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Challenges of Implementing a Circular Economic Model in the Bangladeshi RMG Industry

Master's Thesis

Spring 2024

Master's Program in International Business Management



SEINÄJOKI UNIVERSITY OF APPLIED SCIENCES

Thesis abstract

Degree Programme: Master of Business Administration, International Business Management

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Title of thesis: Challenges of implementing a circular economic model in the Bangladeshi RMG industry

Supervisor: Dr. Dario Liberona

Year: 2024

Number of pages: 57

Number of appendices: 1

In Bangladesh, the Ready-Made Garment (RMG) industry is by far the most important one in terms of generating export revenue. Adopting a circular economic model can bring benefits such as reduction of apparel waste, increased recycling practices, the creation of new unique selling points, and the creation of more jobs. Despite all these potential benefits, the Bangladeshi RMG industry is yet to adopt circular economic models in its operations. This research aims to discuss the challenges associated with shifting towards circular economic models in the Bangladeshi RMG industry by taking direct insights from RMG industry professionals. Previous studies have focused on field visits and observations and discovered some obstacles to introducing circular economic models in the industry, but none of them took direct insights from industry professionals through detailed interviews.

This study involved 39 respondents who directly work in the Bangladeshi RMG industry in various corporations. Through an abductive approach, the study evaluated the previous literature and extended on their findings.

The challenges in implementing circular economic models in the Bangladeshi RMG Industry include a lack of awareness and knowledge, resistance to change, insufficient government support and regulation, inadequate infrastructure and facilities, and a lack of market and product diversification.

Keywords: circular economy, sustainability, Bangladeshi RMG sector, recycling, RMG waste.

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1. Introduction

The Ready-Made Garment (RMG) industry in Bangladesh is one of the key drivers of economic growth in the country. It significantly contributes to export earnings and provides employment opportunities for our population. However, its rapid expansion, conventional linear production, and consumption practices have led to several issues, such as environmental degradation, excessive resource consumption, waste generation, and social challenges related to worker conditions and safety (Bahraini, 2021). The concept of a circular economy, which aims to solve these issues by minimizing waste, extending product lifecycles, and promoting sustainable consumption and production, has gained global attention as a potential solution.

This research paper examines the applicability of circular economy principles within the Bangladeshi RMG industry. By adapting from a linear to a circular model, the industry can potentially address environmental and social concerns while ensuring long-term economic sustainability.

1.1 Background

The RMG industry in Bangladesh has grown exponentially over the past few decades. Having favorable factors of endowment, it is the largest manufacturing sector in the country, contributing significantly to GDP and employment. The industry primarily focuses on producing low-cost garments utilizing the low labor cost for export to international markets, which has led to concerns about sustainability and ethical practices. The RMG industry is by far the highest revenue generating industry in the country when it comes to exports. By the end of the 2021-2022 fiscal year, Bangladeshi RMG companies exported products worth more than 42 billion USD, making the country the second largest RMG exporter of the world. It was almost a 39% increase from the previous fiscal year. The textile and garments industry of the country employs over 4.4 million people, with the majority of the workforce being women. According to BGMEA (2024) by the end of the year 2030, the industry is forecasted to export 100 billion USD worth of products per year. In fact, the RMG sector shapes the country's gross production. Figure 1 shows connection Between the RMG Industry and the GDP of Bangladesh.

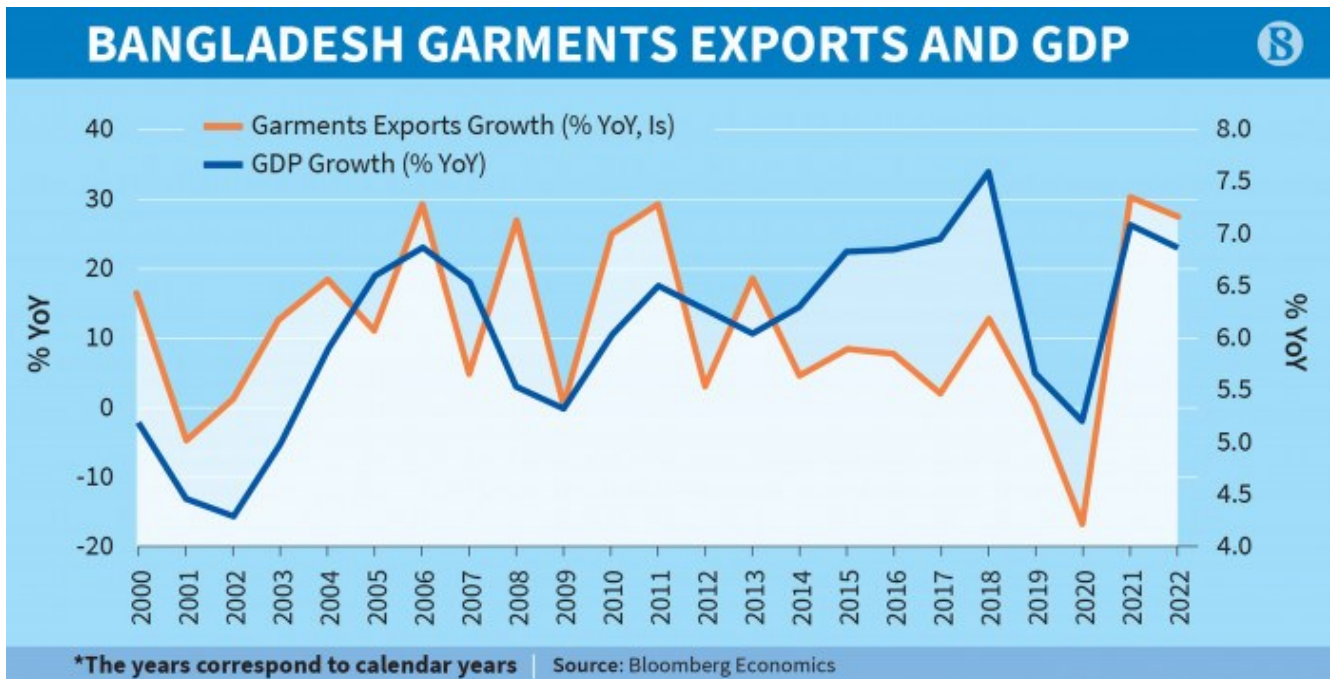


Figure 1. Connection Between the RMG Industry and the GDP of Bangladesh (Shukla, 2023).

