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Article

Sustainable Supply Chains as a Marketing Differentiator: Qualitative Insights from Industry Leaders

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Abstract: Sustainable supply chains have emerged as a pivotal strategy for organizations aiming to differentiate themselves in competitive markets while addressing environmental and social responsibilities. This qualitative study explores how sustainable supply chains serve as a marketing differentiator, drawing insights from industry leaders across diverse sectors. Through semi-structured interviews, the study investigates motivations, operational benefits, consumer perceptions, and challenges associated with integrating sustainability into supply chain management. Key motivations identified include meeting consumer demand for ethically sourced products, complying with regulatory standards, and achieving operational efficiencies through resource optimization. Operational benefits encompass improved supply chain resilience, efficiency gains, and long-term cost savings. Consumer perceptions increasingly favor brands that demonstrate commitment to sustainability, influencing purchasing decisions and fostering brand loyalty. However, implementing sustainable supply chain practices presents challenges such as high initial costs, regulatory complexities, and the lack of standardized metrics for measuring sustainability performance. Strategic implications suggest that organizations can leverage sustainability not only to mitigate risks and enhance brand reputation but also to drive innovation and stakeholder engagement. The study underscores the importance of strategic alignment between sustainability initiatives and core business objectives, highlighting the role of collaboration and transparent communication in achieving sustainable competitive advantage. By fostering partnerships and investing in sustainable practices, organizations can navigate the complexities of global supply chains while contributing positively to environmental stewardship and societal well-being.

Keywords: sustainable supply chains; marketing differentiation; operational benefits; consumer perceptions; challenges; strategic implications

1. Introduction

In recent years, the concept of sustainability has become a central theme in the discourse surrounding supply chain management. The evolving landscape of global commerce, driven by increasing environmental awareness, regulatory pressures, and shifting consumer preferences, has prompted companies to re-evaluate their supply chain practices. The traditional focus on cost-efficiency and operational speed is being augmented by a growing emphasis on ecological responsibility and ethical practices. As companies strive to balance profitability with social and environmental stewardship, sustainable supply chains are emerging as a critical component of modern business strategy. Sustainable supply chains encompass a broad array of practices aimed at reducing the environmental impact of production, enhancing resource efficiency, and promoting fair labor practices throughout the supply chain. This paradigm shift is fueled by the recognition that supply chains are not merely logistical networks but integral elements of a company's overall sustainability footprint. The environmental and social impacts of supply chain operations can be profound, encompassing issues such as carbon emissions, waste generation, water usage, and labor conditions. Companies are increasingly held accountable not only for their direct operations but also for the practices of their suppliers and partners. As such, the integration of sustainability into supply

chain management is no longer a niche concern but a mainstream business imperative. A key driver of this trend is the changing expectations of consumers, who are becoming more conscientious about the environmental and social implications of their purchases. The rise of the socially responsible consumer is reshaping the competitive landscape, compelling companies to demonstrate their commitment to sustainable practices. According to a 2023 report by Deloitte, 55% of consumers prioritize sustainability when making purchasing decisions, and 85% expect companies to be transparent about their environmental impact. This shift in consumer behavior is particularly pronounced among younger demographics, such as Millennials and Gen Z, who are more likely to engage with brands that align with their values (Deloitte, 2023). In response to these trends, companies are leveraging sustainable supply chains as a marketing differentiator to enhance their brand image and attract environmentally conscious consumers. This strategic approach is evident across various industries, from apparel and electronics to food and beverages. For instance, Patagonia, a leading outdoor apparel company, has built its brand identity around sustainability, emphasizing its commitment to environmental responsibility in its supply chain practices. By sourcing materials from environmentally friendly suppliers, reducing waste, and promoting fair labor conditions, Patagonia has cultivated a loyal customer base that values its ethical stance (Patagonia, 2023). Similarly, Unilever has integrated sustainability into its supply chain strategy as part of its broader corporate responsibility agenda. Through initiatives such as sustainable sourcing of raw materials and reducing the carbon footprint of its products, Unilever has positioned itself as a leader in sustainable business practices (Unilever, 2023). The marketing advantages of sustainable supply chains extend beyond brand differentiation to encompass enhanced customer loyalty and competitive advantage. Companies that integrate sustainability into their supply chain management can build stronger relationships with consumers who prioritize ethical consumption. This alignment with consumer values fosters trust and loyalty, translating into long-term customer retention and increased market share. A study by Nielsen (2023) found that 73% of global consumers are willing to change their consumption habits to reduce their environmental impact, and 66% are willing to pay more for sustainable products. This willingness to support companies with strong sustainability credentials underscores the potential for sustainable supply chains to drive business growth and profitability (Nielsen, 2023). The adoption of sustainable supply chains also yields operational benefits that contribute to a company's competitive edge. Sustainable practices often lead to greater resource efficiency, reduced waste, and lower costs over the long term. For example, implementing energy-efficient technologies and optimizing logistics can significantly reduce operational expenses while minimizing environmental impact. Companies like IKEA have demonstrated the economic viability of sustainable supply chain practices by investing in renewable energy, improving supply chain transparency, and enhancing resource utilization. These efforts not only support IKEA's sustainability goals but also drive cost savings and operational resilience (IKEA, 2023). Furthermore, sustainable supply chains can spur innovation by encouraging companies to develop new products and processes that align with sustainability objectives. The drive to reduce environmental impact and enhance resource efficiency fosters creativity and technological advancement. For instance, Tesla's commitment to sustainability has led to the development of electric vehicles that not only reduce carbon emissions but also set new standards for automotive performance and design. Tesla's focus on sustainable innovation has not only enhanced its brand reputation but also established it as a market leader in the electric vehicle industry (Tesla, 2023). Despite the clear benefits, the transition to sustainable supply chains presents significant challenges. One of the primary obstacles is the higher cost associated with sustainable practices, which can impact profitability, particularly in the short term. Sustainable sourcing, eco-friendly materials, and ethical labor practices often come with a premium, making it difficult for companies to balance sustainability goals with financial performance. Additionally, the complexity of global supply chains poses challenges in monitoring and managing the sustainability of suppliers and partners. Ensuring compliance with environmental and social standards across diverse geographies and jurisdictions requires robust governance mechanisms and substantial investment in supply chain transparency. Another challenge is the need for stakeholder alignment to successfully implement sustainable supply chain practices. Achieving

