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**THE EMPIRICAL STUDY ON SUSTAINABLE MADE IN BANGLA-  
DESH BRAND**

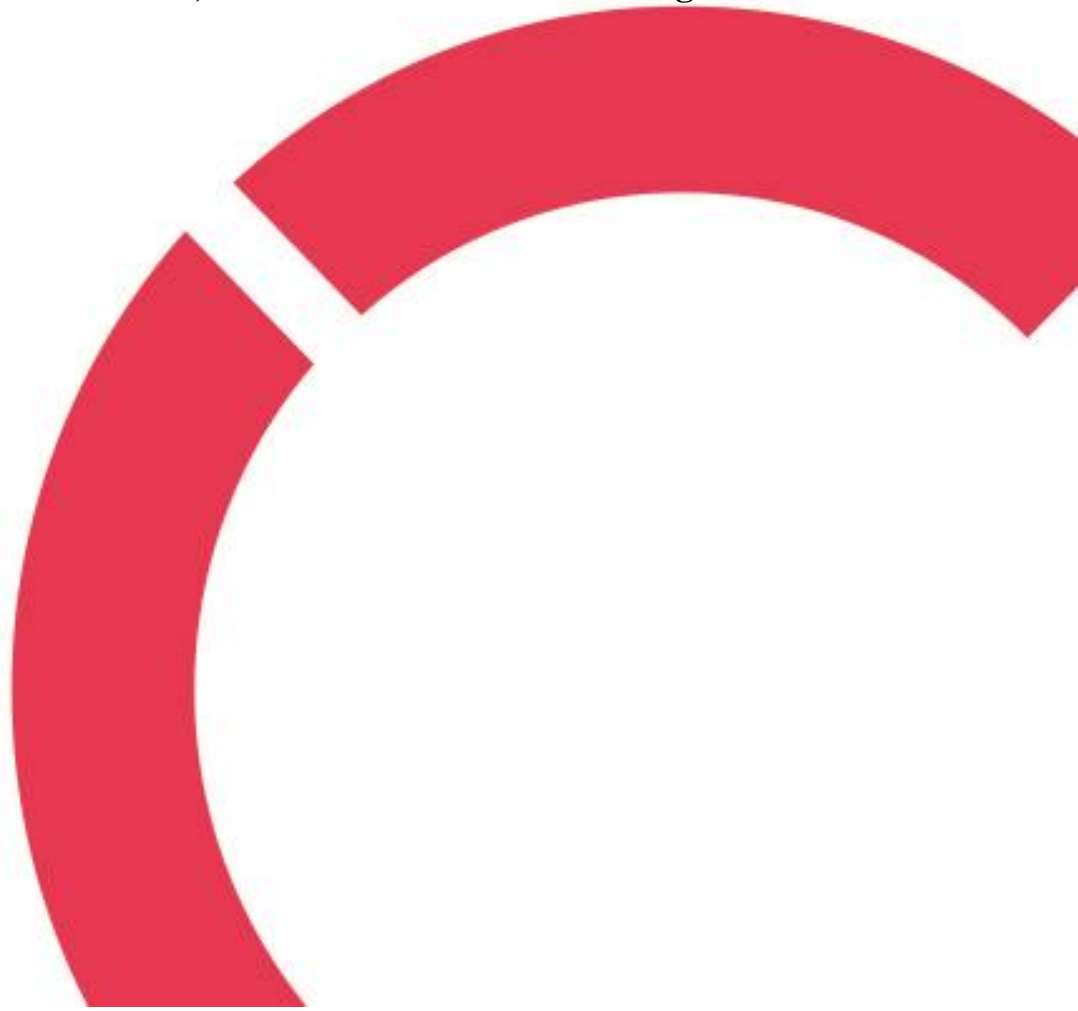
**On manufacturing, marketing, logistic, and export**

**Thesis**

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## ABSTRACT

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<b>Name of Thesis</b> THE EMPIRICAL STUDY ON SUSTAINABLE MADE IN BANGLADESH BRAND. On manufacturing, marketing, logistic, and export		
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<p>The textile and readymade garments industries of Bangladesh have been vanguard of the country's national economic development but they face significant challenges relating to the sustainability. The global demand for sustainable manufacturing practices and the tragic Rana Plaza collapse have intensified the focuses on developing working condition and implanting environmentally friendly practices.</p> <p>The 'Made in Bangladesh' brand is renowned internationally, its numerous contributions in different aspects in the world. The only sign of Bangladesh is in the court of the world is 'Made in Bangladesh' brand. The thesis was about the empirical study on sustainable 'Made in Bangladesh' brand. The aim of the study was to examine the adoption of sustainable manufacturing practice within the Bangladeshi garments and textile industry and analyse the effect of the practices on the industry's export performances and the international perception of the 'Made in Bangladesh' brand. The primary objective was to assess how these practices influenced the industry's export performance. The theoretical framework included sustainability concept, manufacturing, environmental management, and supply chain logistics.</p> <p>A quantitative approach was employed, involving the distribution of structure survey to various stakeholders in the textile and garments industries of Bangladesh. The thesis quantified the rate of adoption of sustainability practices drivers and implementation, assessed and evaluated their impact on export activities and brand perception.</p> <p>Sustainable manufacturing practices are essential for enhancing the Triple Bottom Line (TBL) framework-economic, environmental and social outcomes within the textile and garments industries in Bangladesh. The findings suggested that while some practices bolster performances and brand perception, others may initially hinder performance due to their implementation of challenges. The thesis underscored the implementation of strategic practice implementation and continued evaluations.</p>		

The anticipated outcomes of this thesis were to provide valuable insights that can inform policy, guide industry practices, and simulate further academic research. By focusing on sustainable development, this thesis aimed to contribute to the ongoing discourse on enhancing the global competitiveness and ethical standard of the Made in Bangladesh brand.

Sustainable practices had a mixed effect on export success. Environmental certification and digital marketing initiatives showed positive effects. However, expenditure in sustainable technology and safety training had a negative impact on the high initial cost and implementation challenges. Practices related to the energy efficiency and waste management resulted insignificant cost savings. Improvement in labor practice led to enhance labor satisfaction and safety, contributing to higher productivity and reduce employee turnover. The adoption of sustainable practice significantly improved the international perception of 'Made in Bangladesh' brand, aligning with global consumer expectations.

**Key words**

Bangladesh textile and garments industry, Export performance, Green supply chain management, Labor practices, Market competitiveness, Sustainable manufacturing.

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## 1 INTRODUCTION

This thesis explores the integration of sustainable manufacturing practices within Bangladesh's textile and readymade garment manufacturing industry. More than 100 international apparel clothing and garments items brands directly source from Bangladesh every year to export and supply their brand to more than 150 countries worldwide. Bangladesh's textile and garments sectors significantly contribute to the country's national economy as export earnings and provide employment for 40% of Bangladeshi in total workforce. In response to global sustainability initiatives like the United Nations Sustainable Development Goals, Bangladeshi manufacturers face increasing pressure to adopt environmentally conscious and socially responsible practices. This research aims to bridge the empirical gap in understanding how sustainability is being incorporated into the 'Made in Bangladesh' narrative, particularly post the Rana Plaza collapse, which highlighted critical labor and safety issues. By examining the impacts of these practices on export performance and international brand perception, the study assesses the adoption barriers and drivers, providing insights that could guide policy, shape industry practices, and stimulate further academic exploration in this field.

### 1.1 Background

The textile and garment industry in Bangladesh, transitioning from a jute-dominated economy in the late 1970s to a powerhouse in textiles and garments, has been a pivotal factor in the country's economic development. This sector has driven Bangladesh to the global face as a leading apparel manufacturer, second only to China, due to favourable policies, low labor costs, and better trade agreements with Western countries. However, this rapid growth has brought to light significant sustainability challenges, particularly concerning environmental management and labor practices. The Rana Plaza collapse in 2013, which resulted in over 1,100 dead, underscored the dreadful need for improved working conditions and thrust the sustainability issues within the industry into the international spotlight (Bhattacharya & Rahman 2000).

In today's global economy, sustainability has become a critical agenda, commanded by initiatives such as the United Nations Sustainable Development Goals (SDGs). These developments have placed im-

mense pressure on developing countries like Bangladesh to adopt more sustainable manufacturing processes. The global shift towards environmental consciousness and social responsibility necessitates a reevaluation of operational and strategic approaches by Bangladeshi manufacturers to align with international standards and preserve their competitive edge (United Nations 2015; Kolk 2016).

Despite the accredited importance of sustainable practices in the realm of global manufacturing and trade, there exists a significant gap in comprehensive empirical research focusing on the integration of these practices within the Bangladeshi manufacturing sector. This lack of empirical evidence hinders the ability of stakeholders to comprehend the full scope and implications of sustainability in Bangladesh's pivotal industries (Islam & Deegan 2010).

Given the current global emphasis on sustainability and the critical role of the manufacturing sector in Bangladesh's economy, it is both timely and crucial to explore how sustainable practices are being integrated into the 'Made in Bangladesh' narrative. This thesis aims to bridge the empirical gap, providing a detailed analysis of sustainable manufacturing practices in Bangladesh, their impact on export and logistics, and the overall effect on the international perception of the 'Made in Bangladesh' brand.

## **1.2 Focus and scope**

The increasing scope of the investigation spans the last decade, which has seen substantial and significant shift in global sustainability standard and their related impact on manufacturing practices. This timeframe is particularly relevant and important involving sustainability programs, such as the United Nations Sustainable Development Goal (SDGs), and the industry's response to disastrous event like collapse 2013, which serve as a catalyst for change (United Nations 2015; Yardley 2013; Manik & Yardley 2013).

In terms of the demographics, this thesis will look and examine the board array of stakeholders within the textile and garments industries sectors in Bangladesh, including manufacturers, workers and policymakers, and the international customer and buyers. The group represent a diverse range of interests and viewpoint that are critical for gaining a comprehensive gap of sustainable practice's interrogation. The study will focus on specific themes related to sustainable manufacturing, such as environmental management, labor practices, and supply chain logistics. A strong emphasis will be placed on how this

sustainability is being embraced and adopted and also interrogate into manufacturing process and the barriers and drivers influenced by this adoption. Moreover, the study will explore the impact of how these practices affect Bangladeshi manufacturing export performances and international brand perception of the ‘Made in Bangladesh’ brand.

By defining the parameters, the study aims to provide a focused and in-depth analysis of sustainable manufacturing practices in Bangladesh’s textile and garments industries, providing the insights that can inform policy, guide industry practices, and simulate further academics research in the critical fields.