Circular Economy is a sustainable economic model that aims to keep resources in use for as long as possible, extract maximum value from them during their use, and recover and regenerate products and materials at the end of their lifecycle. This concept contrasts with the traditional linear economy, which follows a "take-make-dispose" approach.

According to *The Business Standard* (2023), Faruque Hassan, President of Bangladesh Garment Manufacturers and Exporters Association (BGMEA) stated that the readymade garment industry of Bangladesh is increasingly focusing on the transition from a linear business model to a circular economy for greater environmental sustainability coupled with economic growth. At present, the industry produces over 3.2 million of textile waste every year. There is little to no effort to recycle the waste into the RMG industry itself, and create a sustainable economic model (Sarkar et al., 2020).

According to *Dhaka Tribune's* report 'Fair Prices Key to Overcoming Challenges to Eco-friendly RMG Export' (2022), a circular economy aims to maximize resource efficiency, minimize the use of raw materials, and repurpose waste through recycling or creating new products. To create harmony between advancement and environmental responsibility, the

circular economy operates on three fundamental principles, which are:

1. Eliminating waste and pollution in design,
2. Expanding the lifespan of products and materials
3. Rejuvenating natural systems.

Its primary objective is to detach economic growth from resource consumption and environmental harm.

Additionally, there are some other crucial add-ons – repair, renovate, recycle, and recover. All of these are executed with the intention of promoting the best practice in waste management.”

1.2 Problem Discussion

Now, some issues in the current scenario will be stated:

1.2.1 Environmental Challenges

The Bangladeshi RMG industry faces severe environmental challenges due to its current linear production model. Such as, high water consumption, chemical pollution, and the generation of vast amounts of textile waste.

High Water Consumption

High water consumption is specifically harmful for a agriculture-heavy country like Bangladesh. Due to high water consumption, two types of issues occur. First, areas where RMG factories are situated, the cultivable land gradually loses its fertility. Secondly, due to water shortage farmers find it difficult to water their crops during the dry seasons.

Chemical Pollution

Chemical pollution, on the other hand, is responsible for water and air contamination. Dhaka, the capital city of Bangladesh, is situated on the bank of the river Buriganga. The river's water is highly polluted due to the existence of factories in the vicinity.

Garbage Treatment

Due to not having enough facilities for sustainable waste management, more often than not the textile wastes are simply dumped or burnt. These issues are not only harmful for the environment but also threatens the long-term viability of the industry.

Clean Energy Use

Bangladesh does not produce enough clean energy to support big factories in the RMG industry. The main source of energy is electricity produced from fossil fuel. There are a few factories that use solar energy to some extent, but that is not enough by any means.

Fast Fashion Model

Due to the fast fashion business model, apparel production occurs on a frequent basis. If factories had followed sustainable models and relied on recycling RMG wastes, production duration would increase and it would be insufficient to follow the fast fashion model.

1.2.2 Social Challenges

Poor working conditions

The RMG industry in Bangladesh has been criticized for its poor labour practices, including low wages, unsafe working conditions, and limited worker rights. All these challenges were proved time and again during incidents such as Rana Plaza Tragedy on 24 April 2013. There are not too many RMG factories in the country that can provide a totally safe working condition for the labours. After the Rana Plaza incident, many foreign buyers also expressed their concerns over the working conditions in Bangladeshi RMG factories. Yet, very little has been done to address the issue. These social challenges have led to international scrutiny and calls for improved working conditions and labour rights.

Low Wages

There has been lots of discourses whether it is worth to build an industry based on low cost as the major selling point. The salary for RMG labours is around \$100 US dollars per month

on average. It is not uncommon for the industry to face roadblock due to labour unrest to increase wages.

1.2.3 Economic Vulnerabilities

Reliance on Low Cost

Dependence on a linear production model leaves the industry vulnerable to fluctuations in raw material prices, supply chain disruptions, and changing consumer preferences. When the price of cotton increases in exporter countries, the Bangladeshi RMG industry has to face difficulties to hold to low product prices. The prices of other raw materials and machinery also fluctuates from time to time. Moreover, the latest degradation of BDT against the USD made it even more difficult for the RMG industry as now the companies have to import raw materials and machinery at a higher price.

Technological Issues

Most of the RMG factories in Bangladesh do not have advanced machines and sustainability maintenance technology. As a result, the production heavily depends on human labour, and the chemical and apparel wastes are not recycled properly. It also has to do with keeping the prices of the products low, as investing in advanced technology and installing environment friendly technology might bump up the product prices.

1.3 Research Purpose

The primary purpose of this research is to investigate the potential for implementing circular economy principles in the Bangladeshi RMG industry. This includes assessing the industry's current sustainability practices, identifying barriers to circularity, and exploring the economic, environmental, and social benefits of adopting a circular approach.

The assessment will be done through identifying whether or not some companies are moving forward with sustainable practices and adopting circular economic models specifically. A brief comparison with successful transitions to circular economic models in other industries abroad will also be provided to understand how a strategy to implement a circular economic model in the Bangladeshi RMG industry can be formulated.

The primary objective of the thesis would be identifying the current challenges of implementing circular economic model in Bangladesh, and then finding solutions to overcome those challenges. The secondary objective will be to find ways to minimize environment pollution that stems from the RMG industry within the status quo.

1.4 Research Questions

To achieve the research purpose, the following research questions will guide the study:

1. What are the current sustainability practices within the Bangladeshi RMG industry?
2. What are the key barriers and challenges hindering the transition to a circular economy within the industry?
3. What are the potential economic, environmental, and social benefits of adopting circular economy principles in the Bangladeshi RMG industry?

2. Literature Review

The Ready-Made Garment (RMG) industry is of highly important magnitude in the Bangladeshi economic landscape, aptly and largely playing a part to the nation's Gross Domestic Product (GDP) and export revenue (Circular Economic Model for Bangladesh Textile Industry, 2021). However, this sector is concerned with daunting sustainability challenges primarily arising from its long-held traditional linear operational model illustrated by the 'take-make-consume-waste' approach. This pre-existing model comprises significant consumption of resources, the generation of monumental waste, and a notable lack of value worth sustaining throughout the entire process.

