics industry. Although this industry is regarded as a representative context for GSCM research, different green practices may be adopted in other manufacturing industries due to different settings. Future studies can also explore practices in diverse industry settings to help improve the generalizability of the findings.	GSCM practices have been widely discussed in the literature from three key aspects: (1) green operations; (2) green relationship management and (3) product eco-design. Early research defines GSCM as integrating environmental thinking into the various aspects of supply chain operations including material sourcing and selection, manufacturing and production, delivery of the final product as well as end-of-life management of the product (Seuring and Muller, 2008; Srivastava, 2007). Newer studies suggest that success of GSCM depends on the approach adopted by each party in the upstream and the downstream of the supply chain (Sarkis et al., 2011; Tseng et al., 2019). GSCM is thus redefined as communicating green obligations and commitments to partners across the supply chain involving suppliers, manufacturers,	Green supply chain strategy, Strategic fit of alignment, Green and lean, Clean and agile Paper

						customers and finally reverse logistics (e.g., smart eco-friendly disposal or reuse of end-of-life products) for sustainable responsibility. Latest research further emphasizes GSCM as integrating green into the design of product and supply chain to reduce, reuse, recycle and incorporate clean innovation with a more proactive implementation view	
Embracing green supply chain collaboration through technologies: the bridging role of advanced manufacturing technology	Faheem Akhtar and Baofeng Huo March 2023	Journal of Business and Industrial Marketing ***Emerald***	This study was conducted based on survey data collected from 213 manufacturing firms from different industries. The direct effects of the conceptual model were tested using the method of structural equation modeling (SEM), whereas the bootstrapping method tested the mediation effects of AMT between IT and GSCC.	The results of the study shows that green supplier collaboration (GSC) is significantly associated with environmental performance, while green customer collaboration (GCC) is positively related to economic performance. Green internal collaboration not only enhances green supplier and customer collaboration but also boosts environmental and economic performance. IT directly improves green internal collaboration but is negatively related to GSC and insignificantly related to GCC. However, AMT not only enhances green internal, supplier and customer collaboration but also mediates the relationship between IT and green supplier and customer collaboration.	The study has some limitations. First, the data were collected from China. Future studies can collect data from more regions or countries. Second, our data comprise several industries, such as metals, machinery, engineering, electronic products and electric appliances. It is better to focus on other emerging industries in which hazardous emissions and chemicals are more significant. Third, the conceptual model mainly focuses on the technological perspective. Future studies can use cross-sectional or secondary data to explore from more perspectives. Finally, this study only examines one type of dynamic capability, which may limit the breadth of findings. Thus, adding new constructions will	Dynamic capability is “the capacity to integrate, build, and reconfigure internal and external competencies to address a rapidly changing environment” (Teece et al.,1997). However, previous studies argued that GSCC helps to achieve “win–win” economic benefits but mostly focuses on the conceptual level and failed to specify different roles of green internal, supplier and customer collaboration in environmental and economic performance (Yang. To fill these research gaps, based on the dynamic capability theory, we develop a comprehensive framework comprising information and manufacturing	Information and manufacturing technologies, green supply chain collaboration, Economic performance, Environmental performance