### **1.3 Relevance and importance**

The interrogation of sustainable manufacturing method and practices within the ‘Made in Bangladesh’ apparel sector represent an important link to both academics and practical realms of sustainable development and international trade. This thesis is motivated by the urgent need to reconcile and resolve rapid industrial growth with environmental sustainability and social responsibility, as highlighted by incident such as the Rana Plaza collapse and the global push towards achieving the United Nations’ Sustainable Development Goal (SDGs), (United Nations 2015; Yardley 2013; Manik & Yardley 3023).

Existing literature, including pivotal works by Bhattacharya and Rahman (2000), and more recent analysis by Islam and Deegan (2010), provide a foundational framework for understanding the evolution and socioeconomic implications of Bangladesh’s garments industries. However, there are still remains a significant gap in empirical study specifically addressing the integration of sustainable practices across this sector, particularly in the context of export performances, logistics and supply chain and international brand perception.

### **1.4 Research question**

The research questions of this thesis are:

- A. How is the textile and garment industry in Bangladesh weaving sustainable manufacturing practices into its core operations, and what unique models of sustainability are emerging in this context?
- B. What comprehensive factors are propelling or hindering the textile and garment manufacturers in Bangladesh towards sustainable practices, and how do these factors interplay with the socio-economic dynamics of the region?
- C. To what extent do sustainable manufacturing practices contribute to the export performance and international competitiveness of Bangladesh's textile and garment sector?
- D. How are logistics and supply chain management being optimized in Bangladesh's textile and garment sector to enhance sustainability, and what innovative strategies are being employed?
- E. How does the integration of sustainable practices into the 'Made in Bangladesh' brand influence its perception in the international market, particularly among environmentally and socially conscious consumers?

## **1.5 Aim of the research**

The aim of this thesis is to conduct an in-depth empirical investigation into the integration, evolution, and outcomes of sustainable manufacturing practices within the textile and garment sector of Bangladesh, with a particular focus on assessing their influence on the sector's export performance, logistic efficiencies, and the international brand perception of 'Made in Bangladesh'. The objectives of this thesis include:

To conduct a comprehensive examination of the current landscape of sustainable manufacturing practices in the Bangladeshi textile and garment industry, highlighting innovative and unique approaches to sustainability.

To dissect the complex web of drivers and barriers affecting the adoption of sustainable practices in the sector, with a focus on economic, regulatory, cultural, and technological factors.

To critically analyze the impact of sustainable manufacturing on the sector's export dynamics, market share, and competitiveness on the global stage.

To investigate the role of logistics and supply chain management in bolstering sustainable practices within the industry, identifying key areas of improvement and successful strategies.

To assess how sustainability efforts within the sector are reshaping the international image of the 'Made in Bangladesh' brand, particularly in terms of consumer trust, market appeal, and ethical considerations.

## **1.6 Overview of the structure**

This study is structured to provide a comprehensive examination of the integration of sustainable practices within Bangladesh's textile and garment manufacturing sector, aligning with the study's objectives and central aim.

Chapter one sets the foundation by detailing the background and significance of sustainability in the context of Bangladesh's economic and industrial development, emphasizing the pivotal role of the textile and garment industry. It lays out the research questions and objectives, establishing the scope and relevance of the study.

Chapter two delves into a critical review of the existing literature, highlighting previous studies on sustainable manufacturing, global sustainability trends, and their intersection with the Bangladeshi manufacturing landscape. This chapter aims to contextualize the research within the broader academic discourse, identifying gaps the current study seeks to fill.

Chapter three outlines the methodology employed in this empirical study, including research design, data collection methods, and analytical approaches. This chapter ensures the research is grounded in robust methodological practices, enhancing the credibility and reliability of the findings.

Chapter four presents the empirical findings related to the integration of sustainable practices in Bangladesh's textile and garment sector. It systematically addresses the research questions, offering insights into the current state of sustainable manufacturing, the drivers and barriers to its adoption, and its impacts on export performance and brand perception.

Chapter five discusses the implications of these findings, linking them back to the theoretical framework and existing literature. This chapter critically evaluates the outcomes considering the research objectives, exploring the broader implications for stakeholders, policy, and future research directions.

Chapter six concludes the thesis by summarizing the key findings, contributions to the field, and practical implications. It also outlines potential limitations of the study and suggests avenues for future research, aiming to inspire continued exploration of sustainable practices in the manufacturing sector, particularly within developing economies like Bangladesh.

## **2 THEORETICAL FRAMEWORK**

Theoretical framework review examines the evolution and challenges of sustainable manufacturing practices within the Bangladeshi garments and textile industry, which stand as a cornerstone of national economy and significant employer. As global demand of environmental stewardship and social responsibility intensify, Bangladeshi manufacturers face increasing pressure to adapt and innovate.

This section delves into scholarly works that explore diverse aspects of sustainability in the textile and garments from technological advancement and marketing strategies to border economy, social and environmental impacts. The aim of the theoretical framework is to outline the current state of sustainable practices, the barriers to their adoption, and the potential pathways that could help align Bangladesh's garments industry with international sustainability standard. This review synthesizes findings from recent studies to provide a comprehensive understanding of the challenges and opportunities that shape the sustainability landscape in Bangladesh's textile and ready garments industry.

### **2.1 Sustainable manufacturing in Bangladesh**

The garments industries in Bangladesh are not just a major economic driver in Bangladesh but also significant employer as well as this industry is an internationally remarkable identity for Bangladesh. With the rapid growth, however, come challenges of sustainability that are crucial to address, both from an environmental and social standpoint. The global movement for environmental and ethical consumption emphasizes the importance of sustainable practices in the industry. Asif (2017), in their seminal work highlight the progress made in adopting sustainable manufacturing practices within Bangladeshi garments and textile factories. Their study focuses on initiatives like improve energy efficiency technology and waste reduction techniques. These practices not only align with the global sustainability goals, but also increase and developing long term cost effectiveness.

However, it is very natural that proper and appropriate wastewater management guarantees the quality of wastewater discharged into public water systems including lakes, rivers and canals. It involves the reduction of biodegradable organics, suspended sediments and harmful.

Salam, and Senasu (2019) They closely look at the technological adaptations that are settings new benchmarks for reducing the environmental impact. They also noted significant advancements in cleaner production techniques among the larger manufactures with the capital to invest in high-cost technologies. These include water recycling systems, energy efficient machinery, beside this procedure assessed various waste and wastewater treatment technique used to determine industry's or facility's responsibility. And waste management systems that significantly lower ecological footprint of production and manufacturing processes.

Despite of these advancements, a considerable segment of textile and garments industry of Bangladesh, particularly small and medium enterprises (SMEs) remains behinds the carve and remarkable limitations due to financial constraints and the lack of technical expertise, the initial high investment costs for sustainable technologies and the ongoing expenses associated with the training and maintenance are substantial barriers. Moreover, there is a significant gap in awareness about the long-term economic and environmental benefits of these investment, which hinder their adoption.

## **2.2 Marketing strategies for 'Made in Bangladesh'**

The branding and logo of 'Made in Bangladesh' carries connections that can be often detrimental and demanding to market positioning especially in the western markets. Rahman, Hossain, and Hossain, G.M.S. (2019) discuss how negative stereotypes often related and associated with labor practices and environmental concern impact brand identity.

Digital marketing plays a key role in promoting sustainable development according to the current world of study and research internationally, digital marketing promotes the economic, social and environmental development of enterprise through innovative technology and strategy which is align with the sustainable marketing. Jiani Xia (2024), outlined a transformative approach and highlighted the promise of how industries are industries and brands can be internationally recognized for their sustainable practices that can also suitable for Bangladeshi brand also, further explore the role and significance of digital marketing in repositioning Bangladeshi products in the global market. Companies can directly communicate with the international marketplace and platforms like social media, companies can also offer directly to their audiences with providing transparency, Mudi, Raut, R., Narkhede, B.E.

and Shee, H., (2022), in their research and findings suggest that a well strategized digital presence can significantly amplify the visibility of sustainability efforts and reshape consumer perceptions.

### **2.3 Export challenges and opportunities**

The global market increasingly inclined towards products that meet high environmental and social standards. Ginting, Razzaque and Hasan (2024) examine the challenges and barriers that Bangladeshi exporters conflicts, especially the stringent requirements of markets in Europe and North America. These range from the need for certifications proving sustainable practices to socioeconomic conditions under which items and products are made in our manufacturing system.

The authors call for enhance financial support from the government for manufacturers meet the international standard through subsidies, with also training, and infrastructural improvement. Islam and Chowdhury (2021) identify potential and possible growth opportunities in less saturated markets like Africa and South America. These regions present new opportunities where the demand for sustainable products is increasing but comprehensive pressures are less intense compare to traditional markets. This strategic development and expansion could allow Bangladeshi industry's manufacturers to diversify their market base and reduce reliance on the highly competitive Western Market.

### **2.4 logistics and supply chain sustainability**

Teixeira, Assumpção, Correa, Savi and Prates (2018) focus on the logistics component and aspect, which is maintaining the integrity and capability of sustainability claims. They explore how investment in green logistics such as eco-friendly transportation and energy efficient warehousing system can reduce and minimizing the operational cost and supply chain's environmental impact. Such practices are essential not for only carbon footprint reducing rate, but also but also developing and enhancing the overall efficiency of the supply chain.

Mudi, et al (2022), addresses the increasing need for transparency in the supply chain, its uses extant beyond the straightforward idea of purchasing and selling in public and private sectors, but it is also

ultimately impact and transform how these vital industries may operate more effectively and more secure way than traditional business. Blockchain technology enhances supply chain performance through traceability, transparency and reliability through tracking and regulatory compliance reporting, which is a key factor in maintaining customer trust. The adoption of technologies like blockchain can significantly improve traceability, allowing consumers to track the lifecycle of a product from production and manufacturing to purchase. This transparency is crucial in combatting issues like counterfeit products and ensuring compliance with labor standards.

The literature on sustainable practices in Bangladesh's garments and textile sector highlights a complex landscape of advancements and ongoing challenges. While there are significant strides in manufacturing technology and marketing strategy that promote sustainability, barriers such as financial constraints, technical knowledge, and global competition remain formidable. Addressing these difficulties requires a multifaceted approach that includes government involvement, industry partnership and collaboration, and ongoing innovation. As Bangladesh continues to develop its sustainable path, the global market's response will play an important part in modeling the future of these essential industries.