To combat these pressing sustainability challenges and in lieu of an eco-friendlier future, there has been a great need for the adoption of a circular economy framework within the RMG sector (*The Business Standard*, 2023). The primary context of the circular economy model is highly composed of waste elimination through the most efficiently possible utility of resources (*Circular Economic Model for Bangladesh Textile Industry*, 2021). This

transformation places in front of the RMG industry in Bangladesh with a plethora of opportunities, like reducing the carbon footprint, bettering resource efficiency, generating innovative economic endeavours, and enhancing societal well-being.

2.1 Waste Management

An essential facet of implementing the circular economy in the RMG industry revolves around waste management. This encompasses efforts to prevent, reduce, reuse, and recover waste. A recent report by Reverse Resources sheds light on Bangladesh's staggering textile waste generation, which stands at approximately 3.2 million tons annually. Unfortunately, only a fraction of this waste undergoes recycling or repurposing within the country (*Circular Economic Model for Bangladesh Textile Industry*, 2021). This situation underscores the critical necessity for the RMG industry to adopt improved waste management practices. Various studies, including one conducted by Al Alam et al. in 2023, reveal that a considerable number of RMG factories in Bangladesh lack sufficient waste management infrastructure and awareness regarding circular economy principles. To address this issue, Al Alam et al. (2023) recommend implementing measures such as enhancing waste segregation, improving collection and transportation methods, and optimizing waste disposal techniques to yield better environmental outcomes.

In a different vein, Saha et al. (2021) explore an innovative approach by investigating the feasibility of utilizing textile waste as a valuable resource for biogas production in Bangladesh. Their findings suggest that this waste-to-energy strategy could potentially make a substantial contribution to the country's natural gas supply. However, it's essential to note that this approach comes with its own set of technical, economic, social, and institutional challenges that need to be thoughtfully addressed.

2.2 Economic and Social Implications

Shifting towards a circular economy model within the RMG sector can bring about significant economic and social changes. It's not just about helping the environment; circular practices open up fresh business prospects and job opportunities (*The Business Standard*, 2023). However, it's essential to acknowledge that existing literature highlights some substantial hurdles and shortcomings in the process. These include a lack of awareness, knowledge,

and skills among those involved in the industry, along with challenges related to infrastructure, technology, and innovation.

2.3 Policy and Regulatory Framework

Making the shift towards a circular economy in the RMG industry is not a solo endeavour; it requires the sturdy backing of well-defined policies and regulations. As we study existing literature, it becomes evident that what's needed are thorough strategies, action plans, and regulations to chart this transformative course (*Circular Economic Model for Bangladesh Textile Industry*, 2021). Nevertheless, it's crucial to recognize that there's ample space for enhancement when it comes to enforcing these policies, creating incentives, and establishing standards.

2.4 Recycling

Recycling is a crucial element in adopting a circular economy within the RMG industry. It involves turning waste materials into new products or raw materials, benefiting both the environment and the economy. In Bangladesh, where around 3.2 million tons of textile waste are generated annually, recycling presents a significant opportunity (*Circular Economic Model for Bangladesh Textile Industry*, 2021). Unfortunately, much of this waste ends up in landfills or is incinerated, harming the environment.

Recycling textile waste offers multiple advantages. It reduces environmental harm, generates income, creates jobs, and encourages innovation in the RMG sector. Research, like Saha et al.'s (2024) study on cotton recycling in Bangladesh, highlights its potential. They found that recycling cotton can reduce its environmental impact by 40-60%, compared to conventional cotton. However, challenges such as the lack of quality standards, traceability systems, and market incentives still exist.

Similarly, Al Alam et al. (2023) explored the feasibility of polyester recycling in Bangladesh's RMG industry. Their findings indicate that recycling polyester can lead to significant cost savings (up to 50% in raw material costs) and reduce the carbon footprint by 75% compared to virgin polyester. They recommend improving collection and sorting systems, enhancing

technological capabilities, raising awareness, and stimulating consumer demand to promote polyester recycling.

2.5 Circular Economy

The circular economy is a system where materials never become waste and nature is regenerated. In a circular economy, products and materials are kept in circulation through processes like maintenance, reuse, refurbishment, remanufacture, recycling, and composting. The circular economy tackles climate change and other global challenges, like biodiversity loss, waste, and pollution, by decoupling economic activity from the consumption of finite resources.

The three principles of circular economy are:

- Eliminate waste and pollution
- Circulate products and materials (at their highest value)
- Regenerate nature

2.6 Green Design

Another crucial aspect of the circular economy in the RMG industry is green design, which focuses on creating products that are long-lasting, repairable, reusable, and recyclable. This approach extends the lifespan of products, reduces waste, conserves resources, and enhances customer satisfaction. For Bangladesh's RMG sector, embracing green design principles can bring substantial benefits, including improved competitiveness, reputation, and resilience in the global market.

Research, like the study conducted by Shamsuzzaman et al. (2023), has examined the adoption of green design practices in RMG factories in Bangladesh. Their findings showed that many factories had already implemented various green design measures. These measures include using organic or recycled materials, reducing chemical usage, optimizing fabric cutting, and minimizing packaging.

Importantly, these green design practices had a positive impact on environmental performance, product quality, customer satisfaction, and market access for RMG factories.

Nevertheless, challenges remain, including a lack of knowledge, skills, innovation, high initial costs, risks, low consumer awareness and preference, and inadequate policy support and incentives.

Similarly, Ahmed et al. (2020) explored the factors driving and hindering green product development in the Bangladesh RMG industry. Their findings revealed that customer demand, competitive advantage, and environmental concerns were significant drivers. Conversely, barriers included high costs, low profitability, and insufficient collaboration and coordination among stakeholders.

2.7 Challenges and Barriers to Implementing Circular Economy

Various actors in the RMG sector of Bangladesh, such as manufacturers, suppliers, buyers, and consumers, resist changing their practices to adopt a circular economy, due to perceived risks, costs, or complexities (Al Alam et al., 2023; Melati et al., 2021). According to a survey by Melati et al. (2021), only 13% of the respondents from the RMG sector of Bangladesh were aware of circular economy practices, while 87% were not. – Possible solutions include raising awareness and education on the concept and benefits of circular economy among all stakeholders (Al Alam et al., 2023; Melati et al., 2021), providing incentives and support for circular innovation and entrepreneurship among manufacturers and suppliers, creating standards and labels for circular products and services to increase their visibility and credibility among buyers and consumers, and promoting collaboration and communication among different actors along the value chain to foster trust and mutual learning.

