



RESEARCH ARTICLE

EXPLORING THE DYNAMICS OF SUSTAINABLE SUPPLY CHAIN PRACTICES IN THE TEXTILE INDUSTRY FROM BANGLADESH CONTEXT

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ABSTRACT

This qualitative research delves into the dynamics of sustainable supply chain practices within the Bangladeshi textile industry, aiming to comprehensively examine challenges, impacts, and opportunities associated with the adoption of sustainable approaches. Employing a qualitative approach, in-depth interviews were conducted with 45 industry experts, including stakeholders, practitioners, and governmental representatives. The study reveals a landscape marked by challenges such as technological limitations, financial constraints, and regulatory gaps hindering widespread adoption of sustainable practices. Despite these hurdles, significant positive impacts emerge, encompassing improved worker welfare, reduced environmental footprints, and community development arising from sustainability initiatives. Collaborative efforts, technological innovations, and supportive policies surface as pivotal drivers for sustainable transformations. Research limitations include the study's reliance on a limited sample size and qualitative insights, suggesting the need for further quantitative research to obtain comprehensive industry-wide perspectives. Practical implications advocate for collaborative approaches, technological innovations, and policy interventions to overcome barriers and promote sustainability in the textile supply chain. The study underscores societal benefits like enhanced worker welfare, improved environmental conservation efforts, and community upliftment arising from sustainable initiatives. This research contributes by shedding light on challenges, impacts, and pathways for fostering sustainability in the textile supply chain, providing valuable insights for industry stakeholders and policymakers.

KEYWORDS

Sustainable supply chain, Textile industry, Bangladesh, Challenges, Impacts, Collaborative approaches.

1. INTRODUCTION

The textile industry in Bangladesh holds a significant position in the global market, playing a pivotal role in the country's economic growth. However, its contributions are accompanied by challenges, particularly in terms of sustainability within its supply chain practices. The imperative of sustainable practices has increasingly garnered attention worldwide, emphasizing the integration of environmental, social, and economic considerations into operational frameworks. Examining the intricacies of sustainable practices within the Bangladeshi textile industry becomes crucial in this context. Bangladesh has risen as a key player in the global textile market, primarily through its garment sector, which substantially contributes to the nation's GDP and employs a vast workforce, predominantly women, in factories dispersed across the country. Despite its economic significance, the industry grapples with reputational issues concerning environmental concerns, labor rights, and workplace safety (Hasan et al., 2023). The catastrophic Rana Plaza incident in 2013, where a garment factory collapse led to numerous fatalities, shed light on the urgent need for sustainable reforms within this industry. Sustainable supply chain practices encompass a holistic approach, aiming to embed environmental stewardship, social responsibility, and economic viability into the operational fabric of industries. Within the textile industry, this translates to efforts in minimizing environmental impact, ensuring equitable labor practices, advocating for ethical sourcing, and fostering community development. Notably, the adoption of sustainable practices aligns with global initiatives like the United Nations' Sustainable Development Goals (SDGs) and offers an avenue for the industry to enhance its competitiveness, mitigate risks, and bolster its standing in the

global market (Emon & Khan, 2023b). Despite the growing discourse surrounding sustainability in the textile industry, the nuanced dynamics within the Bangladeshi context remain underexplored. It is crucial to understand the challenges faced, the driving forces behind sustainable initiatives, successful implementation strategies, and stakeholder perspectives within this specific geographical and industrial landscape. This exploration seeks to address this research gap by delving into the intricate layers of sustainable supply chain practices within Bangladesh's textile industry. The objective of this study is to comprehensively explore the multifaceted dimensions of sustainable supply chain practices within the Bangladeshi textile industry. This research study holds significant promise in catalyzing transformative change within the Bangladeshi textile industry and contributing substantially to the global discourse on sustainable supply chain practices. The textile sector in Bangladesh faces critical challenges concerning environmental degradation, ethical labor practices, and safety concerns. By delving into the dynamics of sustainable supply chain practices, this study seeks to unearth insights that can address these pressing issues. Its value extends to empowering diverse stakeholders within the industry, offering manufacturers, suppliers, policymakers, and NGOs actionable guidance to implement effective and ethical practices. Embracing sustainability can not only enhance the industry's global competitiveness by meeting the growing demand for ethically sourced and environmentally responsible products but also aligns with the United Nations' Sustainable Development Goals (SDGs), particularly those related to responsible production and consumption (SDG 12), decent work and economic growth (SDG 8), and sustainable cities and communities (SDG 11). Furthermore, this research aims to fill critical gaps in qualitative studies focusing specifically on sustainable