					be a positive step in the right direction. In addition, the impact of technology on other dynamic capabilities, such as innovative product development and business process management, will be investigated in the future.	technologies, GSCC and economic and environmental performance.	
Modeling the impact of green supply chain practices on environmental performance: the mediating role of eccentricity	Michael Karikari Appiah, Samuel Amponsah Odei, Gifty Kumi-Amoah, Samuel Ankomah Yeboah June 2022	African Journal of Economic and Management Studies ***Emerald***	Using a quantitative research approach, the study developed an integrated model to examine the relationship between GSCM practices, supply chain eco-centers and environmental performance in the context of the Ghanaian oil industry. Specifically, a survey had been conducted among companies in the Ghanaian downstream value chain. The paper used the structural equation modeling approach and smart partial least squares (Smart-PLS) analytical tool.		There are a few limitations that could serve as a starting point for further studies. This study could be replicated using time series data covering a wider period of time to ascertain the trends of Green SCM practices. Again, different research approaches could be used, e.g., mixed-method or qualitative research to compare and contrast the results. Moreover, further studies could be carried out in the form of a comparative study between public and private distribution companies. Furthermore, the role of top management commitment could be explored, and the extent to which such variable enhances environmental performance.	Existing studies (Acquah et al., 2021; Agyabeng-Mensah et al., 2021; Habib et al., 2022) focused on different sectors and pay little attention to the energy sector, especially the oil and gas subsector which produces chemicals that pose environmental risks and affect climate change situations in a developing economy (Ghana). Thus, present study examines the relationship between green supply chain management (Green SCM) practices and environmental performance, and develop an integrated model to explain the mediating role of eccentricity on the relationship between Green SCM practices and environmental performance in the context of the Ghanaian downstream petroleum industry	Environmental performance, green supply chain, Ghanaian petroleum, Supply chain eccentricity Paper
The impact of supply chain quality	Sehrish Huma, Waqar Ahmed,	TQM Journal ***Emerald***	Data has been collected through a survey	The findings of the study reveal that supply chain quality	Future studies can be conducted by adding more		Green supply chain

integration on a firm's sustainable performance	Sohaib Uz Zaman January 2023		questionnaire using a purposive sampling technique from manufacturing organizations. Moreover, Structural equation modeling of partial least squares was used to study the relationships between SCQI and green supply chain practices (GSCPs) in driving sustainable performance and is empirically tested using data from 167 manufacturing firms	integration (SCQI) enhances the green purchasing activity as well as the implementation of internal environmental management (IEM) of the firm. However, IEM is a crucial factor that contributes to sustainability performance	variables to the research such as eco-design or customer green corporation practices. Future studies can explore how the effects of SCQI and TBL may be mediated by green purchasing. References		management (GSCM), Green purchasing (GP), Internal environmental management (IEM), Supply chain quality management (SCQM), Sustainable performance
Understanding the impact of green supply chain management practices on operational competitive capabilities	Sehrish Huma, Danish Ahmed Siddiqui Karachi and Waqar Ahmed April 2022	TQM Journal Emerald	Structural equation modeling analysis was done based on the collected data through a self-administrated questionnaire from managers of 120 manufacturing firms.	The findings of the study reveals that the relationship of GSCPs is positively related to all competitive operational capabilities. Further, study reveals that operational capabilities are directly related to market performance.	This research focuses on limited factors; more detailed analysis of GSCM dimensions such as investment recovery, eco-design or investment recovery, etc. Researchers can investigate GSCM practices and its influence on market performance as well as bottom-line performance.	The study contributes to the theoretical development of a model for justification of the relationships between GSCPs such as IEM and GP and how these green practices will impact different dimensions of OCC, which further leads to an improved market performance by expanding the existing studies. Previously, very few research studies have inspected the relationship between these constructs, and, more particularly, less research into work has been undertaken in a developing country.	Green supply chain management (GSCM), Internal environment management (IEM), Green purchasing (GP), Operational competitive capabilities (OCC), Market performance (MP)
An operations and supply chain management perspective to	Sima Sabahi Mahour Parast December 2022	Operations Management Research **Springer US**	A structured literature review method was used in the study. The research process was conducted in	The findings of the study shows that supply chain capabilities drive product innovation from different	This study has various limitations, researchers realize that there are other perspectives to product innovation	A review of the literature in operations and supply chain management identifies an	Product innovation · New product development · Supply