Infrastructure and technology requirements - The RMG sector of Bangladesh lacks adequate infrastructure and technology to support circular processes, such as sustainable sourcing of materials, eco-friendly production processes, product design for durability and recyclability, and recycling and waste management (Shamsuzzaman et al., 2023; Al Alam et al., 2023). For instance, only 10% of the textile waste generated in Bangladesh is recycled, while 90% is dumped or burned (Shamsuzzaman et al., 2023). – Possible solutions include investing in upgrading and expanding the infrastructure facilities to ensure reliable and efficient delivery

of energy, water, materials, and waste services, adopting modern and green technologies that can improve production efficiency, reduce resource consumption and emissions, enhance product quality and performance, or enable recycling and reuse of materials), developing local capacity and skills for innovation and technology transfer through education, training, collaboration, or incentives, and accessing external sources of finance and technology through partnerships, networks, platforms, or funds (Shamsuzzaman et al., 2023; Al Alam et al., 2023).

The RMG sector of Bangladesh operates under a complex and fragmented policy environment that lacks or weakly enforces policies and regulations that can facilitate or mandate circular practices among different actors in the industry. For example, there is no specific policy or regulation on circular economy in Bangladesh, nor any incentives or penalties for adopting or not adopting circular practices (Al Alam et al., 2023; Saha et al., 2021). - Possible solutions include developing a comprehensive and coherent national strategy and action plan for circular economy in the RMG sector that aligns with the global sustainability agenda and the Sustainable Development Goals (SDGs), strengthening the policy and regulatory instruments that can promote or mandate circular practices among different actors in the industry, such as standards, labels, taxes, subsidies, quotas, bans, or penalties, enhancing the policy and regulatory implementation and compliance through monitoring, evaluation, reporting, verification, or auditing mechanisms, and engaging and consulting with relevant stakeholders and experts in the policy and regulatory design and review processes.

The following table addresses some of the challenges of implementing sustainable practices in the Bangladeshi RMG industry in brief and how severe they are:

Table 1. Challenges of implementing sustainable practices in the Bangladeshi RMG Industry.

Challenge	Severity
Lack of awareness	High
Lack of collaboration and communication between actors	Medium

Infrastructure and technology difficulties	High
Complex and fragmented policy and regulations	High
Lack of funds	Low

2.8 Opportunities and Benefits of Circular Economy Adoption

The adoption of circular economy principles in the RMG sector of Bangladesh holds the promise of significant environmental benefits. By minimizing resource consumption and waste generation, this approach can make the industry more environmentally friendly and sustainable. Research from the Ellen MacArthur Foundation in 2017 indicated that implementing circular strategies in the global textile industry could potentially reduce waste by as much as 80% and decrease non-renewable resource usage by 79% by the year 2050, in contrast to a business-as-usual scenario. This transformation could translate into substantial savings for the RMG sector of Bangladesh, including reductions in the use of raw materials, energy, water, and land. Additionally, it could lead to lower environmental impacts and risks, such as greenhouse gas emissions, waste production, pollution, resource depletion, and land degradation (Ellen MacArthur Foundation, 2017).

The circular economy model can also offer notable economic advantages to the RMG sector in Bangladesh. These advantages can result in cost savings and the creation of new revenue streams, ultimately enhancing the sector's competitiveness and profitability. According to a study conducted by Remy et al. in 2016, the implementation of circular strategies in the global apparel industry could potentially yield cost savings of \$560 billion and generate an additional \$710 billion in revenues by the year 2030, compared to a business-as-usual scenario. For the RMG sector of Bangladesh, these benefits could translate into improved operational efficiency, higher product quality and innovation, increased customer loyalty and satisfaction, and enhanced market potential and differentiation.

Beyond environmental and economic considerations, the circular economy approach can also contribute to positive social impacts within the RMG sector of Bangladesh. This includes

the creation of more jobs and the improvement of working conditions, which can lead to social well-being and development for industry stakeholders. Research conducted by the International Labour Organization (ILO) in 2018 revealed that implementing circular strategies in the global garment industry could potentially result in the creation of 6 million jobs and the enhancement of working conditions by 2030, as opposed to a business-as-usual scenario. For the RMG sector of Bangladesh, these outcomes could have a significant impact in terms of both job quantity and quality, the health and safety of workers, workers' rights and empowerment, as well as social inclusion and cohesion.

To summarize, this study has explored various aspects of circular economy implementation within Bangladesh's RMG sector. Circular economy, grounded in the principles of waste and pollution reduction, material circulation, and natural system regeneration, presents a promising avenue for sustainability enhancement in the sector. It holds the potential to revolutionize resource efficiency, reduce costs, stimulate innovation, bolster product quality, and increase customer satisfaction.

Moreover, it offers the prospect of curbing environmental impacts and creating social value. However, it is essential to acknowledge the challenges and barriers that accompany the adoption of circular economy practices. These include resistance to change, infrastructural and technological drawbacks, policy and regulatory issues, and financial considerations. To overcome these obstacles, a multi-pronged approach is proposed, spanning awareness elevation, incentivization, standardization, collaboration promotion, infrastructure enhancement, technology integration, local capacity development, financial resource mobilization, comprehensive national strategy formulation, policy reinforcement, and stakeholder engagement.

Additionally, this review highlights certain research gaps within the existing literature. These gaps encompass the dearth of empirical studies explaining the actual impacts of circular practices in the RMG sector, the need for more case studies explaining successful circular business models within Bangladesh, and the demand for additional tools and frameworks facilitating the assessment of the sector's circularity performance.

Therefore, future research endeavours should aim to bridge these gaps by conducting in-depth analyses quantifying the environmental, economic, and social implications of circular strategies, exploring best practices and innovative circular initiatives in the Bangladeshi context, and devising indicators and methodologies for evaluating and benchmarking the sector's circularity progress. By addressing these knowledge voids, subsequent studies can play a pivotal role in advancing circular economy knowledge and application within Bangladesh's RMG sector.