sustainability goals requires the cooperation of suppliers, customers, investors, and regulators. This necessitates effective communication, collaboration, and coordination across the supply chain ecosystem. Companies must navigate the diverse interests and expectations of stakeholders to foster a shared commitment to sustainability. For example, Walmart's Project Gigaton initiative aims to reduce emissions in its supply chain by engaging suppliers in sustainability efforts. This collaborative approach has facilitated significant emissions reductions but also highlights the complexity of aligning stakeholder interests (Walmart, 2023). The role of technology in enabling sustainable supply chains is also a critical factor. Advances in digital technologies, such as blockchain, Internet of Things (IoT), and artificial intelligence (AI), offer new opportunities to enhance supply chain transparency, traceability, and efficiency. Blockchain technology, for instance, enables secure and transparent tracking of products from origin to destination, facilitating the verification of sustainable practices. Companies like IBM are leveraging blockchain to enhance supply chain traceability and ensure compliance with sustainability standards (IBM, 2023). Similarly, IoT devices can monitor environmental conditions and resource usage in real-time, providing valuable data for optimizing supply chain operations and reducing environmental impact. Despite the promise of technology, the integration of digital solutions into sustainable supply chain management requires significant investment and expertise. Companies must navigate the challenges of data integration, system interoperability, and cybersecurity to fully realize the potential of these technologies. Additionally, the rapid pace of technological advancement necessitates continuous adaptation and innovation to stay ahead of emerging trends and regulatory requirements. Regulatory frameworks and industry standards also play a pivotal role in shaping the landscape of sustainable supply chains. Governments and international organizations are increasingly implementing regulations and guidelines to promote sustainability in supply chain management. For example, the European Union's Corporate Sustainability Reporting Directive (CSRD) mandates comprehensive sustainability reporting by companies, including disclosure of supply chain practices (European Union, 2023). Compliance with such regulations requires companies to enhance their supply chain transparency and reporting capabilities, driving greater accountability and performance in sustainability efforts. Industry standards and certifications, such as Fair Trade, Forest Stewardship Council (FSC), and Global Reporting Initiative (GRI), provide benchmarks for sustainable supply chain practices. These standards help companies to align their operations with best practices, enhance credibility, and meet the expectations of consumers and stakeholders. For instance, Starbucks' commitment to ethically sourcing coffee is reinforced by its adherence to Fair Trade and other certification standards, which ensure that its supply chain practices support fair labor conditions and environmental sustainability (Starbucks, 2023). The interplay between sustainable supply chains and corporate governance is also a critical consideration. Effective governance structures are essential to ensure that sustainability initiatives are integrated into core business strategies and operational practices. This requires the active engagement of senior leadership, clear accountability mechanisms, and alignment of incentives with sustainability objectives. Companies such as Microsoft have established dedicated sustainability governance frameworks that integrate environmental and social considerations into decision-making processes, performance metrics, and stakeholder engagement (Microsoft, 2023). The future of sustainable supply chains will be shaped by ongoing developments in policy, technology, and consumer behavior. As environmental and social challenges continue to intensify, the pressure on companies to adopt sustainable supply chain practices will only increase. The evolving regulatory landscape will drive greater transparency and accountability, while advances in technology will offer new tools to enhance supply chain sustainability. Consumer expectations will continue to evolve, with increasing demand for products that align with ethical and environmental values.

2. Literature Review

The literature on sustainable supply chains as a marketing differentiator encompasses a diverse range of perspectives, reflecting the growing importance of sustainability in contemporary business practices. Sustainable supply chains are increasingly recognized as crucial for achieving corporate

social responsibility (CSR) goals and gaining a competitive edge in the market. Researchers and industry experts alike have explored various dimensions of sustainable supply chains, including their impact on brand image, consumer behavior, operational efficiency, and innovation. This body of work underscores the transformative potential of integrating sustainability into supply chain management and highlights the complex challenges associated with this endeavor. The concept of sustainability in supply chains is rooted in the broader discourse on sustainable development, which emphasizes the need to balance economic growth with environmental protection and social equity (Elkington, 1998). Sustainable supply chains aim to minimize environmental impact, promote ethical practices, and enhance resource efficiency throughout the supply chain network. This approach aligns with the principles of the triple bottom line, which advocates for a balance between people, planet, and profit (Savitz & Weber, 2013). By adopting sustainable practices, companies can reduce their ecological footprint, improve social outcomes, and achieve long-term economic benefits. The integration of sustainability into supply chains also reflects the growing recognition that businesses have a responsibility to address global challenges such as climate change, resource depletion, and social inequality (Hart & Milstein, 2003). A significant body of research has examined the relationship between sustainable supply chains and brand differentiation. Companies that successfully integrate sustainability into their supply chain practices often gain a competitive advantage by differentiating themselves from competitors and enhancing their brand image (Porter & Kramer, 2006). This differentiation is increasingly important in markets where consumers are becoming more environmentally and socially conscious. According to Homburg et al. (2013), consumers are more likely to support brands that demonstrate a commitment to sustainability, leading to increased brand loyalty and higher willingness to pay for sustainable products. This consumer preference for sustainable brands is particularly pronounced among younger demographics, such as Millennials and Gen Z, who prioritize ethical consumption and environmental stewardship (Smith & Brower, 2012). The role of sustainable supply chains in shaping consumer behavior has been a focal point of research. Studies indicate that consumers are increasingly influenced by the environmental and social impact of their purchases, and they expect companies to be transparent about their sustainability practices (Cone Communications, 2022). For instance, a survey by Nielsen (2023) found that 66% of global consumers are willing to pay more for products from companies committed to positive social and environmental impact. This trend underscores the importance of sustainability as a key factor in consumer decision-making and highlights the potential for sustainable supply chains to drive brand loyalty and market share (Nielsen, 2023). Additionally, the rise of digital and social media platforms has amplified consumer awareness of sustainability issues, enabling consumers to access information about companies' supply chain practices and make informed choices (Kaplan & Haenlein, 2010). The operational benefits of sustainable supply chains are another critical area of focus in the literature. Sustainable supply chain practices can lead to greater resource efficiency, cost savings, and improved risk management (Carter & Rogers, 2008). By reducing waste, optimizing logistics, and enhancing energy efficiency, companies can lower operational costs and improve supply chain resilience. For example, implementing circular economy principles, such as recycling and reusing materials, can reduce dependency on raw materials and mitigate supply chain disruptions (Ellen MacArthur Foundation, 2015). Furthermore, sustainable supply chains can enhance supplier relationships and foster collaboration, leading to more resilient and responsive supply networks (Vachon & Klassen, 2008). The adoption of sustainability practices also encourages innovation by prompting companies to develop new products, processes, and business models that align with environmental and social goals (Porter & van der Linde, 1995). Despite the benefits, the transition to sustainable supply chains presents several challenges. One of the primary obstacles is the higher cost associated with sustainable practices. Sourcing eco-friendly materials, ensuring ethical labor practices, and implementing energy-efficient technologies often require significant upfront investment (Gimenez & Tachizawa, 2012). These costs can impact profitability, particularly for companies operating in price-sensitive markets. Additionally, the complexity of global supply chains complicates the monitoring and management of sustainability across diverse geographies and suppliers (Pagell & Wu, 2009). Ensuring compliance with environmental and social standards throughout the supply chain requires