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supply chain practices in Bangladesh's textile industry, paving the way for further academic inquiry and practical interventions. Ultimately, the study's significance lies in its potential to drive positive change, promoting ethical practices, reducing environmental degradation, and improving social welfare within the industry while contributing to a more sustainable and competitive landscape on a global scale.

2. LITERATURE REVIEW

The sustainable supply chain methods of the Bangladeshi textile industry have been extensively studied by scholars in recent years. These studies take into account the environmental, social, and economic elements of the sector in a comprehensive manner (M. S. Islam et al., 2018; Tumpa et al., 2019). The resource-intensive processes in this industry have led to increased focus on environmental sustainability, with a strong emphasis on efficient resource usage (Eisenmenger et al., 2020; Todeschini et al., 2017). Researchers have investigated technological advancements to promote water and energy-efficient methods in textile manufacturing, aiming to minimize resource use and environmental impact (Emon et al., 2024; Hasanbeigi & Price, 2015). A study have suggested using environmentally friendly dyeing techniques and wastewater treatment technologies to address water pollution problems related to textile production (Kishor et al., 2021). The industry has recognized social responsibility and ethical labor standards as crucial considerations (Perry et al., 2015). Research emphasizes the significance of equitable remuneration, improved labor conditions, and safety regulations for workers (Sorensen et al., 2021). Advocates argue that worker empowerment and involvement in decision-making processes are crucial elements for improving social sustainability in the textile supply chain (Govindan et al., 2021). Research has investigated the economic aspects of incorporating sustainable practices in the textile sector. The findings indicate that while there may be upfront costs, integrating sustainability into supply chain operations leads to long-term economic advantages (Esfahbodi et al., 2016). Enhancing resource allocation and streamlining operations lead to substantial cost savings, hence playing a crucial role in ensuring the long-term economic viability of textile enterprises (Dharmayanti et al., 2023). The Bangladeshi textile sector has been significantly influenced by regulatory frameworks and worldwide efforts, which have been instrumental in promoting sustainable practices (Sarkar et al., 2020). The industry has been compelled to adhere to ethical and environmental norms due to initiatives like the Global Organic Textile Standard (GOTS) and the Accord on Fire and Building Safety in Bangladesh (M. T. Islam et al., 2022). Obstacles remain in the implementation of sustainable measures, such as restricted technological access, budgetary limitations, and gaps in stakeholder understanding (Clark et al., 2018). Nevertheless, the problems may be surmounted by joint endeavors, technical advancements, enhancement of capabilities, and governmental backing, as highlighted by (Dwivedi et al., 2021). Recent study has explored the difficulties encountered by the Bangladeshi textile sector in adopting and executing sustainable supply chain methods. The hurdles include technology limits, budgetary limitations, and the need for stakeholder knowledge and education (Khanal et al., 2023). Nevertheless, research has shown that these challenges may be overcome by engaging in cooperative initiatives, exchanging information, and making investments in programs that enhance capabilities (Choi & Hwang, 2015). Furthermore, comprehending the customer viewpoint has become a vital element of sustainable supply chains in the textile sector. Consumer preferences are progressively placing more importance on items that are environmentally friendly and supplied ethically (Abtahi et al., 2023; Manika et al., 2015). As a result, the practice of ensuring transparency in supply chains, which involves tracking the origin of materials and monitoring the manufacturing processes, has become more popular in order to satisfy customer expectations for ethical and environmentally-friendly goods (Centobelli et al., 2022). Local dynamics have a substantial effect on sustainable practices within the Bangladeshi textile sector, alongside the global and national settings. Studies have emphasized the significance of cultural factors, institutional frameworks, and the involvement of local people in influencing sustainability efforts (Alamgir & Banerjee, 2019). Active involvement of local communities and comprehensive comprehension of their requirements and ambitions have been recognized as key measures in attaining sustainability objectives within the sector (Van Der Schoor & Scholtens, 2015). The COVID-19 pandemic has emphasized the need for supply networks to possess resilience and adaptation. Research has emphasized the influence of the pandemic on the textile sector, underscoring the need of adaptability and versatility in addressing disturbances while upholding sustainability goals (Müller et al., 2023). Recent research has highlighted the significance of stakeholders working together to promote sustainable efforts in the textile sector of Bangladesh. Academia, industrial players, governmental authorities, and non-governmental organizations (NGOs) are considered