The following table provides a brief overview of the opportunities circular economic models can create in the Bangladeshi RMG industry:

Table 2. Opportunities offered by circular economic models in the Bangladeshi RMG industry.

Opportunities for the Bangladeshi RMG Industry in Light of Circular Economic Models
- Significant reduction of apparel waste
- Decrease non-renewable energy source usage
- Operational efficiency, higher production quality, and product diversity
- Creation of new revenue streams
- Creation of more jobs and improved working conditions

3. Methodology

The methodology used in this thesis serves a crucial purpose, impacting both its outcome and credibility. This chapter offers insights into the execution of the thesis, divided into sections that clarify the chosen methods and provide justifications for their selection. This will be a qualitative study of the Bangladeshi RMG industry, with the research design developed on multiple case studies and semi-structured interview as the research method.

3.1 Research approach

Choosing an appropriate research methodology is a vital component in the formulation of a thesis. This particular thesis explores obstacles associated with sustainability-focused innovation within the Bangladeshi clothing industry, a domain that has received relatively limited attention in academic study. Given the qualitative nature of this study, which prioritizes textual data over numerical data, we adopt a qualitative research approach, as described by Bell et al. (2019). It refrains from the collection or generation of quantitative data. The absence of formulated hypotheses in this thesis aligns with our research questions, ensuring that our findings remain open-ended and unforeseen. The validity of our findings relies on the information collected from individuals working within the clothing industry, as we investigate the challenges associated with the implementation of a circular economic model in the RMG industry in Bangladesh.

Qualitative research, as per Bell et al. (2019), depends on verbal data collection and analysis, emphasizing the dynamism of social phenomena. This research approach captures the evolving nature of events and patterns over time, reflecting a sense of fluidity and transformation.

Moreover, within the realm of contemporary business research, the abductive approach has gained popularity, offering an alternative to deductive and inductive methodologies. This approach, as outlined by Bell et al. (2019), involves making logical conclusions and constructing theories grounded in empirical evidence. It allows theory development without rigidly conforming to predefined conceptual frameworks, encouraging the generation of fresh hypotheses and theories based on unexpected research findings. This approach is the most suitable one for this study because it aims to provide explanations for observations by combining both inductive and deductive approaches. As this study contrasts existing theories with direct responses from industry professionals, the abductive approach can confirm, refute, or improve the existing theory. In qualitative research, this approach is particularly relevant as it gives priority to the use of qualitative data to enhance concepts central to the field of study.

Considering the thematic and contextual nuances of this thesis, the qualitative research strategy and abductive approach emerge as the most suitable tools for our study.

3.2 Research design

In the realm of academic research, it is not uncommon for researchers to encounter two pivotal aspects that require special attention following the establishment of a research strategy: research design and research methods. Research design serves as the foundational framework that guides the process of data collection and analysis, while research methods encompass the precise techniques chosen for acquiring data (Bryman & Bell, 2011). This section will explain the selection of the research design to be employed in the context of this thesis, with discussions to follow regarding the chosen research methods.

The case study approach stands as a suitable choice, particularly well-suited for qualitative research due to its compatibility with methods such as observation and unstructured interviews, which yield rich and in-depth findings (Bryman & Bell, 2011). Specifically, a multiple-case study design aligns seamlessly with the research questions in this paper.

Case study design enjoys widespread popularity. Although a case study conventionally implies a focus on a single geographic location, the multiple-case study design, an extension thereof, has gained popularity in business research, primarily serving the purpose of comparative analysis (Bryman & Bell, 2011). It enables researchers to juxtapose and contrast findings across various cases, often referred to as a comparative design.

This thesis involves 20 RMG companies, each being a significant contributor to the Bangladeshi RMG industry. The selection of these companies stems from the expectation that they will contribute significantly to addressing the research question. The rationale behind opting for this design lies in the imperative need to critically scrutinize cases to arrive at precise answers to the research inquiry. Furthermore, the careful selection of sample organizations ensures their accurate representation of the industry and relevance to the thesis's thematic focus. Additionally, respondents with extensive experience within this industry and subject area have been thoughtfully chosen to participate in this study.

3.3 Research methods

Within the academic context, the deliberation over research methods unfolds organically as a logical continuation of the establishment of the research design. Fundamentally, research methods assume the role of instrumental conduits for data collection, encompassing an array of distinct tools and techniques. As explained by Bryman and Bell (2011), research methods can manifest in the form of distinct instruments, such as self-completion questionnaires, structured interview schedules, or participant observation, whereby researchers actively engage in the observation or interaction with study subjects. Subsequently, the forthcoming section delineates the precise research methods that have been chosen for the execution of this thesis.

3.3.1 Primary sources

The focal point of this study revolves around the investigation of sustainability-oriented innovation practices and the accompanying challenges they bring forth. Given the research's objective of yielding reliable outcomes, a reliance on primary sources is deemed indispensable. Consequently, interviews emerge as the sole viable avenue for the acquisition of primary data. Notably, interviews stand as one of the most extensively employed methods in qualitative research, as endorsed by experts in the field.

In the context of qualitative research, interviews are characteristically less structured when juxtaposed with their quantitative research counterparts (Bryman & Bell, 2011). Qualitative research emphasizes a broader conceptual framework, encouraging a more open-ended exploration of research ideas and the perspectives of interviewees.

Within the realm of qualitative research, two primary interview types prevail: unstructured interviews and semi-structured interviews. Unstructured interviews typically involve posing a single, overarching research question, permitting interviewees to respond freely. The interviewer retains the flexibility to pursue points of interest as they arise in the conversation. Conversely, semi-structured interviews entail a predetermined list of questions, organized around specific topics to be addressed within the study (Bryman & Bell, 2011). However, the sequence of questions may deviate from the predefined order.

Semi-Structured Interview

For this thesis, a semi-structured interview approach is deemed the most suitable method for primary data collection. This method provides a framework within which the researcher can set boundaries in alignment with the research theme while retaining the flexibility to explore questions beyond the predefined list, as deemed necessary to the research. According to Bell et al. (2019), a semi-structured interview involves a list of specific questions on the subjects to be covered, offering interviewees considerable leeway in how they respond. While there may be deviations from the question guide, this thesis opts for the semi-structured interview approach.