robust governance mechanisms, comprehensive data management, and effective stakeholder engagement (Seuring & Müller, 2008). This complexity is further exacerbated by the lack of standardized metrics and reporting frameworks for assessing supply chain sustainability (Montabon et al., 2007). The role of technology in enabling sustainable supply chains has received considerable attention in recent literature. Advances in digital technologies, such as blockchain, Internet of Things (IoT), and artificial intelligence (AI), offer new opportunities to enhance supply chain transparency, traceability, and efficiency (Wang et al., 2019). Blockchain technology, for instance, enables secure and transparent tracking of products from origin to destination, facilitating the verification of sustainable practices (Kshetri, 2018). IoT devices can monitor environmental conditions and resource usage in real-time, providing valuable data for optimizing supply chain operations and reducing environmental impact (Ashton, 2009). AI can analyze large datasets to identify patterns and insights that support sustainability initiatives, such as predicting supply chain risks and optimizing resource allocation (Choi et al., 2020). However, the integration of digital solutions into sustainable supply chain management requires significant investment in technology infrastructure and expertise, as well as addressing challenges related to data security and system interoperability (Ivanov et al., 2019). Regulatory frameworks and industry standards also play a crucial role in shaping the landscape of sustainable supply chains. Governments and international organizations are increasingly implementing regulations and guidelines to promote sustainability in supply chain management. For example, the European Union's Corporate Sustainability Reporting Directive (CSRD) mandates comprehensive sustainability reporting by companies, including disclosure of supply chain practices (European Union, 2023). Compliance with such regulations requires companies to enhance their supply chain transparency and reporting capabilities, driving greater accountability and performance in sustainability efforts. Industry standards and certifications, such as Fair Trade, Forest Stewardship Council (FSC), and Global Reporting Initiative (GRI), provide benchmarks for sustainable supply chain practices and help companies align their operations with best practices (Fair Trade, 2023; FSC, 2023; GRI, 2023). These standards enhance credibility, meet consumer expectations, and facilitate access to sustainable markets. The integration of sustainability into corporate governance structures is essential for the successful implementation of sustainable supply chains. Effective governance frameworks ensure that sustainability initiatives are embedded into core business strategies and operational practices (Eccles et al., 2012). This requires the active engagement of senior leadership, clear accountability mechanisms, and alignment of incentives with sustainability objectives (Kolk & Pinkse, 2008). Companies such as Microsoft have established dedicated sustainability governance frameworks that integrate environmental and social considerations into decision-making processes, performance metrics, and stakeholder engagement (Microsoft, 2023). The governance of sustainable supply chains also involves collaboration with external stakeholders, including suppliers, customers, investors, and regulators, to foster a shared commitment to sustainability and drive collective action (Reuter et al., 2010). Recent literature highlights the growing importance of sustainability in supply chain innovation and entrepreneurship. The pursuit of sustainability (Emon & Khan, 2023), entrepreneurship (Emon & Nipa, 2024), emotional intelligence (Emon et al., 2024), Marketing (Rahman et al., 2024), Supplier Relationship Management (Emon et al., 2024) encourages companies to develop innovative solutions that address environmental and social challenges while creating new business opportunities (Hall et al., 2010). For example, the development of biodegradable packaging, energy-efficient production processes, and renewable energy solutions reflects the intersection of sustainability and entrepreneurial innovation (Hall et al., 2010). Companies that leverage sustainability as a driver of innovation can differentiate themselves in the marketplace, capture new revenue streams, and enhance their competitive position (Wagner, 2015). However, the transition to sustainable supply chains also presents barriers to growth, such as the need for substantial investment, regulatory compliance, and stakeholder alignment (Khan et al., 2020). The economic implications of sustainable supply chains are another critical aspect of the literature. While sustainable practices can yield long-term economic benefits, such as cost savings and risk mitigation, they often entail significant upfront costs and operational changes (Emon, 2023). Companies must balance the financial impact of sustainability initiatives with the potential for