## **2.5 Defining the research problem**

Despite being a global leader in garments manufacturing, Bangladesh confronts significant obstacles in exploring sustainable techniques in textile and garments industries. Rapid industrial advancement, while economically beneficial, has had significant environmental and social implications. The business industries are plagued by concerns such as poor working conditions, environmental deterioration, and a failure to comply with international labor and environmental standards, as evidenced by the Rana Plaza collapse in 2013. These difficulties impact not just the local environment, workforce and manpower, but also the international perception of the 'Made in Bangladesh' brand. There is a considerable lacuna in empirical research specifically examining how sustainable practices are being integrated within the Bangladeshi industrial manufacturing framework. Current studies and research have primarily focused on descriptive analysis or case studies without extensive empirical validation. This gap hinders comprehensive understanding and effective policymaking, which are crucial for advancing sustainability in this important economic sector.

Internationally, there is increasing the demand for sustainability products driven by consumer awareness and regulatory changes. Locally, the need to developing production and manufacturing practices in critical to ensure the safety and wellbeing of millions of workers and the sustainability of environment. How Bangladesh responds to these demands and challenges has significant implications not only for its own economic improvement but also for its standing in the global market. While there have been initiatives and some adoption of sustainable practices in the large-scale of manufacturing units small and medium sized industries (SMEs) are failing behind due to various barriers such as financial restrictions, lack of technical knowledge, and limited access to sustainable technology.

Given the critical role of the garment and textile industries in Bangladesh's economy as well as increasing the national and international demand for sustainable production, this study seeks to empirically as well as by providing all information relating to this thesis will investigate the integration of sustainable manufacturing practices present situation of the throughout the industry. It aims to assess the current landscape, identify drivers and barriers to the adoption of sustainable practices, and evaluate their influence on export performance and international brand perception of the 'Made in Bangladesh' brand. This thesis will provide a detailed analysis that could inform policy, guide industries practices and simulate further studies in in the vital area.

## **2.6 The Triple Bottom Line (TBL) theory**

The triple bottom line (TBL) theory introduced by John Elkington in the 1990s, expands the traditional framework of business success beyond financial performance to include social and environmental dimensions. This strategy, frequently embodied in the slogan "people, planet, profit," emphasizes the importance of businesses balancing economic growth, with the social equality and environmental care. The TBL framework has become a cornerstone of sustainable practices, arguing for a comprehensive approach that consider the cross-border implication of economic activities.

The framework of the Triple Bottom Line theory includes people, planet, and profit. The people focus is for social sustainability aspects, emphasizing the fair and profitable and beneficial practices within the labor and communities. Planet centres on environmental sustainability managing natural resources wisely, and minimizing ecological impact. Profit pertains to economic success, ensuring the organization is economically viable and efficient.

### **2.6.1 Economic sustainability**

Economic sustainability focuses on the financial performances of an organization, ensuring it remains profitable and comprehensive while also contributing to the border economy. Where the key aspects include:

Relevance to the textile and garments industry:

In the context of Bangladeshi textile and garments sector, economic sustainability involves assessing how sustainable manufacturing practices can enhance export performance, reduce operational costs, and improve overall profitability. Studies such as Rahman et al. (2019) highlight the cost benefits of adopting energy-efficient technologies and waste reduction technique.

### **2.6.2 Environmental sustainability**

The second element of the TBL theory describes the roles and responsibility of a business organization towards the environment. The climate is changing and environmental pollution is ever increasing. Business organizations can take part in environmental protection following the framework discussed below as per the TBL theory. Some key aspects are:

Resource Management: Efficient use of natural resources like water, energy, and raw materials.

Pollution Reduction: Initiatives to lower emissions, manage waste, and reduce pollutants.

Ecosystem Preservation: Practices to protect biodiversity and ecosystems.

Relevance to the Textile and Garment Industry:

Bangladeshi garment industries have a significant impact on the environment of the country. Especially the dyeing process involved in these industries is a great offender to the river bodies and marine life. By incorporating effective liquid treatment plants and air treatment plants and by keeping them functioning over time can significantly reduce the environmental impacts of such industries. Teixeira et al. (2018) described the importance of adoption of green technology in every step in these factories. By proper implementation of the concepts of the TBL theory, the environmental impacts of the textile and garment industries can be reduced to a satisfactory level.

### **2.6.3 Social sustainability**

The last element discussed by the TBL theory is the people. It covers the social responsibilities of a business organization. By ensuring the following principles, the social responsibilities of a business organization can be implemented:

**Labor Practices:** Ensuring fair wages, safe working conditions, and workers' rights.

**Community Engagement:** Contributing to local communities through social initiatives, education, and health programs.

**Equity and Inclusion:** Ensuring equal chances to everyone involved.

**Relevance to the Textile and Garment Industry:**

Several human right organizations and some of the media in Bangladesh have repeatedly mentioned the violence of labor law practices in garment and textile industries. According to the allegations, the industry owners are unwilling to provide minimum wages to the factory workers, deprive them of their basic human rights, and presented with improper working conditions. While such allegations are yet to be validated, companies can still strengthen their roles in protecting the social rights of the employees. To do that the textile and garments industries in Bangladesh can implement the principles of the TBL theory covering the social responsibilities. That way, the companies can be benefitted in the long term by achieving loyalty of the employees and improving the global perception of the company brands (Bhattacharya & Rahman 2010).

## **2.7 Application of TBL theory in sustainable manufacturing**

TBL theory provides a fresh perspective of the roles and responsibilities a business organization should have. The principles of this theory can be implemented in the sustainable manufacturing segment to enhance their economic and social outputs while also protecting the environment. First, sustainable manufacturing can be achieved by introducing green technologies in the process of manufacturing. Waste materials should also be handled with environmental protection in mind. But introducing such technologies can have significant upfront costs.

However, as per the findings of Asif (2017), green technologies can prove to be even more financially beneficial in the long term. Green technologies in manufacturing settings can have considerable impact on reducing carbon foot-prints of a manufacturing plant as well (Rahman et al. 2018). Secondly, business organizations should also ensure implementation of labor laws in every step possible.

The TBL theory emphasizes on the notion that workers should not be deprived of their rights. As pointed out by Bhattacharya and Rahman (2000) by protecting the rights of the workers, companies can improve their sustainability. Through focusing on the rights of the workers, a company can improve the employee satisfaction. It was established by these studies that satisfied employee can outperform a dis-satisfied employee in the long term and thus can play roles in the sustainability of the company. Considering all these, it can be said that by providing a comprehensive framework to focus on the environment and social factors, TBL theory plays a critical role in the field of sustainable manufacturing.

### **3 RESEARCH METHODOLOGY**

This chapter describes the methodology used to investigate and explore sustainable manufacturing practices within the Bangladeshi textile and readymade garments industries. The study, which is based on the Triple Bottom Line (TBL) framework, takes a quantitative approach to collect information and data for analysis, ensuring robust measurable, and replicable outcomes. To detailed explanation of how the research questions were operationalized practically, a through descriptions of the data collection procedure and method is provided including survey sampling method and statistical tools were use for the analysis of this thesis.

This methodology section also emphasizes the ethical consideration used throughout the research process, and also emphasizes the commitment to maintaining the high standard of research integrity and participant privacy. Through the principal structured of this study, this thesis aims to provide a comprehensive evaluation of sustainable practices adopted by the industries and identifying major drivers, barriers and their and their overall impact of economic, environmental and social outcomes.

#### **3.1 Research design**

Quantitative research was chosen for this thesis to process and analyse the data. This method was selected for its ability to provide objective, measurable insights into complex phenomena. It allows for statistical analysis to determine the strength and nature of relationship between variables (Jarausc & Hardy 2016). This approach is also conducive to generalizing findings across the textile and garment industry in Bangladesh, which is essential for informing policy and industry practices.

#### **3.2 Quantitative methods: operationalization and measurement**

Sustainable practices were operationalized through dimensions such as environmental management (e.g., waste reduction, energy efficiency), labor practices (e.g., worker safety, fair wages), and supply chain logistics (e.g., green logistics, transparency). Variables were measured using scales developed or adapted from existing literature.

### 3.3 Sampling method

Stratified random sampling was employed to ensure representation from different sectors of the industry, including large enterprises, SMEs, and different geographical locations within Bangladesh. Companies were selected based on annual turnover, number of employees, and their involvement in export activities to ensure a diverse sample that reflects the industry's extent.

### 3.4 Tools and procedures of surveys

Questionnaires were carefully designed to include multiple-choice questions and Likert scales for assessing the presence and extent of sustainable practices, perceived barriers, and their perceived impact on business outcomes. Surveys were distributed using a combination of online platforms and in-person distribution where necessary, especially in regions with limited internet access.

The target sample size was determined based on power analysis to ensure sufficient statistical power to detect meaningful effects. Efforts were made to achieve a high response rate through follow-ups and incentives for participation. To determine the sample size required for this study, I aimed to detect a medium effect size (Cohen's  $d$ ) of 0.5 with a significance level ( $\alpha$ ) of 0.05 and a power ( $1 - \beta$ ) of 0.80.

The sample size calculation involves the following steps:

1. Z-Scores for  $\alpha$  and  $\beta$

The significance level ( $\alpha$ ) of 0.05 is a two-sided test, requiring us to consider  $\alpha/2$  for each tail. The corresponding Z-score is the critical value where the cumulative distribution of the standard normal distribution is  $1 - \alpha/2$ . For power ( $1 - \beta$ ) of 0.80,  $\beta$  is 0.20. The Z-score here is the critical value where the cumulative distribution equals the power.

2. Calculating the Z-Scores

For  $\alpha = 0.05$  (two-sided),  $Z_{\alpha/2}$  is the Z-score at the 97.5th percentile of the normal distribution, approximately 1.96. For  $\beta = 0.20$ ,  $Z_{\beta}$  is the Z-score at the 80th percentile of the normal distribution, approximately 0.84.

### 3. Sample size formula

The formula for the sample size needed to detect an effect size with equal variance and sample size:  $n = 2[(Z_{\alpha/2} + Z_{\beta})/\text{Cohen's } D]^2 = 2[(1.96 + 0.84)/0.5]^2 = 62.72 \approx 63$

Therefore, to detect a medium effect size of 0.5 with a significance level of 0.05 and a power of 0.80, the study requires approximately 63 participants.

### 3.5 Data collection

The collected data using surveys designed to measure the economic, environmental, and social indicators of the TBL framework. To achieve these aims, quantitative data is necessary to measure the extent of sustainable practices across different industry segments, quantify the relationship between sustainable practices and key business outcomes like export performance and brand perception, and identify patterns and trends that can be generalized to the broader industry. The data included general information and information on environmental, social, and economic sustainability, as well as export and brand perception, and barrier, drivers and future plans.