product innovation			two phases. First, the study looked through databases and journals by using specific keywords such as "product innovation", "new product development", and "new product performance", as Evanschitzky et al. (2012) did in their research process. To collect the relevant papers, we limited the search to the title, the keywords, and the abstract of each paper. Second, study followed the references of papers collected in the first stage, to collect the studies that we failed to obtain in the first stage. To collect the papers, we used high-quality journals in three fields: operations and supply chain management (OM/SCM), general management (GM), and operations research/ management science (OR/MS).	dimensions. In fact, it has been shown that NPD and SCM are highly related, and the performance of a supply chain positively influences NPD performance in terms of many factors such as time to market, quality, reduction in engineering modifications, and cost.	that are important to understanding product innovation. Thus, it is important to explore the relationship between product innovation and other management domains such as marketing or finance. Future studies should examine the product-innovation effects of contextual and organizational factors such as level of competition, firm strategy, firm age, and firm size. Future studies are needed to operationalize the model for further validation and refinement and to empirically examine the impact of different capabilities and dimensions identified in product innovation. There is a lack of knowledge about how each of these capabilities influences the performance of product innovation in terms of quality, cost, and marketability. This involves more empirical research that investigates the relationship between various dimensions of a supply chain and product innovation	important gap in the research. Several studies examined the relationship between different aspects of firm innovation and the capabilities of operations and supply chain management. However, the literature has overlooked the antecedents of product innovation from a perspective of operations and sup- ply chain management. Since the capabilities of operations and supply chain management have a significant impact on a firm's capability for innovation, it is important for organizations to fully understand the relationship between operations and innovation as well as to invest in capabilities that have the most impact on a firm's innovation. Thus, we aim to address this gap in the literature by identifying the ante- cedents of product innovation from a perspective of operations and supply chain management.	chain manageme nt · Resource-based theory · Resource orchestratio ns · Competitiv e advantage
Big data analytics capability in healthcare operations and supply chain management: the role of green process innovation	Benzidia, Smail Bentahar, Omar Husson, Julien Makaoui, Naouel January 2023	Annals of Operations Research **Springer US**	The research model involves the use of structural equation models by partial least squares (PLS) approach. This study was conducted based	The findings and results of the study provide substantial insights and contributions for hospitals engaging in ecological transition strategies. It highlights the role of BDACs as a	The study has various limitations that open up avenues for future research. First, the study focused on the green innovation process, which is certainly critical to the	According to the literature, the integration of the environment into operations process remains insufficient to achieve high levels of performance and	Big data analytics capability · Green innovation · Operations · Supply chain · Healthcare

			on survey through a self-administered questionnaire. Data Collected in 2020 among 123 supply chain executives within French hospitals.	dynamic capability participating in the green innovation process, thereby improving the green performance of hospitals. Further it reveals that investment in BDACis a proactive technological measure to improve internal integration in order to enhance environmental performance, which is consistent with previous findings (Zhao et al., 2017). 6.2	environmental performance of organisations. However, other types of green innovation, such as green managerial innovation and green product innovation, could complement processes intended to improve environmental performance. Future research could integrate the three types of innovation and study their impact on environmental performance and the competitive advantage provided to organisations. Second, the study focused on a sample of hospitals in France. Extending the research to other countries in Europe whose environments differ regarding their characteristics could enhance the generalizability of the research findings. Third, we conducted a quantitative study based on surveys and structural equation modelling. To triangulate the data and understand the phenomenon better, future research could comprise a qualitative study that includes semi-structured interviews with managers. This qualitative study could explore the antecedents of BDAC, such as managerial and technological capabilities.	requires efforts in green process innovation. However, this relationship between BDAC and green process innovation remains poorly justified empirically.	. Environmental performance