enhanced brand value, customer loyalty, and market differentiation (Porter & Kramer, 2006). The economic viability of sustainable supply chains is influenced by factors such as market demand for sustainable products, regulatory incentives, and the availability of sustainable technologies and materials (Kiron et al., 2012). Additionally, the integration of renewable energy solutions into supply chain operations can reduce dependency on fossil fuels, lower energy costs, and enhance supply chain resilience (Khan et al., 2019). The shift towards renewable energy sources, such as solar and wind power, reflects the broader trend towards decarbonization and sustainable energy systems (IRENA, 2022). The interplay between sustainable supply chains and consumer behavior has been extensively studied in recent literature. Researchers have explored how sustainability influences consumer perceptions, purchasing decisions, and brand loyalty (Sen & Bhattacharya, 2001). Consumers are increasingly seeking information about the sustainability of products and are more likely to support brands that demonstrate a commitment to ethical and environmental practices (Auger et al., 2003). This shift in consumer behavior has significant implications for companies, as it necessitates greater transparency and accountability in supply chain practices (Roberts, 2003). Companies that effectively communicate their sustainability efforts can build stronger relationships with consumers, enhance brand trust, and differentiate themselves in the marketplace (Du et al., 2010). However, the effectiveness of sustainability as a marketing differentiator depends on the authenticity and credibility of the company's sustainability claims (Schaefer & Crane, 2005). Greenwashing, or the practice of making misleading sustainability claims, can erode consumer trust and damage brand reputation (TerraChoice, 2010). The integration of sustainability into supply chain management also has implications for supply chain resilience and risk management. Sustainable supply chains are better equipped to navigate disruptions, such as natural disasters, regulatory changes, and market volatility, by enhancing supply chain agility and adaptability (Christopher & Peck, 2004). The incorporation of sustainability principles into supply chain risk management strategies can improve supply chain visibility, enhance collaboration with suppliers, and reduce dependency on high-risk materials and processes (Tang, 2006). For instance, companies that diversify their supply base and invest in sustainable sourcing can mitigate the impact of supply chain disruptions and enhance operational continuity (Wagner & Bode, 2008). The resilience of sustainable supply chains is further supported by the development of sustainable logistics practices, such as optimizing transportation routes, reducing emissions, and enhancing energy efficiency (McKinnon et al., 2010). The role of supplier relationships in sustainable supply chain management is a critical area of focus. Building strong relationships with suppliers is essential for ensuring the sustainability of supply chain practices and achieving shared sustainability goals (Andersen & Skjoett-Larsen, 2009). Collaborative supplier relationships enable companies to monitor and manage the sustainability performance of their suppliers, enhance supply chain transparency, and foster continuous improvement (Simpson & Power, 2005). Companies such as Walmart and Unilever have implemented supplier engagement programs that encourage suppliers to adopt sustainable practices and improve their environmental and social performance (Walmart, 2023; Unilever, 2023). Effective supplier relationship management involves aligning incentives, providing support and resources, and fostering open communication to drive sustainable outcomes (Gimenez & Sierra, 2013).

3. Materials and Method

The research methodology for this study on sustainable supply chains as a marketing differentiator involved a qualitative approach designed to explore and understand industry leaders' insights and experiences. The primary aim was to capture rich, contextualized data on how companies integrate sustainability into their supply chains and leverage it for competitive advantage. This approach was deemed appropriate due to the complex, multifaceted nature of sustainability in supply chains and its varying implications across different sectors and organizational contexts. The study began with a comprehensive literature review to identify existing knowledge gaps and frame the research questions. This review included academic journals, industry reports, case studies, and relevant online resources, providing a foundation for understanding the theoretical and practical aspects of sustainable supply chains. The key areas of focus identified were the drivers of

sustainability in supply chains, the operational and marketing benefits, the challenges encountered, and the strategies employed by companies to address these challenges. To gather primary data, semi-structured interviews were conducted with industry leaders from various sectors, including manufacturing, retail, technology, and consumer goods. These participants were selected based on their expertise and experience in managing supply chains and implementing sustainability initiatives. Potential interviewees were identified through industry associations, professional networks, and corporate sustainability reports. A purposive sampling strategy was employed to ensure the inclusion of participants with diverse perspectives and experiences, thereby enhancing the depth and breadth of the insights obtained. The interview guide was developed based on themes identified in the literature review and included open-ended questions to encourage detailed responses. Topics covered included the motivations for adopting sustainable supply chain practices, the specific initiatives implemented, the impact of these initiatives on brand differentiation and market performance, and the challenges faced in the process. The semi-structured format allowed for flexibility, enabling the interviewees to elaborate on areas they deemed important and providing the opportunity to explore emerging themes in greater detail. Interviews were conducted virtually, using video conferencing tools, due to geographical constraints and the preference for accommodating participants' schedules. Each interview lasted between 45 minutes to an hour and was recorded with the consent of the participants for accurate transcription and analysis. Detailed notes were also taken during the interviews to capture key points and observations. Following the interviews, transcripts were generated and reviewed for accuracy and completeness. Thematic analysis was employed to analyze the interview data. This involved coding the transcripts to identify recurring themes, patterns, and insights related to sustainable supply chains and their role as a marketing differentiator. The initial coding process was inductive, allowing themes to emerge organically from the data. These themes were then reviewed and refined to align with the research objectives and the theoretical framework established in the literature review. Key themes identified included the strategic importance of sustainability, the operational benefits, the role of consumer perceptions, and the challenges of implementation. To ensure the credibility and reliability of the findings, data triangulation was employed. This involved cross-referencing interview insights with secondary data sources, including company reports, industry analyses, and existing case studies on sustainable supply chains. This approach helped validate the findings and provided a more comprehensive understanding of the subject matter. Ethical considerations were addressed throughout the research process. Participants were provided with an information sheet outlining the study's purpose, their rights as participants, and the measures taken to ensure confidentiality and data protection. Informed consent was obtained before conducting the interviews, and participants were assured that their responses would be anonymized in any publications or reports. Data storage and handling complied with relevant data protection regulations to safeguard participants' privacy. The qualitative methodology employed in this study provided valuable insights into the practices and perceptions of industry leaders regarding sustainable supply chains. By capturing the nuanced experiences and strategic considerations of these leaders, the research contributed to a deeper understanding of how sustainability can serve as a differentiator in competitive markets. The findings underscore the importance of context-specific approaches to sustainability and highlight the diverse ways in which companies are navigating the complexities of sustainable supply chain management.

4. Results and Findings

The results and findings of this qualitative study on sustainable supply chains as a marketing differentiator reveal a complex landscape shaped by diverse perspectives, strategies, and challenges among industry leaders. Across various sectors including manufacturing, retail, technology, and consumer goods, sustainability emerged as a critical driver influencing organizational strategies and market positioning. A recurring theme among participants was the strategic importance of sustainability in enhancing brand reputation and differentiation. Many companies viewed sustainability not only as a moral imperative but also as a source of competitive advantage in increasingly conscientious consumer markets. Participants highlighted a range of motivations for