### 3.6 Data processing

Data was rigorously prepared by checking for completeness, handling missing values through imputation or exclusion based on the pattern of missingness, and managing outliers through cleaning or removal, depending on their impact on the analysis. Descriptive statistics were used to summarize the data.

### 3.7 Ethical consideration

The voluntarily consent statement to participate of the survey, with the option to withdraw at any time without any consequence. All the collected data and informations including survey responses and transcripts of participant's identity were highly confidentiality. Its mean identity of all the participant were anonymized to identified individual participants or responses. The respects for the autonomy, dignity,

position in the industries and privacy of all participant were respectfully maintained throughout the whole of entire data collection procedure. It was ensured that interaction with participants were sensitive and not in intimidation. All of the stapes for the survey and data collection were taken to minimize any potential discomfort and or harmful for participants.

This involvement of participations to on the survey ensuring that survey questionnaire were non-intrusive and do not make any unnecessary stress or emotional harm. Participants were treated fairly with equality without any discrimination based on gender, age, ethnicity in their workplace designation or socioeconomic position. The research process, including data collection, analysis and reporting was within the honesty integrity and transparency. Any conflicts of interest stated and the findings were accurately represented without manipulation or bias.

## 4 RESULTS AND FINDINGS

This chapter contains the results and findings of a survey conducted among 63 participants from the practical based background of Bangladeshi readymade garments and textile industries, also manufacturing, international marketing, supply chain and logistics, and export sectors.

These results shed light on the current landscape of sustainable practices within the industries, categorizing the data and information by organizational size, sector of their industries, operational duration, and export proportion. Additionally, in details and comprehensive distribution based on respondent's opinion on economic, environmental and social sustainability investigated. Each figure and table offer breakdown of the key indicators from Triple Bottom Lin (TBL) framework, providing insights into the adoption rates of sustainability practices, the perceives barriers and drivers of sustainability, and the aim intention of the organizations regarding their sustainability strategy.

This structured of data presentation attempts to provide a practical image of details and comprehensive reflection of how sustainability interrogates into the fabrics of Bangladeshi textile and garments industries, reflating on current situations and prospective developments.

### 4.1 Distribution of respondents based on organization's size

Figure 1 presents the distribution of respondents based on the size of their organizations from where the participants were selected, with a total sample size of 63 participants within the online survey. The categorization of organizational size of survey participants was divided into three groups based on the organization of employee's amount: small sized organization, medium sized organization, and large organizations.

Small Organizations are companies those have 1-50 employees: This group represents the largest proportion of respondents. Out of the total 63 respondents, 32 belong to small organizations, accounting for 50.79% of the sample. This indicates that half of the respondents are employed in smaller establishments, suggesting a significant representation from this sector.

Medium Organizations are companies those have 51-250 employees: The second group includes respondents from medium-sized organizations. There are 23 respondents in this category, making up 36.51% of the total. This substantial proportion highlights the relevance of medium-sized enterprises in the sample, though not as predominant as the small-sized ones.

Large Organizations are companies those have more than 251 employees: The final group comprises respondents working in large organizations. With 8 respondents, this category constitutes 12.70% of the total sample. While this is the smallest group, it still provides valuable insights into the experiences and perspectives of those in larger corporate environments.

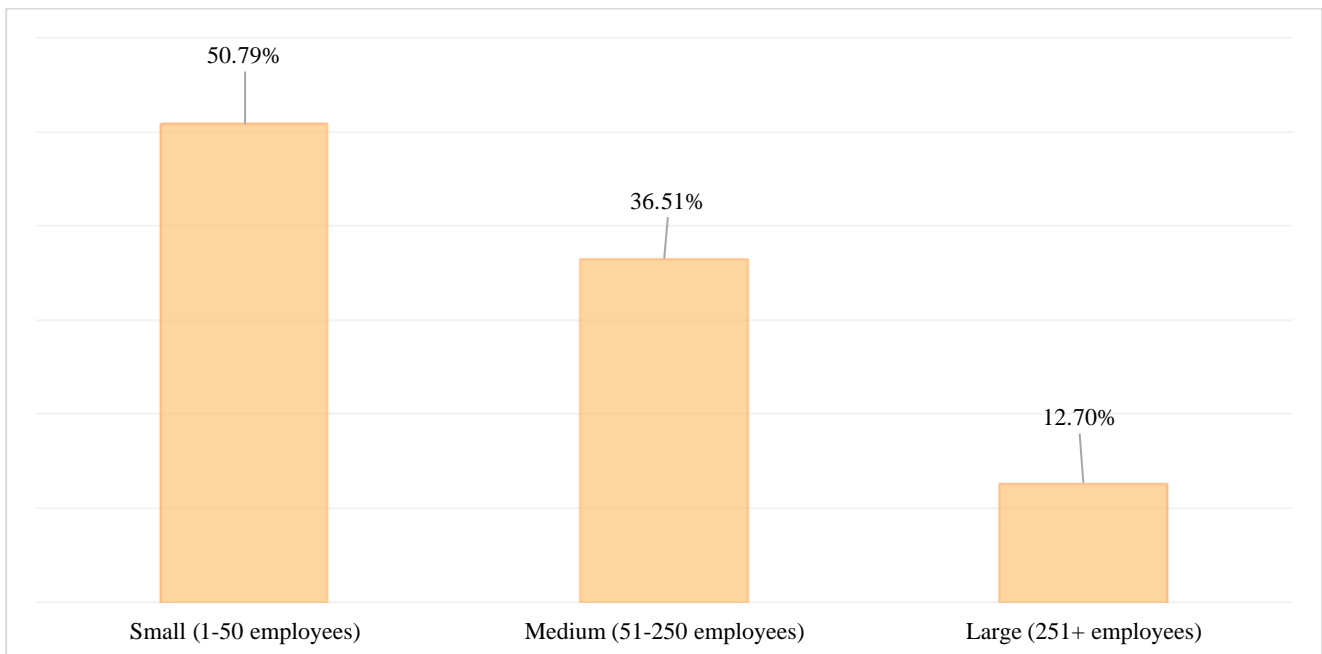


FIGURE 1. Distribution of the respondents according to the size of their organization (n=63).

## 4.2 Distribution of respondents based on organization

Figure 2 illustrates the distribution of respondents according to the sector of their organizations, with a total sample size of 63 participants. The sectors are categorized into three distinct groups: textile manufacturing industries, garment manufacturing industries, and both of textile and garments industries.

This sector of textile manufacturing industries includes organizations solely focused on textile manufacturing. There are 19 respondents from this sector, which accounts for 30.16% of the total sample. This indicates that nearly one-third of the respondents are employed in the textile manufacturing industry, highlighting its significance in the overall sample.

The largest proportion of respondents comes from the garment manufacturing industries sector of Bangladesh. Out of the total 63 respondents, 27 are employed in this sector, representing 42.86% of the sample. This substantial proportion suggests that garment manufacturing is the most represented sector among the respondents.

The final group consists of respondents whose organizations operate in both textile and garment manufacturing industries of Bangladesh. There are 17 respondents in this category, making up 26.98% of the total. This indicates that a notable portion of the respondents work in organizations with a diversified focus on both textile and garment manufacturing.

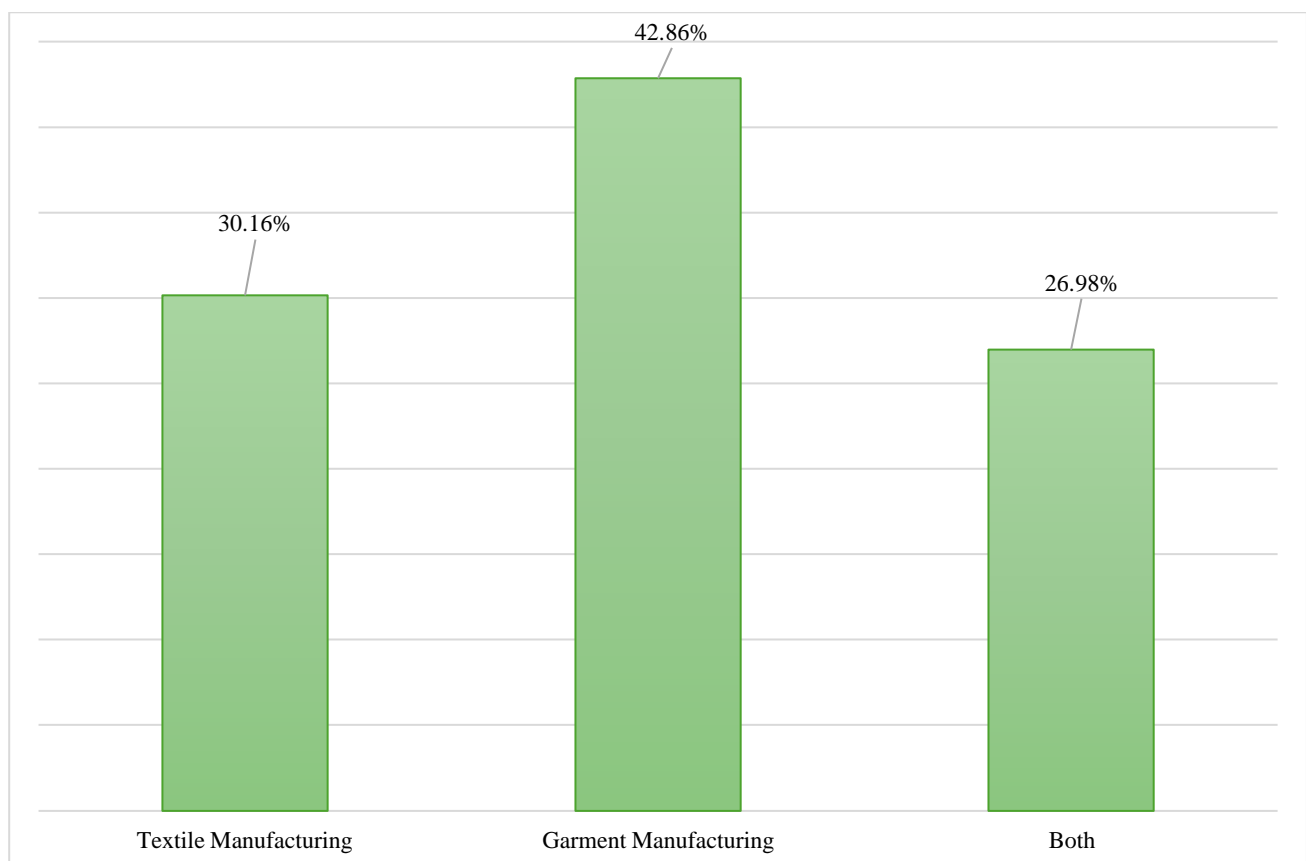


FIGURE 2. Distribution of the respondents according to their organization sector (n=63).