essential actors in establishing partnerships to promote sustainable practices (Harangozó & Zilahy, 2015). Collaborative endeavors may result in the sharing of information, the creation of inventive solutions, and the establishment of optimal methods that promote the incorporation of sustainability across the supply chain. Technological progress has been recognized as crucial in driving the textile sector towards sustainability. The study conducted by Kabir (Emon, 2023a; Rejeb et al., 2020) investigates the capacity of new technologies, such as blockchain and Internet of Things (IoT), to improve the visibility and traceability of supply chains. These technologies provide instantaneous monitoring, guaranteeing adherence to ethical norms and environmental rules throughout the industrial processes (Rabbani et al., 2023). Furthermore, circular economy ideas have garnered attention as a strategy to tackle the waste and depletion of resources in the textile sector. The implementation of circularity models, which encompass the practices of reusing, recycling, and upcycling materials, has been suggested as a sustainable strategy to mitigate waste and diminish the environmental impact of the industry (Awan & Sroufe, 2022). The level of knowledge and active involvement of consumers significantly influence the demand for environmentally-friendly goods (Emon & Nahid, 2023). Recent research emphasizes the impact of consumer education and advocacy on shifting purchase habits towards ethical and sustainable choices (Joshi et al., 2021). The industry must be very sensitive to these evolving customer tastes in order to maintain market competitiveness and ensure long-term survival. Moreover, the significance of government policies and regulatory frameworks cannot be underestimated in guiding the textile sector towards sustainability. The Bangladeshi government's recent efforts to encourage sustainable practices, encourage the development of renewable energy, and enforce environmental legislation have been recognized as essential factors in driving change across industries (Emon, 2023b; Emon & Khan, 2023a; Muktadir et al., 2018). Amidst growing worries about climate change, the sector has escalated its efforts to decrease carbon emissions and promote energy efficiency. Sustainable energy sources, such as solar and wind power, have been increasingly accepted as feasible alternatives to lessen the industry's dependence on fossil fuels and mitigate its carbon emissions (A. M. Hasan & Emon, 2023; Shahsavari & Akbari, 2018).

3. RESEARCH METHODOLOGY

The qualitative study was conducted with an exploratory approach to delve into the dynamics surrounding sustainable supply chain practices within the Bangladeshi textile industry. A purposive sampling method was utilized to select a diverse pool of participants representing various stakeholders in the industry. Approximately 45 participants, including manufacturers, suppliers, government representatives, NGOs, and sustainability experts, were chosen to ensure a broad spectrum of insights and viewpoints. Data collection primarily relied on semi-structured interviews, allowing for in-depth exploration of participants' perceptions, challenges faced, strategies implemented, and motivations regarding sustainable practices within the textile supply chain. The interviews were conducted either face-to-face or virtually, accommodating the participants' preferences for engagement. Thematic analysis served as the primary method for analyzing the qualitative data gathered from the interviews. This analytical process involved the systematic identification of patterns, themes, and recurring concepts within the dataset. Initial codes were generated, followed by the identification, review, definition, and refinement of themes, ensuring rigor and reliability in interpreting the multifaceted perspectives on sustainable supply chain practices. Throughout the study, ethical considerations were paramount. Informed consent was obtained from all participants, emphasizing confidentiality, anonymity, and voluntary participation. Adherence to ethical guidelines and regulations governing human subjects' research was strictly followed, ensuring the ethical integrity of the study and respecting the rights and privacy of the participants. Several limitations were acknowledged within this research endeavor. Potential biases in participant selection and reliance on self-reported data might have influenced the findings. The scope of the study might have been confined to specific perspectives or experiences, potentially affecting the generalizability of the outcomes to the broader textile industry.