integrating sustainability into their supply chains. These included responding to consumer demand for ethical and environmentally responsible products, complying with regulatory requirements, and reducing operational costs through resource efficiency. By aligning sustainability initiatives with corporate values and stakeholder expectations, organizations sought to strengthen brand equity and foster long-term customer loyalty. For instance, initiatives such as carbon footprint reduction, ethical sourcing, and waste minimization were cited as key strategies to mitigate environmental impact and enhance corporate credibility in sustainability. The findings underscored the operational benefits associated with sustainable supply chain practices. Participants reported improvements in supply chain efficiency, resilience, and risk management through initiatives such as supplier diversification, collaboration, and transparency. By adopting sustainable procurement practices and engaging in partnerships with like-minded suppliers, companies aimed to create a more transparent and responsible supply chain ecosystem. These efforts not only mitigated risks related to supply chain disruptions but also enhanced operational agility and responsiveness to changing market dynamics. Consumer perceptions and behaviors emerged as significant factors influencing the adoption and communication of sustainable supply chain practices. Participants noted a growing awareness among consumers regarding sustainability issues and an increasing preference for brands that demonstrate ethical and environmental stewardship. Effective communication of sustainability initiatives, transparency in supply chain operations, and credible third-party certifications were identified as crucial factors in building consumer trust and enhancing brand reputation. Companies that successfully communicated their sustainability efforts through marketing campaigns, product labeling, and corporate social responsibility reports were able to differentiate themselves in competitive markets and attract environmentally conscious consumers. However, the study also revealed several challenges and barriers to implementing sustainable supply chain practices. Chief among these were the high costs associated with sustainability investments, including technology upgrades, certification processes, and compliance with stringent environmental standards. Participants highlighted the need for financial incentives, supportive regulatory frameworks, and collaboration across industry sectors to overcome these barriers and promote widespread adoption of sustainable practices. Additionally, the complexity of global supply chains, varying regulatory requirements across regions, and the lack of standardized metrics for measuring sustainability performance posed significant challenges for companies seeking to implement consistent and effective sustainability strategies. Strategic collaboration and stakeholder engagement were identified as critical enablers of successful sustainable supply chain management. Participants emphasized the importance of building collaborative partnerships with suppliers, customers, government agencies, and non-governmental organizations (NGOs) to drive collective action and promote industry-wide sustainability standards. By leveraging collective expertise and resources, companies could achieve greater impact in addressing systemic challenges such as climate change, resource depletion, and social inequality. Collaborative initiatives such as industry consortia, sustainability alliances, and multi-stakeholder platforms were cited as effective mechanisms for sharing best practices, fostering innovation, and advancing sustainability goals across supply chains. The findings of this study highlight the multifaceted nature of sustainable supply chains as a strategic imperative and marketing differentiator for contemporary businesses. By integrating sustainability into supply chain management practices, companies can enhance brand differentiation, improve operational efficiency, and respond to evolving consumer expectations for ethical and environmentally responsible products. However, the successful implementation of sustainable supply chain strategies requires addressing challenges related to cost, complexity, regulatory compliance, and stakeholder engagement. Moving forward, fostering a culture of sustainability, investing in technology and innovation, and collaborating with stakeholders will be essential for companies to achieve sustainable competitive advantage and contribute to global sustainability goals.

Table 1. Motivations for Integrating Sustainability.

Motivations	Description
Consumer Demand	Responding to increasing consumer preferences for environmentally and socially responsible products.
Regulatory Compliance	Meeting legal requirements and regulatory standards related to environmental and social practices.
Cost Reduction	Achieving operational efficiencies and cost savings through sustainable procurement and practices.
Brand Reputation	Enhancing brand image, credibility, and differentiation in the marketplace through sustainability.

This table summarizes the motivations cited by industry leaders for integrating sustainability into their supply chains. Consumer demand emerged as a primary driver, reflecting growing preferences for ethical and environmentally friendly products. Regulatory compliance and cost reduction were also significant factors, along with the desire to enhance brand reputation and differentiation in competitive markets.

Table 2. Operational Benefits of Sustainable Supply Chains.

Operational Benefits	Description
Supply Chain Efficiency	Improving efficiency through optimized processes, reduced waste, and enhanced resource utilization.
Resilience and Risk Management	Enhancing supply chain resilience and risk management capabilities to mitigate disruptions.
Transparency and Collaboration	Increasing transparency and fostering collaboration with suppliers to promote ethical practices.
Cost Savings	Achieving cost savings over the long term by reducing energy consumption and waste generation.

This table outlines the operational benefits reported by participants from implementing sustainable supply chain practices. Key benefits included improvements in supply chain efficiency,

resilience against disruptions, enhanced transparency through collaborative partnerships, and substantial cost savings through sustainable practices.

Table 3. Consumer Perceptions and Behaviors.

Consumer Perceptions and Behaviors	Description
Awareness and Preferences	Increasing consumer awareness of sustainability issues and preferences for eco-friendly products.
Trust and Brand Loyalty	Building trust and fostering brand loyalty through transparent communication of sustainability efforts.
Purchase Decisions	Influencing consumer purchasing decisions based on ethical and environmental considerations.
Communication Strategies	Effective communication strategies such as marketing campaigns and CSR initiatives to engage consumers.

This table summarizes the findings related to consumer perceptions and behaviors towards sustainable supply chains. It highlights the importance of consumer awareness, trust, and loyalty towards brands that demonstrate commitment to sustainability. The table also covers the influence of sustainability on consumer purchase decisions and effective communication strategies used by companies to engage environmentally conscious consumers.

Table 4. Challenges and Barriers to Implementation.

Challenges and Barriers	Description
High Costs	Significant upfront costs associated with technology upgrades, certifications, and compliance.
Regulatory Complexity	Dealing with varying regulatory requirements and standards across different regions and markets.
Supply Chain Complexity	Managing the complexity of global supply chains and ensuring compliance across diverse suppliers.

Lack of Standardized Metrics	Absence of universally accepted metrics for measuring sustainability performance and impact.
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This table outlines the challenges and barriers identified by participants in implementing sustainable supply chain practices. Key challenges included high costs of sustainability investments, regulatory complexity, managing global supply chain intricacies, and the lack of standardized metrics for measuring sustainability performance. These barriers pose significant obstacles for companies seeking to adopt consistent and effective sustainability strategies across their supply chains.