### **4.3 Distribution of respondents based on organization's duration of operation**

Figure 3 presents the distribution of respondents of survey in this thesis based on the duration of the organizations' operations, with a total sample size of 63 participants. The duration of work and service for organization is categorized into three groups: less than 5 years, 5-10 years, and more than 10 years.

Less than 5 years is the first category, this category includes some organizations that have been in operation for less than 5 years. There are 14 respondents from several industries in this group, accounting for 22.22% of the total sample. This indicates that over one-fifth of the respondents are employed in relatively new organizations, reflecting the presence of emerging businesses within the sample.

The second category consists with organizations that have been operating for 5 to 10 years. There are 22 respondents from this group, this organizations are representing 34.92% of the total sample. This substantial proportion suggests that a significant number of respondents work in organizations that have established themselves over the past decade.

The final category of the survey includes organizations that have been in operation for more than 10 years. With 27 respondents from individual industries, this group constitutes 42.86% of the total sample. This indicates that the largest proportion of respondents are employed in long-established organizations, reflecting the stability and longevity of these businesses.

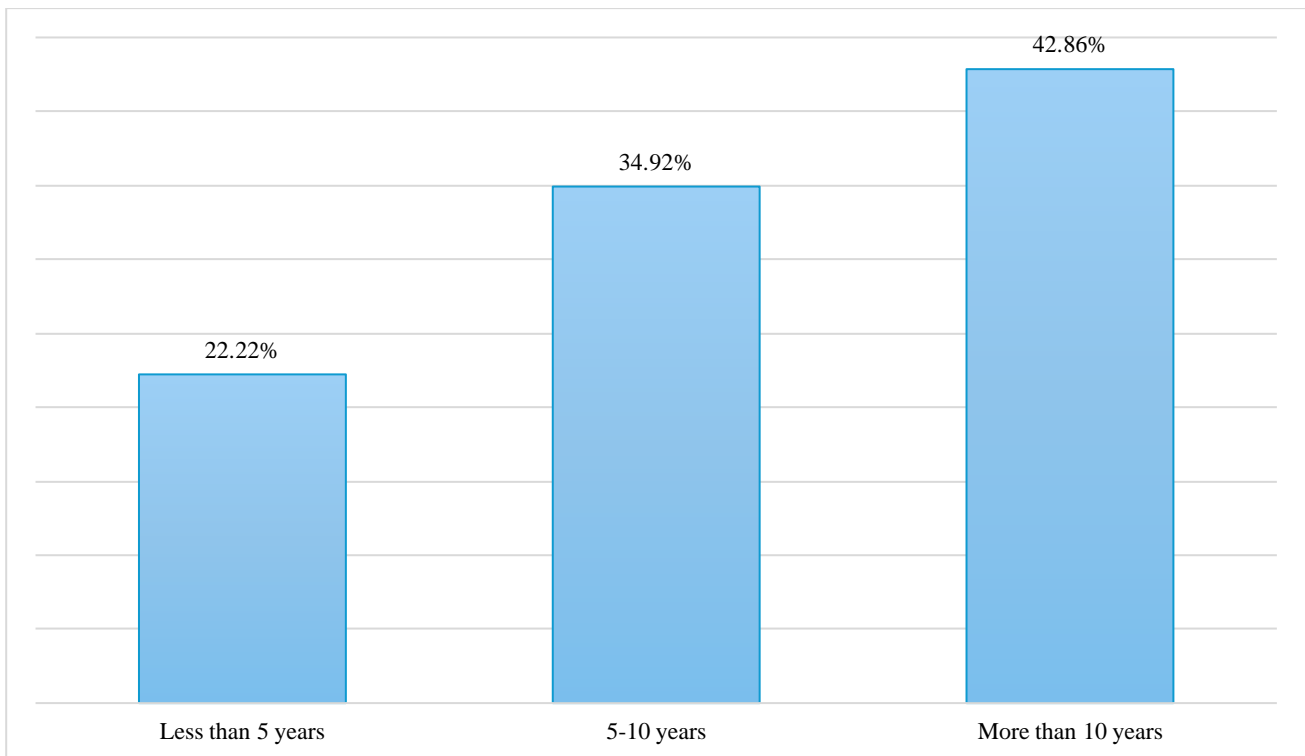


FIGURE 3 Distribution of the respondents according to the duration of their organization operation (n=63).

#### 4.4 Distribution of respondents based on organization's turnover

Figure 4 illustrates the distribution of respondents based on their organization's annual turnover, with a total sample size of 63 participants from the online survey. The annual turnover is categorized into three groups: first one's turnover annual less than \$1 million, then \$1 million to \$10 million, and the last one's annual turnover more than \$10 million.

Organizations with an annual turnover of less than \$1 million comprise the largest group, with 39 respondents accounting for 61.90% of the total sample, indicating a significant representation are from of smaller-scale businesses.

The second category consists of organizations with an annual turnover ranging from \$1 million to \$10 million, represented by 19 respondents, making up 30.16% of the sample, suggesting a considerable number of mid-sized organizations.

The final category includes organizations with an annual turnover of more than \$10 million, with 5 respondents constituting 7.94% of the sample, indicating a smaller proportion of high-revenue businesses.

In summary, the distribution shows that most respondents are employed in organizations with an annual turnover of less than \$1 million, followed by those in organizations with a turnover of \$1 million to \$10 million, and the least representation from organizations with a turnover of more than \$10 million. This distribution provides a comprehensive overview of the varying financial scales of the organizations represented in the sample, highlighting a mix of small, mid-sized, and large businesses.

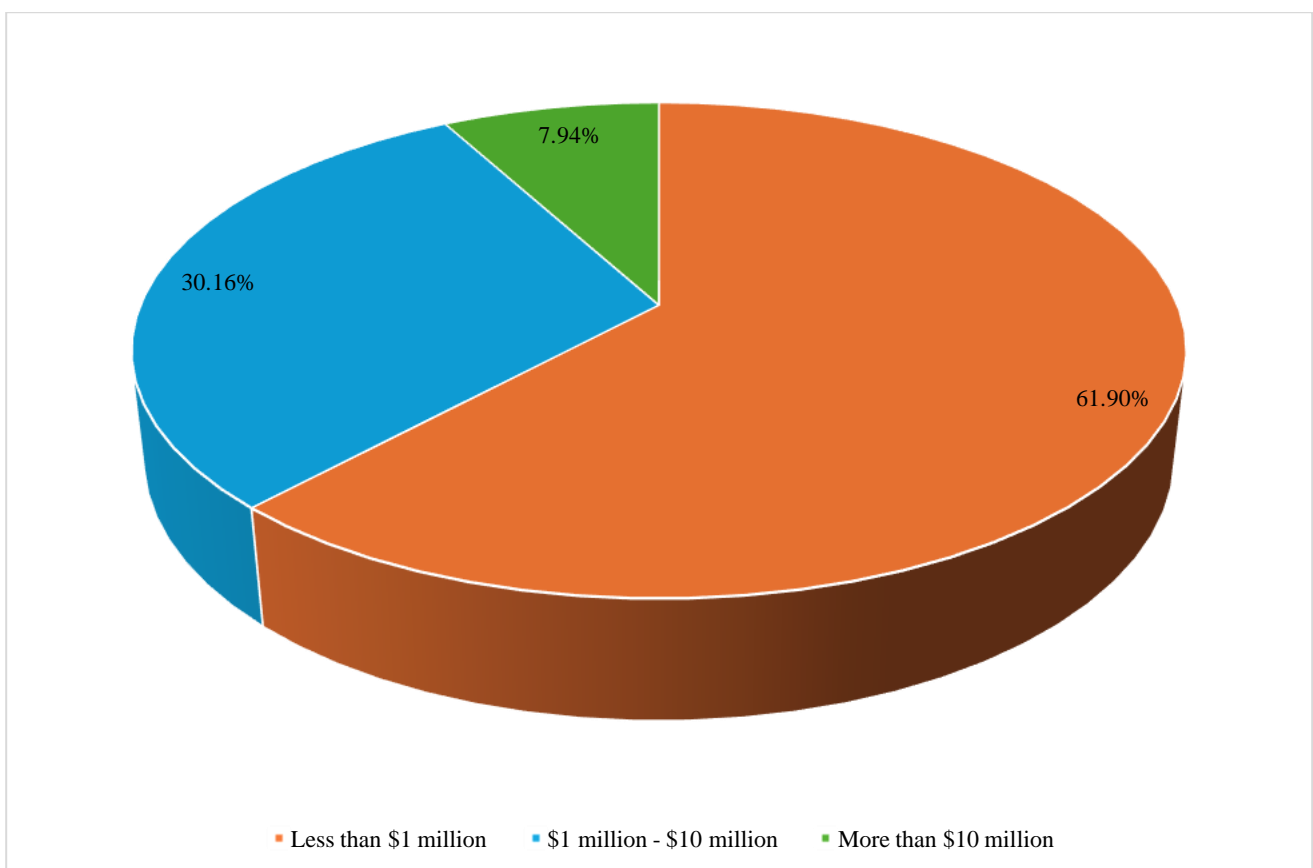


FIGURE 4. Distribution of the respondents according to their organization's annual turnover (n=63).

#### 4.5 Distribution of respondents based on organization's export percentage

Figure 5 illustrates the distribution of respondents according to their organization's export percentage, with a total sample size of 63 participants. The export percentage is categorized into three groups, first

of all, export percentage of less than 25%, then from 25% to 50%, and more than 50% as final categories.

Organizations with an export percentage of 25% to 50% represent the largest group, with 35 respondents accounting for 55.56% of the total sample, indicating a significant proportion of organizations moderately engaged in export activities.

The second category consists of organizations with an export percentage of more than 50%, represented by 16 respondents, making up 25.40% of the sample, suggesting a notable presence of highly export-oriented businesses.

The final category includes organizations with an export percentage of less than 25%, with 12 respondents constituting 19.05% of the sample, reflecting the smallest proportion of organizations with minimal export activities.