To ensure that all pertinent aspects of the research questions are addressed, a curated list of questions has been prepared in accordance with the research focus (Appendix 1). The use of unstructured interviews is avoided to prevent critical facets from going unanswered. Recognizing the limitations of handwritten notes, audio and video recording of interviews is deemed essential. Interviewees are assured that these recordings are solely intended for the accurate transcription of the interviews and the author's personal reference. Permission is sought from interviewees to record the entire session. Primary data collection is conducted via online platforms such as Zoom and Teams.

Market and Company Selection

In order to meticulously investigate the research inquiries presented in this thesis, we have identified the Bangladeshi markets as appropriate subjects of study. The principal aim of this research is to examine the obstacles associated with sustainability-oriented innovation (SOI) in the Bangladeshi RMG industry, with the goal of implementing the circular economic model.

Furthermore, the selection of sample companies aligns closely with the central theme of the thesis, which revolves around sustainability-oriented innovation (SOI). Accordingly, companies chosen for this study are among the key players in the RMG industry of Bangladesh are responsible for the lion's share of the country's exports.

Selection of Interviewees

Given the thesis's subject and focus, the most relevant interviewees are those in higher managerial positions and mid-level employees with substantial experience in the

clothing industry and a background in sustainability innovation practices. The selection is based on their expertise, roles, and experience.

In some cases, interviewees may refer colleagues who are relevant to the research topic, a technique known as Snowball sampling. This approach involves initially contacting a small group of individuals connected to the research and using their connections to identify additional interviewees. Snowball sampling is chosen here as it is a practical and relevant approach.

It's worth noting that some interviewees declined to disclose their names and personal information due to organizational restrictions. To respect their confidentiality, all interviewees will remain anonymous. Ethical guidelines, as outlined by experts in the field, stress the importance of maintaining participants' privacy and the confidentiality of their information. A table listing the participants will be included for transparency while upholding their anonymity.

Table 3: Overview of interviews compiled by author.

Company	Name	Category	Origin	Respondent Code	Position	Interview Setup	Duration	Interview Language
Ha-meem Group	Laboratory In-Charge	RMG	Bangladesh	B3	Laboratory In-Charge	Zoom	56 Mins	Bengali
Ha-meem Group	Junior Buyer	RMG	Bangladesh	A2	Junior Buyer	Zoom	40 Mins	Bengali
Noman Group	Senior Manager	RMG	Bangladesh	A1	Senior Manager	Zoom	45 Mins	Bengali

Noman Group	Textile Engineer	RMG	Bangladesh	A4	Textile Engineer	Teams	38 Mins	Bengali
Beximco Textile Division Limited	Project Manager	RMG	Bangladesh	C4	Project Manager	Teams	42 Mins	Bengali
Beximco Textile Division Limited	Senior Merchandiser	RMG	Bangladesh	C5	Senior Merchandiser	Zoom	35 Mins	Bengali
DBL Group	Sr. Officer (Environment Chemical Responsibility)	RMG	Bangladesh	D6	Sr. Officer (Environment Chemical Responsible)	Zoom	40 Mins	English
DBL Group	Marketing Coordinator	RMG	Bangladesh	D9	Marketing Coordinator	Teams	50 Mins	Bengali
Thermax Group	Quality Assurance Analyst	RMG	Bangladesh	E9	Quality Assurance Analyst	Teams	45 Mins	Bengali
Thermax Group	HR Manager	RMG	Bangladesh	E7	HR Manager	Zoom	45 Mins	Bengali
Viyellatex Group	Operations Manager	RMG	Bangladesh	F10	Operations Manager	Zoom	35 Mins	Bengali

Viyellatex Group	EMI Coordinator	RMG	Bangladesh	F11	EMI Coordinator	Teams	40 Mins	Bengali
Epyllion Group	Marketing Coordinator	RMG	Bangladesh	G11	Marketing Coordinator	Teams	40 Mins	Bengali
Epyllion Group	HR Specialist	RMG	Bangladesh	G12	HR Specialist	Zoom	35 Mins	Bengali
Mohammadi Group	Production Planner	RMG	Bangladesh	G13	Production Planner	Zoom	40 Mins	English
Mohammadi Group	Textile Designer	RMG	Bangladesh	G14	Textile Designer	Teams	35 Mins	Bengali
Fakir Group	Textile Engineer	RMG	Bangladesh	G13	Textile Engineer	Zoom	40 Mins	English
Fakir Group	Marketing Coordinator	RMG	Bangladesh	G14	Marketing Coordinator	Teams	35 Mins	Bengali
Akij Textile Mills Ltd	Sales Representative	RMG	Bangladesh	G14	Sales Representative	Teams	35 Mins	Bengali
Akij Textile Mills Ltd	Junior Merchandiser	RMG	Bangladesh	G15	Junior Merchandiser	Zoom	30 Mins	Bengali
Masco Industries Limited	HR Manager	RMG	Bangladesh	E7	HR Manager	Zoom	45 Mins	English

Masco Industries Limited	Deputy Manager (Yarn Dyeing)	RMG	Bangladesh	E8	Deputy Manager (Yarn Dyeing)	Zoom	30 Mins	Bengali
Nassa Taipei Denims	Production Manager	RMG	Bangladesh	I16	Production Manager	Teams	50 Mins	Bengali
Nassa Taipei Denims	Quality Assurance Analyst	RMG	Bangladesh	I17	Quality Assurance Analyst	Zoom	40 Mins	Bengali
Esquire Group	Textile Designer	RMG	Bangladesh	I17	Textile Designer	Teams	40 Mins	Bengali
Esquire Group	EMI Coordinator	RMG	Bangladesh	I18	EMI Coordinator	Zoom	45 Mins	English
Ningbo MH Industry	Supply Chain Analyst	RMG	Bangladesh	I18	Supply Chain Analyst	Teams	45 Mins	English
Ningbo MH Industry	Marketing Coordinator	RMG	Bangladesh	I19	Marketing Coordinator	Zoom	35 Mins	Bengali
Beximco	Quality Control Inspector	RMG	Bangladesh	I19	Quality Control Inspector	Zoom	35 Mins	Bengali
Beximco	Textile Engineer	RMG	Bangladesh	I20	Textile Engineer	Teams	40 Mins	Bengali