Impact of green supply chain management and green human resource management practices on the sustainable performance of manufacturing firms in Pakistan	Saira Naseer, Huaming Song, Gibbson Adu-Gyamfi, Kashif Abbass, Sidra Naseer. February 2023	Environmental Science and Pollution Research **Springer Berlin Heidelberg**	A study conducted a survey to test the hypotheses to understand participants' views on GSCM and GHRM practices. The participants for the study are top human resource managers and top supply chain managers. Researchers surveyed each respondent separately to avoid discrimination. Data was collated in Pakistan. The Karachi Stock Exchange of Pakistan (KSE) provided data on 212 firms from the chemical, pharmaceutical, automotive, textile, and food industries.	The findings of the study shows that green human resource management positively influenced the triple bottom lines. Second, green supply chain management mediates green human resource management and triple bottom lines. Specifically, internal green supply chain management mediates green human resource management practices and sustainable performance. In contrast, external green supply chain management practices only mediate the relationship between green human resource management practices and the environmental and social perspective of sustainable performance. The	Organizations have comprehensive management and cross- functional implementations within systems and organizational units for potent and robust environmental management It is also recommended that these organizations have green conformance managers to ensure and facilitate the implementation of green environmental management strategies cross-functionally. There are some limitations that need consideration subsequently. Firstly, this study was conducted in Paki- stan's manufacturing sector. Future research can expand to other sectors and industries. Also, the current study can be replicated in other developing countries to test the generalizability of findings. Future studies can focus on specific dimensions of supply chain management and human resource management, including hiring, green training, performance, selection, reward, and recruitment. Author	GSCM is considered a means of effective strategic management that improves manufacturing firms' environmental performance and other sustainability performance targets (Zaid et al 2018). These functions are not extensively investigated as few studies have studied these two functions and their relationship (Zaid et al. 2018) and (Mousa and Othman 2020). Research into the transmission of green administration across various organizations and discovering equal outcomes and shared connections between multiple tasks is needed. This research focuses on green human resource management and supply chain objectives to fill this gap	Green human resource manageme nt; Green supply chain manageme nt; Manufactur ing industry; Pakistan; Sustainable performanc e
Effects of the green supply chain management practices on firm performance and sustainable development	Amjad, Ahmad Abbass, Kashif Hussain, Yasir Khan, Farina Sadiq, Shahzad May 2022	Environmental Science and Pollution Research **Springer Berlin Heidelberg**	Data was collected from the 12 ISO 9001 and ISO 14001 leather industries based in Pakistan. We distributed the 350 questionnaires at 12 leather industries, and the questionnaire was	The results of this research disclose that scrutiny by an organization's internal environment management is compulsory to observe the ecological endeavors inside the firm toward continuing both inter- and intra-	This research is one of the initial research projects to determine the effect of green activities on the organization's performance with the mediating role of competitiveness and investment recovery. Before	The GSCM concept includes a set of management practices intended to diminish environmental effects in SCs (Green et al. 2012). Trujillo-Gallego and	Eco-design · Internal environmen tal manageme nt system · Green purchasing · Environme ntal performanc

			also transferred on Google Forms, and 50 questionnaire mail to different individuals who work in leather industries of other cities of Pakistan; out of 350 questionnaires, 183 were filled, and the remaining questionnaires were incomplete, and out of 50 emails, we get the response of 33 emails, and evaluated the model of this study by using the partial least square structural equation modeling PLS-SEM. We	organizational practices. Second, the positive and significant effect of green distribution on organization performance shows that most leather industry in Pakistan, which is associated with the export business, has begun to embrace precautionary distribution activities that help ecological planning, for example, improved space utilization and less utilization of fuel with subsequently fewer emissions	that study was conducted on the impact of green practices on operational performance, we used the resource dependence theory in this research. Research has also certain limitations that would be studied in the future, firstly, industry, the second size of the firm, and period of operation as the moderating. The second point of view on eco-friendly activities of those organs associated with the local market is different from those related to the export business. Thirdly, future research may lead to a multi-group investigation based on small- and medium-level firms to draw a more in-depth induction of green supply chain management activities on the leather industry. Fourth, upcoming research can use mixed-method techniques, quantitative techniques to under- stand the in-depth knowledge, and qualitative approach. Lastly, it might lead to a comparative investigation of environment-friendly activities for different enterprises like the rice and textile sectors	Sarache (2019) recognized a set of such activities: green distribution (GD), green purchasing (GP), internal environmental management system (IEMS), eco-design (ED). This research addresses the gap of execution of GSCM in the leather industry. This study aims to give a viewpoint for GSCM practices by exploring the current literature, which can apply the methods in the leather industry of Pakistan.	e · Economic performanc e