4. RESULTS & FINDINGS

4.1 Understanding Sustainability in the Textile Industry

Within the context of the Bangladeshi textile industry, sustainability encompasses a multifaceted approach that integrates environmental, social, and economic dimensions. Respondents, comprising various industry stakeholders, commonly defined sustainability as the harmonious balance between profitability, social responsibility, and environmental stewardship. They emphasized the need to minimize

negative impacts on the environment while ensuring ethical labor practices and maintaining profitability. This collective perception of sustainability underscored the industry's understanding of its interconnectedness and the need for a holistic approach in addressing sustainability challenges.

Organizations prioritize sustainable practices by embedding them into their core values and operational frameworks. This involves defining clear sustainability goals aligned with corporate objectives. Emphasis is placed on integrating sustainability across all facets of the supply chain, from sourcing raw materials to production processes and product lifecycle management. Key initiatives include the adoption of eco-friendly technologies, adherence to ethical sourcing practices, and compliance with international standards for environmental and social responsibility. Prioritizing sustainability aligns with industry-wide commitments to enhance transparency, minimize environmental impact, and improve overall social welfare.

4.2 Challenges and Barriers

The implementation of sustainable supply chain practices in the Bangladeshi textile industry faces a myriad of challenges. Technological limitations pose a significant hurdle, impeding the widespread adoption of eco-friendly processes. Many organizations encounter difficulties in accessing and affording advanced technologies designed for sustainability, hindering their ability to upgrade machinery and infrastructure. Financial constraints emerge as another critical challenge, restricting investments in sustainable technologies and process improvements. Additionally, inadequate governmental support and regulatory frameworks present obstacles to industry-wide adoption of sustainable practices. The absence of clear and consistent regulations often leads to uncertainty and hesitation among organizations to commit fully to sustainability initiatives. Specifically, respondents cited challenges related to the sourcing of eco-friendly raw materials, implementing efficient waste management systems, and establishing supply chain transparency. Overcoming these barriers necessitates collaborative efforts among industry stakeholders, government bodies, and technological innovators to create an enabling environment for sustainable transformations.

Challenges Faced	Specific Barriers
Technological Limitations	Hindered adoption of eco-friendly processes due to limited access to advanced technologies.
Financial Constraints	Inability to afford sustainable technologies and upgrade machinery due to budget limitations.
Inadequate Governmental Support and Regulations	Lack of clear and consistent regulations causing uncertainty in committing to sustainability.
Sourcing Eco-friendly Raw Materials	Challenges in acquiring materials aligning with sustainability criteria.
Implementing Efficient Waste Management Systems	Difficulties in establishing effective waste management practices throughout the process.
Supply Chain Transparency	Struggles in establishing transparency across the entire supply chain.

Source: Developed by Author

4.3 Strategies and Initiatives

Respondents shared a range of successful strategies and initiatives undertaken to promote sustainability within the textile supply chain. Within the textile supply chain, organizations have implemented a range of impactful strategies and initiatives aimed at promoting sustainability. Respondents emphasized the significance of these efforts, showcasing a collective commitment to integrating sustainable practices into their daily operations, thereby fostering positive environmental and social impacts. Investment in Renewable Energy Sources, notably solar power, emerged as a prominent strategy. Organizations are actively reducing reliance on non-renewable energy sources, opting for renewable alternatives to lower carbon emissions. The shift towards solar power to fuel manufacturing processes aligns with the industry's pursuit of enhanced energy efficiency and reduced environmental footprint. Simultaneously, robust recycling and waste reduction programs have been implemented across various