Graphics Textiles	Fabric Technologist	RMG	Bangladesh	I20	Fabric Technologist	Zoom	40 Mins	Bengali
Graphics Textiles	Operations Coordinator	RMG	Bangladesh	I21	Operations Coordinator	Teams	35 Mins	Bengali
Radiance Group	Production Coordinator	RMG	Bangladesh	I21	Production Coordinator	Zoom	35 Mins	Bengali
Benetex Industries	Operations Supervisor	RMG	Bangladesh	I22	Operations Supervisor	Teams	40 Mins	Bengali
Benetex Industries	Textile Engineer	RMG	Bangladesh	I23	Textile Engineer	Zoom	35 Mins	Bengali
Ahmed Group	Compliance Officer	RMG	Bangladesh	I24	Compliance Officer	Zoom	30 Mins	Bengali
Ahmed Group	IT Support Specialist	RMG	Bangladesh	I25	IT Support Specialist	Teams	35 Mins	Bengali
Devor INDUSTRIES Pvt	Marketing Coordinator	RMG	Bangladesh	I26	Marketing Coordinator	Zoom	40 Mins	Bengali
Devor INDUSTRIES Pvt	HR Specialist	RMG	Bangladesh	I27	HR Specialist	Teams	35 Mins	Bengali

This thesis includes interviews with 39 respondents from twenty different companies. The choice of this number of interviewees is based on the availability of participants and the alignment of their experiences with the thesis theme. It is believed that this number of interviewees is reasonably adequate for a robust study, as it encompasses diverse perspectives on the phenomenon under investigation.

For readers' reference, Table 3 provides details about the interviewees, including their positions, interview dates, company types, interview mediums, interview languages, and interview durations.

The table below consists of the market sale percentage, sales amount of the companies.

Table 4. Sales and market share of case companies.

Name	Sales (USD billion)	Market Share (%)
Ha-meem Group	0.7	3.7
Noman Group	1.5	7.9
Beximco Textile Division Limited	0.9	4.7
Square Textile Ltd	0.3	1.6
DBL Group	0.8	4.2
Thermax Group	0.2	1.1
Viyellatex Group	0.4	2.1
Epyllion Group	0.3	1.6
Mohammadi Group	0.2	1.1
Fakir Group	0.2	1.1
Akij Textile Mills Ltd	0.3	1.6
Pakiza Group	0.1	0.5
Masco Industries Limited	0.1	0.5
Nassa Taipei Denims	7.7	3.6

Esquire Group	4	1.9
Ningbo MH Industry	0.643	0.3
Beximco	0.414	0.2
Graphics Textiles	0.391	0.2
Radiance Group	0.389	0.2
Benetex Industries	0.361	0.2
Ahmed Group	0.259	0.1
Devor INDUSTRIES Pvt	0.234	0.1

Bangladesh textile manufacturing market size of USD 19.04 billion in 2024. The market is expected to grow at a CAGR of 5.81% to reach USD 25.25 billion by 2029 (*Top 10 Textiles & Apparel Manufacturing Companies in Bangladesh by Revenue for January 2024, 2024*).

Interview process

In this thesis, open-ended questions were used to understand the theoretical aspects of the research, allowing interviewees to share their insights more freely. Open-ended questions offer the advantage of uncovering the interviewees' depth of knowledge and understanding of the subject matter. They also enable the reconstruction of events, helping interviewees reflect on how certain events occur in the context of current situations (Bell et al., 2019). Given these benefits, open-ended questions were chosen for data collection in this thesis.

All interviews were conducted online using platforms such as Zoom and Teams. Prior to each interview, permission was obtained from interviewees to record the session, and all participants in this thesis consented. Video recording was the preferred method for capturing interviews conducted on Zoom and Teams, aligning with the qualitative research objective of not only analysing what interviewees say but also how they express it (Bell et al., 2019). Additionally, handwritten notes were taken during interviews to emphasize key points.

Two languages, English and Bengali, were utilized during the interviews, with the majority conducted in English. Bengali was used selectively in cases involving Bangladeshi respondents to ensure clarity for specific questions.

3.3.2 Secondary sources

In conjunction with primary data, this study has incorporated secondary data to enhance its comprehensiveness. Company websites, for instance, were visited to gather crucial secondary information, offering valuable insights into the case companies before conducting interviews. Additionally, this research leveraged reputable secondary sources to construct an extensive literature review and establish a theoretical framework.

The secondary data employed in this study was sourced from reliable databases, Google Scholar for example. These sources helped with the research's depth and credibility.

3.4 Data analysis

As previously explained in Section 3.1, this thesis employed abductive research methods. Following the execution of interviews, a transcription process was followed, ensuring the comprehensive documentation of every detail. Interviewees were provided with their respective transcripts, allowing them the opportunity to review and amend their prior statements as needed. Upon receiving the finalized transcripts, they were subjected to a synthesis and organization process to align with the research inquiries.

A comparative analysis was then conducted, analysing the varied approaches and statements of different companies concerning the challenges they encountered while implementing sustainability-oriented innovation within their distinct organizational contexts. Particular attention was given towards identifying recurrent themes and shared terminology addressed by respondents, with the aim of identifying patterns within their narrative descriptions. To facilitate the analysis of the empirical data, harmonization with the established theoretical framework was then conducted, guiding the consolidation of data within the findings chapter.

In conclusion, this thesis concludes with recommendations and the author's revised insights derived from the analysis. In accordance with Bell et al. (2019), thematic analysis emerges as the one of the most suitable methods within qualitative research, perfectly suited for identifying recurring themes. In the context of this thesis, thematic analysis stands as the most fitting and effective analytical tool.

3.5 Reliability and Validity

In qualitative research, ensuring validity and reliability is vital throughout the research process. It's important to note that qualitative research has distinct criteria for evaluating reliability and validity compared to quantitative research (Bryman and Bell, 2011). Guba and Lincoln (1994) propose two key criteria for assessing the reliability and validity of qualitative studies: trustworthiness and authenticity.