In summary, the distribution shows that most respondents are employed in organizations with an export percentage of 25% to 50%, followed by those with more than 50%, and the least representation from organizations with less than 25%. This distribution provides a comprehensive overview of the varying degrees of export engagement among the organizations represented in the sample, highlighting a mix of low, moderate, and high export-oriented businesses

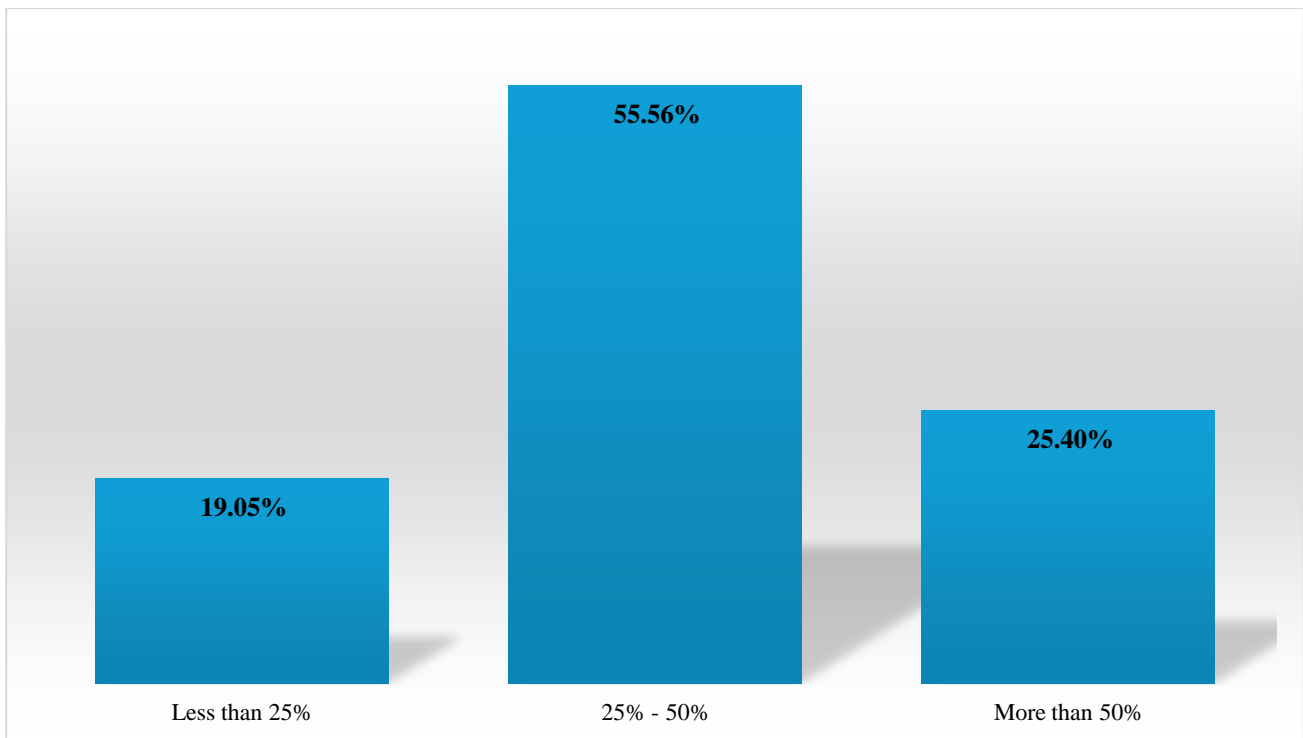


FIGURE 5. Distribution of the respondents according to their organization's export percentage (n=63).

#### 4.6 Distribution of respondents based on organization's environmental sustainability

Table 1 presents the distribution of respondents according to their responses on various aspects of environmental sustainability within their organizations, with a total sample size of 63 participants. The table includes ten statements, each with a "Yes" or "No" answer option.

For the implementation of energy-efficient technologies in organization, 39 respondents (61.90%) reported affirmative, while 24 respondents (38.10%) did not. Regarding waste reduction strategies, 42 respondents (66.67%) confirmed their presence, whereas 21 (33.33%) did not. Only 26 respondents (41.27%) indicated that their organizations recycle water used in the manufacturing process, while 37 (58.73%) reported otherwise.

For green logistics practices, 28 respondents (44.44%) affirmed adoption, with 35 (55.56%) not adopting such practices. Compliance with environmental regulations and standards was high, with 45 respondents (71.43%) affirming and 18 (28.57%) denying compliance. Regular environmental impact

assessments are conducted in 41 organizations (65.08%), while 22 (34.92%) do not conduct them. Renewable energy sources are used in 28 organizations (44.44%), whereas 35 (55.56%) do not use them. Regarding the use of biodegradable or recyclable packaging materials, 29 respondents (46.03%) confirmed their use, while 34 (53.97%) did not.

A dedicated team or department for managing environmental sustainability exists in 36 organizations (57.14%), whereas 27 (42.86%) do not have such a team. Lastly, 32 respondents (50.79%) reported participation in environmental certification programs, while 31 (49.21%) did not.

Sl.	Statement	Answer options			
		Yes		No	
		Freq.	Perc.	Freq.	Perc.
1	Organization implements energy-efficient technologies	39	61.90%	24	38.10%
2	Organization has a waste reduction strategy in place	42	66.67%	21	33.33%
3	Organization recycle water used in the manufacturing process	26	41.27%	37	58.73%
4	Organization adopted any green logistics practices (e.g., eco-friendly transportation, energy-efficient warehousing)	28	44.44%	35	55.56%
5	Organization complies with environmental regulations and standards	45	71.43%	18	28.57%
6	Organization conducts regular environmental impact assessments	41	65.08%	22	34.92%
7	Renewable energy sources (e.g., solar, wind) used in manufacturing processes	28	44.44%	35	55.56%
8	Organization use biodegradable or recyclable packaging materials	29	46.03%	34	53.97%
9	There is a dedicated team or department for managing environmental sustainability	36	57.14%	27	42.86%
10	Organization participates in any environmental certification programs (e.g., ISO 14001)	32	50.79%	31	49.21%

TABLE 1. Distribution of respondents according to their response on environmental sustainability (n=63).

#### 4.7 Distribution of respondents based on organization's social sustainability

Table 2 presents the distribution of respondents according to their responses on various aspects of social sustainability within their organizations, with a total sample size of 63 participants. The table includes ten statements, each with a "Yes" or "No" answer option.

For regular safety training, 52 respondents (82.54%) confirmed its provision, while 11 (17.46%) did not. Ensuring fair wages was affirmed by 50 respondents (79.37%), with 13 (20.63%) indicating otherwise. Compliance with international labour standards in working conditions was high, with 55 respondents (87.30%) affirming compliance, while 8 (12.70%) did not.

Engagement in community support or social initiatives was reported by 34 respondents (53.97%), while 29 (46.03%) did not report such engagement. Policies to promote diversity and inclusion were present in 43 organizations (68.25%), with 20 (31.75%) lacking such policies. Health and wellness programs for employees were provided by 41 organizations (65.08%), whereas 22 (34.92%) did not offer these programs. Grievance mechanisms for employees were in place in 55 organizations (87.30%), while 8 (12.70%) did not have these mechanisms.

Support for educational and training programs for employees' professional development was confirmed by 51 respondents (80.95%), with 12 (19.05%) indicating a lack of support. Measures to prevent child labor in the supply chain were reported by 62 respondents (98.41%), with only 1 (1.59%) indicating the absence of such measures. Finally, a policy ensuring gender equality was present in all organizations, as confirmed by 63 respondents (100.00%).

Sl.	Statement	Answer options			
		Yes		No	
		Freq.	Perc.	Freq.	Perc.
1	Workers provided with safety training regularly	52	82.54%	11	17.46%
2	Organization ensures fair wages for all employees	50	79.37%	13	20.63%
3	Working conditions in the organization compliant with international labour standards	55	87.30%	8	12.70%

4	Organization engages in community support or social initiatives	34	53.97%	29	46.03%
5	There are policies in place to promote diversity and inclusion within your organization	43	68.25%	20	31.75%
6	Organization provides health and wellness programs for employees	41	65.08%	22	34.92%
7	There are grievance mechanisms in place for employees to report issues	55	87.30%	8	12.70%
8	Organization supports educational and training programs for employees' professional development	51	80.95%	12	19.05%
9	There are measures in place to prevent child labour in your supply chain	62	98.41%	1	1.59%
10	Organization has a policy for ensuring gender equality	63	100.00%	0	0.00%

TABLE 2. Distribution of respondents according to their response on social sustainability (n=63).

#### 4.8 Distribution of respondents based on organization's economic sustainability

Table 3 presents the distribution of respondents according to their responses on various aspects of economic sustainability within their organizations, with a total sample size of 63 participants. The table includes five statements, each with a "Yes" or "No" answer option.

Regarding cost savings from implementing sustainable practices, 48 respondents (76.19%) reported experiencing such savings, while 15 (23.81%) did not. The adoption of sustainable practices improving market competitiveness was affirmed by 51 respondents (80.95%), with 12 (19.05%) indicating otherwise. Financial incentives or support from the government for adopting sustainable practices were received by 38 respondents (60.32%), while 25 (39.68%) did not receive such support.

Investment in research and development for sustainable technologies was reported by 57 respondents (90.48%), with only 6 (9.52%) indicating a lack of investment. Lastly, entering new markets due to sustainable practices was confirmed by 45 respondents (71.43%), with 18 (28.57%) indicating that they had not entered new markets.

Sl.	Statement	Answer options			
		Yes		No	
		Freq.	Perc.	Freq.	Perc.
1	Organization has experienced cost savings from implementing sustainable practices	48	76.19%	15	23.81%
2	Adoption of sustainable practices has improved organization's market competitiveness	51	80.95%	12	19.05%
3	Organization received financial incentives or support from the government for adopting sustainable practices	38	60.32%	25	39.68%
4	Organization invests in research and development for sustainable technologies	57	90.48%	6	9.52%
5	Organization has entered new markets due to sustainable practices	45	71.43%	18	28.57%

TABLE 3. Distribution of respondents according to their response on economic sustainability (n=63).

#### 4.9 Distribution of respondents based on organization's export performance

Table 4 presents the distribution of respondents according to their responses on various aspects of export performance related to sustainable practices within their organizations, with a total sample size of 63 participants. The table includes five statements, each with a "Yes" or "No" answer option.

For the implementation of sustainable practices positively impacting export performance, 55 respondents (87.30%) affirmed, while 8 (12.70%) did not. Regarding whether export products meet international sustainability standards, 56 respondents (88.89%) confirmed compliance, whereas 7 (11.11%) did not. When asked about facing barriers to exporting sustainable products, 26 respondents (41.27%) reported encountering such barriers, while 37 (58.73%) did not.