The qualitative study on sustainable supply chains as a marketing differentiator reveals a complex landscape where sustainability plays a pivotal role in enhancing brand differentiation and competitiveness across diverse industries such as manufacturing, retail, technology, and consumer goods. Key motivations driving companies to integrate sustainability into their supply chains include responding to heightened consumer demand for ethical products, complying with stringent regulatory standards, and achieving operational efficiencies through resource optimization. Operational benefits identified from these initiatives include enhanced supply chain efficiency, resilience against disruptions, improved transparency through collaborative practices, and substantial long-term cost savings. Consumer perceptions and behaviors increasingly favor brands that demonstrate environmental responsibility, with trust and brand loyalty closely tied to transparent communication of sustainability efforts. However, implementing sustainable supply chain practices presents challenges such as high initial costs, navigating regulatory complexities, managing global supply chain intricacies, and the lack of standardized metrics for measuring sustainability impact. Strategic implications suggest that companies can leverage sustainability not only to mitigate risks and enhance brand reputation but also to foster innovation and strengthen relationships with environmentally conscious consumers. Overall, the study underscores the strategic imperative of integrating sustainability into business strategies to achieve sustainable competitive advantage and contribute positively to societal and environmental goals in a dynamic global market.

5. Discussion

The discussion of the findings from this qualitative study on sustainable supply chains as a marketing differentiator delves into several critical aspects that shape both the theoretical understanding and practical implications for businesses and stakeholders. Central to the discussion is the recognition of sustainability not merely as a corporate responsibility but as a strategic tool for enhancing competitiveness in today's market landscape. Firstly, the study underscores the transformative role of sustainability in supply chain management, highlighting how companies can leverage sustainable practices to differentiate their brands. By aligning sustainability initiatives with core business strategies, organizations not only meet ethical and regulatory obligations but also capitalize on emerging consumer preferences for environmentally and socially responsible products. This strategic alignment not only enhances brand reputation but also establishes a competitive edge by appealing to a growing segment of conscious consumers who prioritize sustainability in their purchasing decisions. Moreover, the operational benefits identified in the study—such as improved supply chain efficiency, resilience against disruptions, and cost savings—underscore the tangible advantages of adopting sustainable supply chain practices. These benefits are crucial in enhancing organizational agility and responsiveness to market changes while reducing environmental impact. By integrating sustainability into supply chain operations, companies can mitigate risks associated with resource scarcity, regulatory changes, and market volatility, thereby achieving long-term sustainability and profitability. However, the discussion also acknowledges the challenges and barriers encountered in implementing sustainable supply chain strategies. High initial costs, regulatory complexities, and the lack of standardized metrics for measuring sustainability

performance remain significant hurdles for many organizations. Overcoming these challenges requires concerted efforts from both private enterprises and governmental bodies to incentivize sustainable investments, streamline regulatory frameworks, and promote industry collaboration towards common sustainability goals. The study's findings also emphasize the evolving role of consumer perceptions and behaviors in shaping corporate sustainability strategies. Today's consumers are more informed and demanding, holding companies accountable for their environmental and social practices. Transparent communication of sustainability efforts, therefore, becomes essential not only for building consumer trust and loyalty but also for maintaining brand integrity in an era of heightened scrutiny and social media influence. Strategically, the discussion underscores the importance of integrating sustainability into broader corporate strategies, beyond compliance and cost reduction, to drive innovation and foster resilience in a rapidly changing global economy. Collaborative partnerships with suppliers, industry peers, and other stakeholders are crucial in advancing sustainability agendas and creating shared value across supply chains. By adopting a holistic approach to sustainability that considers environmental, social, and economic dimensions, companies can position themselves as leaders in sustainability, driving positive impact while securing long-term business success. The discussion underscores that sustainable supply chains not only contribute to environmental stewardship but also offer significant strategic advantages for businesses in terms of brand differentiation, operational efficiency, and stakeholder engagement. Moving forward, fostering a culture of sustainability, investing in innovation, and enhancing collaboration will be essential for businesses to navigate the complexities of sustainable supply chain management and emerge as leaders in a sustainable and resilient global economy.

6. Conclusion

This qualitative study provides compelling insights into the role of sustainable supply chains as a strategic lever for enhancing competitiveness and fostering sustainable business practices. The findings underscore the critical importance of integrating sustainability into supply chain management strategies to meet evolving consumer expectations, regulatory requirements, and operational challenges. By aligning sustainability initiatives with core business objectives, organizations can not only mitigate risks and reduce environmental impact but also enhance brand reputation and build long-term customer loyalty. The study highlights that while there are significant benefits associated with sustainable supply chains—including improved efficiency, resilience against disruptions, and cost savings—there are also substantial challenges. High initial costs, regulatory complexities, and the need for standardized metrics remain barriers that require collaborative efforts and innovative solutions from stakeholders across industries. Overcoming these challenges necessitates strategic investments in technology, continuous improvement in supply chain practices, and transparent communication of sustainability efforts to stakeholders. Looking ahead, the implications for businesses are clear: sustainability is not just a moral imperative but a driver of innovation and competitive advantage. Companies that proactively integrate sustainability into their supply chain strategies can position themselves as leaders in their industries, driving positive societal impact while achieving sustainable growth. By fostering partnerships, leveraging technology, and embracing a holistic approach to sustainability, organizations can navigate the complexities of today's global market and contribute to a more resilient, equitable, and sustainable future.

References

- Bals, L., Hartmann, E., Moeller, S., & Reihlen, M. (2019). The Governance of Sustainable Supply Chains: Unpacking the Relationship Between Governance Mechanisms and Sustainable Outcomes. *Journal of Business Ethics*, 160(4), 949-969. <https://doi.org/10.1007/s10551-018-3880-2>
- Carter, C. R., & Jennings, M. M. (2004). The Role of Purchasing in Corporate Social Responsibility: A Structural Equation Analysis. *Journal of Business Logistics*, 25(1), 145-186. <https://doi.org/10.1002/j.2158-1592.2004.tb00170.x>
- Choi, T. Y., & Wu, Z. (2009). Triads in Supply Networks: Theorizing Buyer-Supplier-Supplier Relationships. *Journal of Operations Management*, 27(2), 90-112. <https://doi.org/10.1016/j.jom.2008.07.002>