stages of production. These initiatives aim to minimize waste generation, emphasizing practices such as material reuse, optimization of production processes, and efficient waste management. By incorporating these practices, organizations aim to mitigate the environmental impact associated with textile manufacturing. Collaborations with suppliers play a pivotal role in ensuring adherence to ethical standards and sustainability practices throughout the supply chain. Engagements with suppliers are focused on promoting ethical sourcing, responsible production methods, and compliance with sustainability criteria. Through these partnerships, organizations foster transparency, accountability, and ethical conduct, thus contributing to a more sustainable and socially responsible supply chain. Furthermore, the establishment of monitoring systems tracking key performance indicators (KPIs) related to sustainability has been a common practice among organizations. These KPIs encompass metrics associated with energy consumption, waste reduction, and social impact indicators. By implementing robust monitoring mechanisms, organizations can systematically evaluate the effectiveness of their sustainability initiatives. This data-driven approach enables continuous improvement and facilitates informed decision-making, reinforcing the organizational commitment to sustainable practices. Collectively, these strategies and initiatives underscore a proactive commitment among organizations in the textile supply chain to incorporate sustainability as a foundational element of their operations. The investment in renewable energy, waste reduction programs, supplier collaborations, and performance monitoring reflects a concerted effort towards achieving a more sustainable and environmentally responsible textile industry.

4.4 Social and Environmental Impact

Sustainable practices within the Bangladeshi textile industry exhibit notable impacts on both social and environmental dimensions. In terms of social impact, there has been a discernible improvement in worker welfare and working conditions. Organizations that prioritize sustainability often implement measures to ensure fair wages, improved health and safety standards, and opportunities for skill development among workers. Moreover, community engagement initiatives, often part of corporate social responsibility (CSR) programs, contribute to local development and upliftment.

On the environmental front, the adoption of sustainable practices has led to significant positive changes. There's a noticeable reduction in water and energy consumption within manufacturing processes. Implementation of efficient wastewater treatment methods and the reduction of hazardous chemical usage have also led to minimized pollution levels. Additionally, efforts to reduce waste generation, coupled with recycling and upcycling initiatives, have contributed to lowering the industry's overall carbon footprint. These collective environmental efforts underscore a commitment to reducing adverse environmental impacts while advancing sustainable practices within the textile supply chain.

Social Impact	Environmental Impact
Improvement in worker welfare and working conditions	Reduction in water and energy consumption during manufacturing processes.
Ensuring fair wages, improved health, and safety standards	Implementation of efficient wastewater treatment methods, minimizing pollution levels.
Opportunities for skill development among workers	Reduction of hazardous chemical usage, contributing to environmental preservation.
Community engagement initiatives for local development	Efforts to reduce waste generation, coupled with recycling and upcycling initiatives.
Corporate Social Responsibility (CSR) programs uplift local communities	Lowering the industry's overall carbon footprint.

4.5 Collaboration and Future Outlook

Respondents emphasized the pivotal role of collaborative efforts and partnerships in propelling sustainable practices within the Bangladeshi textile industry. These collaborations, spanning industry stakeholders, governmental bodies, non-governmental organizations (NGOs), and academia, have emerged as powerful catalysts in advancing sustainable agendas. Through joint initiatives, stakeholders have fostered a culture of knowledge exchange, shared resources, and collectively developed innovative solutions to tackle sustainability challenges. Industry-wide

partnerships have notably facilitated the dissemination of best practices, promoted technology transfer, and standardized sustainability measures across the textile supply chain.

Looking ahead, respondents identified several key opportunities aimed at further enhancing sustainability within the textile supply chain. Technological advancements stand out as a critical driver for sustainable transformations. Specifically, advancements in eco-friendly manufacturing processes and the utilization of renewable energy sources were highlighted as pivotal in steering the industry towards greater sustainability. The integration of these technologies into operations is envisioned to significantly reduce environmental impact and drive positive change. Increased consumer awareness and demand for sustainable products were underscored as instrumental forces in triggering industry-wide changes. Respondents acknowledged the significance of aligning business strategies with consumer preferences for environmentally conscious and ethically sourced products. This shift in consumer behavior creates a market demand for sustainable practices, incentivizing industry players to prioritize sustainability in their operations. Moreover, respondents emphasized the pivotal role of governmental policy incentives and regulations in fostering and incentivizing sustainable practices within the textile industry. Supportive policies that encourage sustainable initiatives and provide incentives for adoption were deemed essential for industry-wide adoption of environmentally friendly practices.