The demand for sustainable practices by international buyers was acknowledged by 59 respondents (93.65%), with 4 (6.35%) indicating no such demand. Lastly, participation in international sustainability initiatives was reported by 39 respondents (61.90%), whereas 24 (38.10%) did not participate in such initiatives.

Sl.	Statement	Answer options			
		Yes		No	
		Freq.	Perc.	Freq.	Perc.
1	Implementation of sustainable practices has positively impacted your export performance	55	87.30%	8	12.70%
2	Export products meet international sustainability standards	56	88.89%	7	11.11%
3	Faced any barriers to exporting sustainable products	26	41.27%	37	58.73%
4	International buyers are increasingly demanding sustainable practices	59	93.65%	4	6.35%
5	Organization has participated in any international sustainability initiatives	39	61.90%	24	38.10%

TABLE 4. Distribution of respondents according to their response on export performance (n=63).

#### 4.10 Distribution of respondents based on organization's brand perception

Table 5 presents the distribution of respondents according to their responses on various aspects of brand perception related to sustainable practices within their organizations, with a total sample size of 63 participants. The table includes five statements, each with a "Yes" or "No" answer option. For the belief that integrating sustainable practices has enhanced the international perception of the 'Made in Bangladesh' brand, 56 respondents (88.89%) affirmed, while 7 (11.11%) did not. Regarding the increase in demand from environmentally conscious consumers for their products, 51 respondents (80.95%) reported an increase, whereas 12 (19.05%) did not.

The use of digital marketing to highlight sustainability efforts was confirmed by 60 respondents (95.24%), with 3 (4.76%) indicating they did not use such marketing. Collaboration with other companies or NGOs on sustainability projects was reported by 46 respondents (73.02%), while 17 (26.98%) did not engage in such collaborations. Lastly, 45 respondents (71.43%) believed that sustainability practices have provided a competitive advantage for their organization, while 18 (28.57%) did not share this belief.

Sl.	Statement	Answer options			
		Yes		No	
		Freq.	Perc.	Freq.	Perc.
1	Believe that integrating sustainable practices has enhanced the international perception of the 'Made in Bangladesh' brand	56	88.89%	7	11.11%
2	There has been an increase in demand from environmentally conscious consumers for your products	51	80.95%	12	19.05%
3	Organization use digital marketing to highlight its sustainability efforts	60	95.24%	3	4.76%
4	Organization collaborates with other companies or NGOs on sustainability projects	46	73.02%	17	26.98%
5	Believe that sustainability practices have provided a competitive advantage for your organization	45	71.43%	18	28.57%

TABLE 5. Distribution of respondents according to their response on brand perception (n=63)

#### 4.11 Distribution of respondents based on organization's barriers and drivers

Table 6 presents the distribution of respondents according to their responses on barriers and drivers related to sustainable practices within their organizations, with a total sample size of 63 participants. The table includes multiple response options for both barriers and drivers, as well as a statement on challenges in sourcing sustainable raw materials.

For barriers, 35 respondents (55.56%) identified high implementation costs, 41 respondents (65.08%) reported a lack of technical knowledge, 32 respondents (50.79%) cited limited access to sustainable technologies, and 18 respondents (28.57%) mentioned insufficient governmental support. Regarding drivers, 34 respondents (53.97%) indicated cost savings, 46 respondents (73.02%) pointed to compliance with regulations, 41 respondents (65.08%) noted market demand, and 50 respondents (79.37%) highlighted corporate social responsibility.

Additionally, when asked if their organization faces challenges in sourcing sustainable raw materials, 37 respondents (58.73%) answered yes, while 26 respondents (41.27%) answered no.

<b>Variables</b>	<b>Fre- quency</b>	<b>Percentage</b>
<b>Barriers (Multiple response)</b>		
High implementation costs	35	55.56%
Lack of technical knowledge	41	65.08%
Limited access to sustainable technologies	32	50.79%
Insufficient governmental support	18	28.57%
<b>Drivers (Multiple response)</b>		
Cost savings	34	53.97%
Compliance with regulations	46	73.02%
Market demand	41	65.08%
Corporate social responsibility	50	79.37%
<b>Organizations face challenges in sourcing sustainable raw materials</b>		
Yes	37	58.73%
No	26	41.27%

TABLE 6. Distribution of respondents according to their response on barriers and drivers (n=63).

#### **4.12 Distribution of respondents based on organization's future plans**

Table 7 presents the distribution of respondents according to their responses on future plans related to sustainable practices within their organizations, with a total sample size of 63 participants. The table includes seven statements, each with a "Yes" or "No" answer option.

Regarding the plan to expand sustainable practices in the next five years, 54 respondents (85.71%) affirmed, while 9 (14.29%) did not. Interest in participating in sustainability training programs or workshops was expressed by 43 respondents (68.25%), with 20 (31.75%) not interested.

The presence of a long-term sustainability strategy was confirmed by 45 respondents (71.43%), whereas 18 (28.57%) did not have such a strategy. Planning to invest in new technologies to enhance sustainability was reported by 52 respondents (82.54%), with 11 (17.46%) not planning such investments.

Increasing transparency in the supply chain was a plan for 42 respondents (66.67%), while 21 (33.33%) did not plan to do so. Collaboration with other organizations on sustainability initiatives was planned by 34 respondents (53.97%), with 29 (46.03%) not planning such collaborations.

Finally, 39 respondents (61.90%) foresaw potential challenges in implementing future sustainable practices, while 24 (38.10%) did not foresee such challenges.

Sl.	Statement	Answer options			
		Yes		No	
		Freq.	Perc.	Freq.	Perc.
1	Organization plan to expand its sustainable practices in the next 5 years	54	85.71%	9	14.29%
2	Organization is interested in participating in sustainability training programs or workshops	43	68.25%	20	31.75%
3	Organization has a long-term sustainability strategy	45	71.43%	18	28.57%
4	Planning to invest in new technologies to enhance sustainability	52	82.54%	11	17.46%
5	Organization plan to increase transparency in its supply chain	42	66.67%	21	33.33%
6	Planning to collaborate with other organizations on sustainability initiatives	34	53.97%	29	46.03%

7	Foresee any potential challenges in implementing future sustainable practices	39	61.90%	24	38.10%
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TABLE 7. Distribution of respondents according to their response on future plans (n=63).

## 5 DISCUSSION

The research findings on the adoption and effects of sustainable manufacturing methods and practices within the Bangladeshi readymade garments and textile industries provide key insight that can be contextualized by comparing them to existing literature and theoretical framework of this thesis.

The study found that sustainable practices had mixed impact on international export success. Specifically, environmental certification and digital marketing campaigns have a favourable impact on export capacities. In contrast, investment of sustainability technologies and safety training has positive and profitable effects linked with the export performance which areas are considered as a very important and relating issue to examine in this thesis.

These findings are aligning with the nuanced respective presented by Carter and Rogers (2008), who stated that sustainable practices can have varying effect on business performances based on several criteria such as the types of sustainability practices, implementation of strategy, and industrial sector. Asif (2017) noted that, while certain sustainability practices may improve long term competitiveness and possible market access, they could impose significant short-term cost, resulting in a negative impact on export performance initially.

The findings show that using energy-efficient technology and waste management practice can result in significant cost reductions. These Carter and Easton's (2011) findings, which state that effective supply chain sustainability increases cost efficiency by reducing resource use and waste which statements are relevant with Bangladeshi garments and textile industries. The alignment with the standard of global sustainability goals reduce operational expense while also increasing the implementing green practices.

The study confirms and indicates that firms that use sustainable practices have significant lower environmental footprint. This can be impacted negatively on sustainable manufacturing industries. These findings are consistent with the perspective shared by Srivstava (2007), who stated that environmental management practices effectively contribute to resource conservation and pollution reduction, echoing the global need and necessity for environmental stewardship in manufacturing process.

Improved labor practices have been shown to increase worker satisfaction and safety-security. Mani, V., Gunasekaran, A., Papadopoulos, T., Hazen, B. & Dubey, R. (2018), discussed how improved working conditions contribute considerably to improve worker satisfaction. This stresses the importance of human capital in achieving border sustainability goals, as better workplace conditions lead directly to increase productivity and make lower annual turnover rates.

The use of sustainable practices was found to improve the international perception of the 'Made in Bangladesh' brand. According to Hossain and Rahman (2019), green marketing initiatives have the potential to significantly influenced internationally consumer needs and demand, aligning the brand with increasing global customer demand for ethically produced goods. This achievement of brand impression is critical for new international marketplace and sustaining a competitive advantage.

### **5.1 Implication of the study**

The implantation for industry practices is very practical and significant. Firms within the Bangladeshi garments and textile sector are encouraged to implement sustainable practices not just as a compliance requirement but as a strategic component that improves competitive advantage, market access, and operational efficiency.

Policy Recommendation for policymakers in this industry to implement in the textile industries, they should consider developing supportive framework to help the transition to sustainability. Subsidies, the tax advantages, and technical assistances are crucial for Small and Medium Enterprise (SME's), who frequently face disproportionate challenges in implementing expensive modern technology.

Global Market Positioning as the study emphasizes the role of sustainability in improving global market placement. As international standard shift toward greater environmental and accountability, aligning in poorer countries can be benefited considerably by complying with these requirements.

## **5.2 Strength and limitations**

This thesis's research strategy, which uses quantitative methods to assess and measure the impacts of sustainable practices across economic, environmental and social aspects, provides a solid platform for understanding their multifaceted impacts.

However, this thesis predominantly focuses on enterprises that are already involved in sustainability initiatives, potentially overlooking the full spectrum of challenges faced by industries at various stages of sustainability interrogation.

## 6 CONCLUSION

The study conducted on sustainable manufacturing practices within the Bangladeshi garments and textile sector highlights the numerous benefits and challenges connected with incorporation sustainability into industry operations. The findings show, that while certain sustainable practice, such as environmental certification and digital marketing, significantly boost export performance and improve international brand perception, others such as investment in sustainability technology and safety training, may initially performance due to their cost and implementation complexities.

The economic ramifications are significant demonstration that practices targeted at increasing energy efficiency and reducing waste not only save money but also help to ensure the economic viability of sustainability programs. Environmental outcomes are particularly favourable, demonstrating that sustainable practices result in considerable reduction in the environmental footprint of industries.

This is consistent with global environmental goals and supports the industry's efforts toward ecological responsibility. In terms of social impact, the study emphasizes the importance of improving labor standard in increasing worker sanctification and safety-security, both of which are productivity significant drivers of higher productivity and stuff reduction. This insight is critical for stakeholders in the textile and garments industries and beyond, as they provide a clear depiction of how sustainable practice can be used to achieve economic, environmental, and social benefits for this industry of Bangladesh.