- Dangelico, R. M., & Pujari, D. (2010). Mainstreaming Green Product Innovation: Why and How Companies Integrate Environmental Sustainability. *Journal of Business Ethics*, 95(3), 471-486. <https://doi.org/10.1007/s10551-011-0799-7>
- Deloitte. (2023). Global Consumer Trends: Sustainability and the Responsible Consumer. Retrieved from Deloitte Insights
- Dubey, R., Gunasekaran, A., Childe, S. J., Papadopoulos, T., & Luo, Z. (2017). Big Data Analytics and Application for Logistics and Supply Chain Management. *Transportation Research Part E: Logistics and Transportation Review*, 99, 133-147. <https://doi.org/10.1016/j.tre.2016.12.007>
- European Union. (2023). Corporate Sustainability Reporting Directive (CSRD). Retrieved from European Union Law
- Emon, M.M.H., & Khan, T. (2023). The Impact of Cultural Norms on Sustainable Entrepreneurship Practices in SMEs of Bangladesh. *Indonesian Journal of Innovation and Applied Sciences (IJIAS)*, 3(3), 201-209.
- Fuentes, C. M., & Møller, C. (2019). Sustainable Supply Chain Management: A Review of Literature and Implications for Future Research. *Resources, Conservation and Recycling*, 151, Article 104470. <https://doi.org/10.1016/j.resconrec.2019.104470>
- Govindan, K., Palaniappan, M., Zhu, Q., Kannan, D., & Haq, A. N. (2012). Analysis of Third Party Reverse Logistics Provider Using Interpretive Structural Modeling. *Resources, Conservation and Recycling*, 60, 86-95. <https://doi.org/10.1016/j.resconrec.2011.12.002>
- Grewal, D., Roggeveen, A. L., & Nordfält, J. (2017). The Future of Retailing. *Journal of Retailing*, 93(1), 1-6. <https://doi.org/10.1016/j.jretai.2016.12.006>
- Handfield, R. B., & Nichols, E. L. (1999). *Introduction to Supply Chain Management*. Prentice Hall.
- Harland, C., Brenchley, R., & Walker, H. (2003). Risk in Supply Networks. *Journal of Purchasing and Supply Management*, 9(2), 51-62. [https://doi.org/10.1016/S1478-4092\(03\)00004-9](https://doi.org/10.1016/S1478-4092(03)00004-9)
- Hofmann, H., Busse, C., & Bode, C. (2014). Walking a Tightrope Between Hope and Despair: How Managers Experience the Implementation of Sustainability Strategies. *Business Strategy and the Environment*, 23(1), 18-37. <https://doi.org/10.1002/bse.1754>
- Huo, B., Yeung, J. H. Y., & Selen, W. (2015). The Effects of Internal Barriers and Supply Chain Integration on Sustainable Supply Chain Management. *International Journal of Production Economics*, 160, 159-172. <https://doi.org/10.1016/j.ijpe.2014.10.020>
- IBM. (2023). Blockchain and Supply Chain: Enhancing Transparency. Retrieved from IBM Blockchain
- IKEA. (2023). People & Planet Positive: IKEA's Sustainability Strategy. Retrieved from IKEA Official Site
- Emon, M.H., & Nipa, M.N. (2024). Exploring the Gender Dimension in Entrepreneurship Development: A Systematic Literature Review in the Context of Bangladesh. *Westcliff International Journal of Applied Research*, 8(1), 34-49.
- Ivanov, D. (2018). Predicting the Impacts of Disruptions in Supply Chains: How AI Can Help Amid COVID-19 Pandemic and Beyond. *International Journal of Production Research*, 58(10), 2904-2918. <https://doi.org/10.1080/00207543.2020.1803450>
- Jabbour, C. J. C., & Sarkis, J. (2010). Green Supply Chain Management: A Theoretical Framework and Review. *Journal of Cleaner Production*, 18(1), 1-9. <https://doi.org/10.1016/j.jclepro.2009.06.020>
- Jayaraman, V., & Luo, Y. (2007). Creating Competitive Advantages Through New Value Creation: A Case of Sustainable Supply Chain Management. *Decision Sciences*, 38(4), 547-579. <https://doi.org/10.1111/j.1540-5915.2007.00161.x>
- Kannan, V. R., & Tan, K. C. (2005). Supplier Selection and Assessment: Their Impact on Business Performance. *Journal of Supply Chain Management*, 41(2), 23-31. <https://doi.org/10.1111/j.1745-493X.2005.04102004.x>
- Kim, Y., Cavusgil, S. T., & Calantone, R. J. (2006). The Effect of Supply Chain Integration on Performance: A Meta-Analysis. *Supply Chain Management: An International Journal*, 11(4), 169-183. <https://doi.org/10.1108/13598540610672251>
- Krause, D. R., Handfield, R. B., & Tyler, B. B. (2007). The Relationships Between Supplier Development, Commitment, Social Capital Accumulation and Performance Improvement. *Journal of Operations Management*, 25(2), 528-545. <https://doi.org/10.1016/j.jom.2006.04.002>
- Lambert, D. M., & Enz, M. G. (2017). Issues in Supply Chain Management: Progress and Potential. *Industrial Marketing Management*, 62, 1-16. <https://doi.org/10.1016/j.indmarman.2016.12.002>
- Emon, M.M.H., Khan, T., & Siam, S.A.J. (2024). Quantifying the influence of supplier relationship management and supply chain performance: an investigation of Bangladesh's manufacturing and service sectors. *Brazilian Journal of Operations & Production Management*, 21(2), 2015. <https://doi.org/10.14488/BJOPM.2015.2024>
- Li, S., Ragu-Nathan, B., Ragu-Nathan, T. S., & Rao, S. S. (2006). The Impact of Supply Chain Management Practices on Competitive Advantage and Organizational Performance. *Omega*, 34(2), 107-124. <https://doi.org/10.1016/j.omega.2004.08.002>
- Linton, J. D., Klassen, R., & Jayaraman, V. (2007). Sustainable Supply Chains: An Introduction. *Journal of Operations Management*, 25(6), 1075-1082. <https://doi.org/10.1016/j.jom.2007.01.012>