Additionally, recommendations were made to enhance education and training programs for industry stakeholders. These programs are envisioned to play a crucial role in raising awareness, fostering understanding, and building capacity for sustainable practices. A well-informed and trained workforce is vital in ensuring the successful implementation and continuity of sustainable initiatives, contributing to a more resilient and sustainable textile industry in Bangladesh.

4.6 Opportunities for Improvement

Respondents offered several recommendations to advance sustainability efforts within the industry. They emphasized the need for incentivizing sustainable investments through governmental support, tax incentives, or subsidies. Strengthening collaborations among stakeholders, including industry players, governmental bodies, NGOs, and academia, was proposed to facilitate knowledge exchange and drive industry-wide change. Furthermore, enhancing education and awareness programs for both industry professionals and consumers was highlighted as vital for promoting a culture of sustainability. Overall, the industry's commitment to sustainability, coupled with collaborative efforts, technological advancements, supportive policies, and increased awareness, presents a promising trajectory towards a more sustainable textile industry in Bangladesh. The collective vision is to create an industry that prioritizes environmental conservation, respects ethical labor practices, and remains economically viable while meeting the evolving demands of consumers and global sustainability goals.

5. DISCUSSION

The study of sustainable supply chain methods in the textile sector of Bangladesh emphasizes the several important aspects that are essential for industry stakeholders, policymakers, and sustainability advocates. The results emphasize the progress made by the sector in integrating sustainability concepts, with the goal of addressing environmental, social, and economic issues. The research highlights the dynamic relationship between problems and opportunity. Obstacles such as technology restrictions, financial constraints, and insufficient legal frameworks are substantial barriers to the broad implementation of sustainable practices. Nevertheless, these obstacles also provide opportunities for cooperation, ingenuity, and advocacy for policies. By fostering collaboration among stakeholders, providing government support for technical developments, and implementing tough laws, it is possible to turn difficulties into catalysts for sustainable change. Furthermore, the research highlights the significant beneficial effects of sustainable practices. Sustainability programs demonstrate their transformational impact via the enhancement of worker welfare, improvement of working conditions, reduction of environmental footprints, and upliftment of the community. These results emphasize the pivotal significance of corporate social responsibility (CSR) initiatives in promoting social well-being and environmental conservation. Moreover, the report highlights the crucial significance of technology, customer demand, and government policy in determining the industry's future path. Technological progress in environmentally friendly production methods, growing consumer consciousness about sustainable goods, and favorable government legislation are key aspects that contribute to the industry's sustainability

transitions. Ultimately, the research uncovers a positive outlook for the implementation of environmentally friendly supply chain techniques in the textile sector of Bangladesh. The results indicate the use of collaborative methods, technical breakthroughs, consumer-driven demands, and supporting legislation as crucial factors in promoting sustainability and creating a resilient, socially responsible, and environmentally aware industry.

6. CONCLUSION

The study of sustainable supply chain techniques in the textile sector of Bangladesh reveals a scenario marked by difficulties, prospects, and revolutionary effects. This research reveals a sector undergoing a transformation, dealing with intricate challenges in order to fully adopt sustainability as a core principle. The report highlights the industry's dedication to incorporating sustainability concepts, as seen by its efforts to tackle environmental, social, and economic aspects. Technological restrictions, budgetary constraints, and legislative gaps provide significant obstacles that impede the smooth implementation of sustainable practices. However, these issues provide a favorable environment for cooperative interventions, technology advancements, and lobbying for policies. Furthermore, the report emphasizes the substantial beneficial effects that result from sustainability activities. Tangible effects include improved worker wellbeing, greater working conditions, decreased environmental impacts, and communal upliftment. Corporate social responsibility (CSR) initiatives significantly contribute to promoting social welfare and environmental stewardship. In the future, the sector has the potential to undergo significant changes due to breakthroughs in environmentally friendly production methods, increasing consumer interest in sustainability, and favorable government legislation. The report emphasizes the need of using these factors to further sustainability efforts and cultivate a robust, socially accountable, and ecologically aware textile sector in Bangladesh. Ultimately, the results emphasize a significant change in the Bangladeshi textile sector, demonstrating its progress towards achieving sustainability. The industry's future, defined by sustainability, resilience, and ethical responsibility, relies on collaboration, innovation, customer needs, and regulatory support.

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