The study recommended the following strategies based on the findings of the thesis for industries stakeholders:

Industries should focus on design and implementing the sustainability strategy that not only address immediate economic, environmental and social concern but also with long term business goals.

To maximize the positive impacts of improved labor practices, firms should invest in comprehensive worker training programs that educate employees on safety standards and sustainability goals, thereby enhancing engagement and compliance.

Policymakers should formulate policies that specifically assist small and medium-sized enterprises (SMEs) in overcoming the financial hurdles associated with adopting sustainable practices.

It is recommended that regulatory frameworks be revised to encourage more stringent environmental and social standards, ensuring that all firms within the sector are held to a high standard of sustainability.

Academics and researchers should conduct further studies to identify and analyze the barriers that prevent firms from adopting sustainable practices, with a focus on financial, cultural, and technological challenges.

There is a need for longitudinal research to assess the long-term impacts of sustainable practices on business performance, environmental conservation, and social welfare within the sector.

Firms should leverage their commitment to sustainability as a key component of their marketing and branding strategies to access new international markets, particularly in regions where consumers are highly conscious of environmental and social responsibility.

Engaging in international partnerships and collaborative projects can help share best practices, reduce costs, and enhance the global competitiveness of the Bangladeshi textile and garment sector as global market strategies.

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## **APPENDIX 1/2. CONSENT FORM**

### **An Empirical Study on Sustainable 'Made in Bangladesh' Brand. On manufacturing, marketing, logistics, and export.**

#### **Purpose of the study**

The purpose of this study is to investigate the integration of sustainable manufacturing practices within the textile and garment industry in Bangladesh. The primary objective is to assess how these practices influence the industry's export performance and the international perception of the 'Made in Bangladesh' brand.

#### **Procedures**

Participants will be asked to complete a survey that includes questions about their organization's sustainable manufacturing practices, environmental management, labor practices, supply chain logistics, and export performance. The survey will take approximately 20-30 minutes to complete.

#### **Voluntary participation**

Participation in this study is entirely voluntary. You may choose not to participate or to withdraw from the study at any time without penalty or loss of benefits to which you are otherwise entitled.

#### **Risks and benefits**

There are no known risks associated with this study. The benefits of participating include contributing to the understanding of sustainable practices in the textile and garment industry and helping to inform policy and industry practices.

#### **Confidentiality**

All information collected in this study will be kept confidential. Data will be stored securely and only the research team will have access to it. Any identifying information will be removed before analysis to ensure anonymity.

#### **Compensation**

There is no compensation for participating in this study.

**Contact information**

If you have any questions or concerns about this study or your participation, please let me know. You may also contact the Centria University of Applied Sciences Ethics Committee at if you have any concerns about your rights as a participant.

**Consent**

By signing below, you are indicating that you have read and understood the information provided above, and you agree to participate in this study. You will receive a copy of this consent form for your records.

## APPENDIX 2/2. QUESTIONNAIRE

### Section 1

#### General Information

Sl. No.	Question	Answer options	Code
1.1	What is the size of your organization?	1. Small (1-50 employees) 2. Medium (51-250 employees) 3. Large (251+ employees)	
1.2	Which sector does your organization belong to?	1. Textile Manufacturing 2. Garment Manufacturing 3. Both	
1.3	How long has your organization been in operation?	1. Less than 5 years 2. 5-10 years 3. More than 10 years	
1.4	What is your organization's annual turnover?	1. Less than \$1 million 2. \$1 million - \$10 million 3. More than \$10 million	
1.5	What percentage of your products are exported?	1. Less than 25% 2. 25% - 50% 3. More than 50%	

### Section 2

#### Environmental Sustainability

Sl. No.	Question	Answer options	
		Yes	No
2.1	Does your organization implement energy-efficient technologies?	<input type="checkbox"/>	<input type="checkbox"/>

2.2	Does your organization have a waste reduction strategy in place?	<input type="checkbox"/>	<input type="checkbox"/>
2.3	Does your organization recycle water used in the manufacturing process?	<input type="checkbox"/>	<input type="checkbox"/>
2.4	Has your organization adopted any green logistics practices (e.g., eco-friendly transportation, energy-efficient warehousing)?	<input type="checkbox"/>	<input type="checkbox"/>
2.5	Does your organization comply with environmental regulations and standards?	<input type="checkbox"/>	<input type="checkbox"/>
2.6	Does your organization conduct regular environmental impact assessments?	<input type="checkbox"/>	<input type="checkbox"/>
2.7	Are renewable energy sources (e.g., solar, wind) used in your manufacturing processes?	<input type="checkbox"/>	<input type="checkbox"/>
2.8	Does your organization use biodegradable or recyclable packaging materials?	<input type="checkbox"/>	<input type="checkbox"/>
2.9	Is there a dedicated team or department for managing environmental sustainability?	<input type="checkbox"/>	<input type="checkbox"/>
2.10	Does your organization participate in any environmental certification programs (e.g., ISO 14001)?	<input type="checkbox"/>	<input type="checkbox"/>

### Section 3

#### Social sustainability

Sl. No.	Question	Answer options	
		Yes	No
3.1	Are workers provided with safety training regularly?	<input type="checkbox"/>	<input type="checkbox"/>
3.2	Does your organization ensure fair wages for all employees?	<input type="checkbox"/>	<input type="checkbox"/>
3.3	Are working conditions in your organization compliant with international labor standards?	<input type="checkbox"/>	<input type="checkbox"/>
3.4	Does your organization engage in community support or social initiatives?	<input type="checkbox"/>	<input type="checkbox"/>

3.5	Are there policies in place to promote diversity and inclusion within your organization?	<input type="checkbox"/>	<input type="checkbox"/>
3.6	Does your organization provide health and wellness programs for employees?	<input type="checkbox"/>	<input type="checkbox"/>
3.7	Are there grievance mechanisms in place for employees to report issues?	<input type="checkbox"/>	<input type="checkbox"/>
3.8	Does your organization support educational and training programs for employees' professional development?	<input type="checkbox"/>	<input type="checkbox"/>
3.9	Are there measures in place to prevent child labor in your supply chain?	<input type="checkbox"/>	<input type="checkbox"/>
3.10	Does your organization have a policy for ensuring gender equality?	<input type="checkbox"/>	<input type="checkbox"/>

#### Section 4

##### Economic Sustainability

Sl. No.	Question	Answer options	
		Yes	No
4.1	Has your organization experienced cost savings from implementing sustainable practices?	<input type="checkbox"/>	<input type="checkbox"/>
4.2	Has the adoption of sustainable practices improved your organization's market competitiveness?	<input type="checkbox"/>	<input type="checkbox"/>
4.3	Does your organization receive any financial incentives or support from the government for adopting sustainable practices?	<input type="checkbox"/>	<input type="checkbox"/>
4.4	Does your organization invest in research and development for sustainable technologies?	<input type="checkbox"/>	<input type="checkbox"/>
4.5	Has your organization entered new markets due to sustainable practices?	<input type="checkbox"/>	<input type="checkbox"/>

#### Section 5

##### Export Performance

Sl. No.	Question	Answer options	
		Yes	No
5.1	Has the implementation of sustainable practices positively impacted your export performance?	<input type="checkbox"/>	<input type="checkbox"/>
5.2	Do your export products meet international sustainability standards?	<input type="checkbox"/>	<input type="checkbox"/>
5.3	Have you faced any barriers to exporting sustainable products?	<input type="checkbox"/>	<input type="checkbox"/>
5.4	Are your international buyers increasingly demanding sustainable practices?	<input type="checkbox"/>	<input type="checkbox"/>
5.5	Has your organization participated in any international sustainability initiatives?	<input type="checkbox"/>	<input type="checkbox"/>

## Section 6

### Brand Perception

Sl. No.	Question	Answer options	
		Yes	No
6.1	Do you believe that integrating sustainable practices has enhanced the international perception of the 'Made in Bangladesh' brand?	<input type="checkbox"/>	<input type="checkbox"/>
6.2	Has there been an increase in demand from environmentally conscious consumers for your products?	<input type="checkbox"/>	<input type="checkbox"/>
6.3	Does your organization use digital marketing to highlight its sustainability efforts?	<input type="checkbox"/>	<input type="checkbox"/>
6.4	Does your organization collaborate with other companies or NGOs on sustainability projects?	<input type="checkbox"/>	<input type="checkbox"/>
6.5	Do you believe that sustainability practices have provided a competitive advantage for your organization?	<input type="checkbox"/>	<input type="checkbox"/>

## Section 7

### Barriers, drivers and future plans

Sl. No.	Question	Answer options	Code
7.1	What are the main barriers to adopting sustainable practices in your organization? (Select all that apply)	<ol style="list-style-type: none"> <li>1. High implementation costs</li> <li>2. Lack of technical knowledge</li> <li>3. Limited access to sustainable technologies</li> <li>4. Insufficient governmental support</li> <li>5. Other (please specify)</li> </ol>	
7.2	What are the main drivers for adopting sustainable practices in your organization? (Select all that apply)	<ol style="list-style-type: none"> <li>1. Cost savings</li> <li>2. Compliance with regulations</li> <li>3. Market demand</li> <li>4. Corporate social responsibility</li> <li>5. Other (please specify)</li> </ol>	
7.3	Does your organization face challenges in sourcing sustainable raw materials?	<ol style="list-style-type: none"> <li>1. Yes</li> <li>2. No</li> </ol>	

Sl. No.	Questions	Answer options	
		Yes	No
7.4	Does your organization plan to expand its sustainable practices in the next 5 years?	<input type="checkbox"/>	<input type="checkbox"/>
7.5	Is your organization interested in participating in sustainability training programs or workshops?	<input type="checkbox"/>	<input type="checkbox"/>
7.6	Does your organization have a long-term sustainability strategy?	<input type="checkbox"/>	<input type="checkbox"/>
7.7	Are you planning to invest in new technologies to enhance sustainability?	<input type="checkbox"/>	<input type="checkbox"/>
7.8	Does your organization plan to increase transparency in its supply chain?	<input type="checkbox"/>	<input type="checkbox"/>
7.9	Are you planning to collaborate with other organizations on sustainability initiatives?	<input type="checkbox"/>	<input type="checkbox"/>

7.10	Do you foresee any potential challenges in implementing future sustainable practices?	<input type="checkbox"/>	<input type="checkbox"/>
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Thank you for your participation in this Survey.