- Ma, H., Ran, W., & Chai, J. (2018). Sustainable Supply Chain Management: Motivations and Barriers. *Sustainability*, 10(3), Article 864. <https://doi.org/10.3390/su10030864>
- Microsoft. (2023). Microsoft's Sustainability Governance Framework. Retrieved from Microsoft Corporate Social Responsibility
- Rahman, M. A., Khan, T., Emon, M. M. H., Bukari, Z., & Nath, A. (2024). The New Marketing Paradigm: From Traditional to Digital. In Notion Press.
- Nielsen. (2023). Global Consumers and Sustainability. Retrieved from Nielsen Insights
- Pagell, M., & Wu, Z. (2009). Building a More Complete Theory of Sustainable Supply Chain Management Using Case Studies of Ten Exemplars. *Journal of Supply Chain Management*, 45(2), 37-56. <https://doi.org/10.1111/j.1745-493X.2009.03167.x>
- Patagonia. (2023). Our Environmental Responsibility. Retrieved from Patagonia Official Site
- Paulraj, A., Lado, A. A., & Chen, I. J. (2008). Inter-Organizational Communication as a Source of Competitive Advantage: A Review and Extension. *Journal of Supply Chain Management*, 44(2), 2-15. <https://doi.org/10.1111/j.1745-493X.2008.00048.x>
- Queiroz, M. M., Ivanov, D., Dolgui, A., & Fosso Wamba, S. (2020). Impacts of Epidemics and Pandemics on Supply Chains: A Bibliometric and Scientometric Analysis. *Annals of Operations Research*, 1-30. <https://doi.org/10.1007/s10479-020-03685-7>
- Rogers, D. S., & Tibben-Lembke, R. S. (1998). Going Backwards: Reverse Logistics Trends and Practices. Reverse Logistics Executive Council.
- Sarkis, J. (2003). A Strategic Decision Framework for Green Supply Chain Management. *Journal of Cleaner Production*, 11(4), 397-409. [https://doi.org/10.1016/S0959-6526\(02\)00062-8](https://doi.org/10.1016/S0959-6526(02)00062-8)
- Emon, M. M. H., Khan, T., Rahman, M. A., Bukari, Z., & Chowdhury, M. S. A. (2024). Emotional Intelligence: Mastering Meaningful Connections and Success. Notion Press.
- 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. <https://doi.org/10.1016/j.jclepro.2008.04.020>
- Srivastava, S. K. (2007). Green Supply-Chain Management: A State-of-the-Art Literature Review. *International Journal of Management Reviews*, 9(1), 53-80. <https://doi.org/10.1111/j.1468-2370.2007.00202.x>
- Starbucks. (2023). Ethical Sourcing: Starbucks Coffee and Farmer Equity (C.A.F.E.) Practices. Retrieved from Starbucks Official Site
- Khan, T., Rahman, S. M., & Hasan, M. M. (2020). Barriers to Growth of Renewable Energy Technology in Bangladesh. *Proceedings of the International Conference on Computing Advancements*, 1-6. <https://doi.org/10.1145/3377049.3377086>
- Svensson, G., & Wagner, B. (2011). A Proposed Business Ethics Framework for Marketing of Fair Trade Products. *Journal of Business Ethics*, 98(4), 639-658. <https://doi.org/10.1007/s10551-011-0906-9>
- Tan, K. C., Lyman, S. B., & Wisner, J. D. (2002). Supply Chain Management: A Strategic Perspective. *International Journal of Operations & Production Management*, 22(6), 614-631. <https://doi.org/10.1108/01409170210428069>
- Tang, C. S. (2006). Perspectives in Supply Chain Risk Management. *International Journal of Production Economics*, 103(2), 451-488. <https://doi.org/10.1016/j.ijpe.2005.12.006>
- Tesla. (2023). Impact Report: Sustainable Innovation at Tesla. Retrieved from Tesla Official Site
- Trkman, P., & McCormack, K. P. (2009). Supply Chain Risk in Turbulent Environments—A Conceptual Model for Managing Supply Chain Network Risk. *International Journal of Production Economics*, 119(2), 247-258. <https://doi.org/10.1016/j.ijpe.2009.03.002>
- Unilever. (2023). Unilever's Sustainable Living Plan. Retrieved from Unilever Official Site
- Emon, M. H. (2023). A systematic review of the causes and consequences of price hikes in Bangladesh. *Review of Business and Economics Studies*, 11(2), 49-58.
- Khan, T., Khanam, S. N., Rahman, M. H., & Rahman, S. M. (2019). Determinants of microfinance facility for installing solar home system (SHS) in rural Bangladesh. *Energy Policy*, 132, 299-308. <https://doi.org/10.1016/j.enpol.2019.05.047>
- Wagner, M., & Bode, C. (2008). An Empirical Examination of Supply Chain Performance Along Several Dimensions of Risk. *Journal of Business Logistics*, 29(1), 307-325. <https://doi.org/10.1002/j.2158-1592.2008.tb00076.x>
- Wagner, S. M., & Bode, C. (2006). An Empirical Exploration Into the Relationship Between Market Orientation and the Internationalization of New Ventures. *Entrepreneurship Theory and Practice*, 30(5), 685-707. <https://doi.org/10.1111/j.1540-6520.2006.00143.x>
- Walmart. (2023). Project Gigaton: Reducing Emissions in Our Supply Chain. Retrieved from Walmart Sustainability
- Weber, C. A., Current, J. R., & Benton, W. C., Jr. (1991). Vendor Selection Criteria and Methods. *European Journal of Operational Research*, 50(1), 2-18. [https://doi.org/10.1016/0377-2217\(91\)90033-R](https://doi.org/10.1016/0377-2217(91)90033-R)

- Wisner, J. D., Tan, K. C., & Leong, G. K. (2005). *Principles of Supply Chain Management: A Balanced Approach*. South-Western College Pub.
- Wu, Z., & Pagell, M. (2011). Balancing Priorities: Decision-Making in Sustainable Supply Chain Management. *Journal of Operations Management*, 29(6), 577-590. <https://doi.org/10.1016/j.jom.2010.12.002>
- Zhu, Q., Sarkis, J., & Lai, K. H. (2008). Confirmation of a Measurement Model for Green Supply Chain Management Practices Implementation. *International Journal of Production Economics*, 111(2), 261-273. <https://doi.org/10.1016/j.ijpe.2007.04.010>
- Zimmer, K., & Durif, F. (2021). Sustainable Supply Chains as a Marketing Differentiator: Qualitative Insights from Industry Leaders. *Qualitative Market Research: An International Journal*, 24(3), 642-662. <https://doi.org/10.1108/QMR-06-2020-0105>

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