3.5.1. Trustworthiness

To discuss trustworthiness in this thesis, it will be divided into four criteria, following the suggestions of Guba and Lincoln (1994). These criteria encompass credibility, transferability, confirmability, and dependability.

Credibility

Credibility refers to the extent to which a researcher's findings are seen as plausible and acceptable to others (Bryman and Bell, 2011). In this thesis, it was attempted to bolster credibility by gaining a deep understanding not only of the subject matter but also the relevant industry. Additionally, the use of triangulation, as suggested by Guba and Lincoln (1994) and Bryman and Bell (2011), has been employed to enhance credibility. This involved collecting data from multiple interviewees, enabling comparisons between empirical data and mitigating potential biases.

Furthermore, the theoretical framework chapter also incorporates triangulation to establish a robust foundation and enhance the study's academic merit. The thesis is comprehensively structured to facilitate reader comprehension from start to finish.

Transferability

The assurance of this thesis' transferability is facilitated through a multifaceted approach, encompassing the detailed description of the chosen research methodology and a comprehensive grounding in theoretical findings. These measures serve to provide this thesis with analytical generalizability, making it suitable for analogous research to be carried out later. Transferability means that readers should possess the capability to critically assess an author's work, alongside the substantiating evidence

employed to buttress the findings and conclusions, as posited by Yin (2009). This study ensures transferability by presenting evidence while safeguarding the privacy of respondents. Furthermore, this paper exhibits a heightened sensitivity towards the references incorporated within the bibliography chapter.

Dependability

Dependability, in the context of research, means the likelihood of fellow researchers being able to replicate the outcomes of the study in their own investigations, as expounded by Guba and Lincoln (1994) and Bryman and Bell (2011).

To foster dependability, researchers should adopt an approach akin to an audit, wherein comprehensive records of all phases of the research process are maintained. This practice serves to allow peer scrutiny, ensuring that proper procedures have been adhered to, as emphasized by Bryman and Bell (2011). In the course of this study, records of both the theoretical and empirical studies have been kept, thereby ensuring the study's robustness and transparency. The thesis provides a comprehensive account of the choices and decisions made throughout the research journey, with particular emphasis on the methodology section.

Confirmability

Confirmability is about establishing the researcher's dedication to impartiality, ensuring that personal values or theoretical leanings have not unduly swayed the research process and its outcomes, as underscored by Bryman and Bell (2011). In the course of this thesis, conscientious steps were taken to mitigate biases and uphold an aura of objectivity.

To reinforce confirmability, interviewees were equipped with interview guidelines well ahead of their scheduled interviews. This proactive measure was adopted to encourage rectifications, adjustments, and the inclusion of valuable perspectives, thereby augmenting the thesis's confirmability.

3.5.2 Authenticity

Within the domain of business research, particularly in the qualitative approach, a paramount emphasis must be given to authenticity, a quality that should be diligently upheld throughout the entire research process, as emphasized by Yin (2009). An integral criterion in this context

is fairness, denoting the equitable portrayal of diverse viewpoints held by members within social settings, as explained by Bryman and Bell (2011). In essence, researchers bear the responsibility of incorporating perspectives from all strata of participants.

Hence, this thesis has given priority to fairness in the selection of interviewees, thereby ensuring that the empirical findings are not only authentic but also diverse.

1. Empirical Data

In this section of the study, the findings that have been received from the interview respondents has been presented. It begins with an overview of the respondents.

4.1 Overview of Interview Respondents

A total of 39 interviews were conducted with respondents from 20 different RMG companies in Bangladesh. The companies represented a diverse mix of both large conglomerates and smaller domestic firms. The interviewee details can be found in Table 3.

The interviewees occupied a range of roles and positions within their respective companies, providing perspectives from multiple vantage points. 22 were in mid-level positions such as Merchandiser, Buyer and Project Manager. The remaining 17 were in senior roles including Head of Departments, Managers and Environmental Sustainability Consultants.

Their areas of expertise and responsibilities were closely tied to the research focus on sustainability and innovation. These encompassed merchandise planning, chemical management, CSR initiatives, environmental compliance, and production processes. The depth of their domain knowledge enabled comprehensive insights into the dynamics surrounding circular economy adoption.

The majority of the interviews were conducted in English to facilitate analysis, while a few were done in Bengali owing to the respondents' preference. Most interviews averaged around 40 minutes, allowing for in-depth investigation of the key issues.

In the interest of confidentiality, the identities of the interviewees and their respective companies remain anonymous, with generic labels used for reference. Only necessary details regarding their roles and expertise are highlighted to provide relevant context.

The judicious selection of interviewees possessing extensive industry experience coupled with expertise in sustainability helped provide well-rounded perspectives on the impediments and enablers for circular innovation. Their inputs form the backbone of the empirical analysis, providing real-world grounding to complement the theoretical framework.

4.2 Lack of awareness and knowledge

The interviewees highlight the lack of understanding of circular economy concepts and how to implement them as a key barrier. Respondents like B3 and C5 directly admit the knowledge gaps within their organizations. This aligns with the challenge that many industry stakeholders lack awareness and skills for circular practices. According to a report by the Global Fashion Agenda (GFA), only 12% of the Bangladeshi RMG companies surveyed have a good understanding of circular economy, compared to 22% globally. The report also suggests that there is a need for more education and training on circular economy for the RMG sector, especially on topics such as circular design, waste management, and recycling.

4.3 Resistance to change

Respondents such as F10 and E7 point to the deeply entrenched “fast fashion culture” and the focus on “maximizing profits” in Bangladesh’s RMG sector. This underscores the cultural inertia and resistance to abandoning the linear economic model that has dominated for years. The comments validate the notion that the competitive, fragmented and risk-averse nature of the industry breeds reluctance towards sustainability-focused change. A study by the Ellen MacArthur Foundation reveals that the current linear model of the global textile industry is highly wasteful and inefficient, as it consumes large amounts of resources, generates huge amounts of emissions and waste, and loses most of the value of the materials after use. The study argues that shifting to a circular model could create significant environmental and economic benefits, such as reducing greenhouse gas emissions by 44%, saving water by 28%, and creating an additional \$500 billion in value by 2030.

4.4 Lack of government support and regulation

Interviewees including E7 and A2 emphasize the potential role of government policies, regulations and incentives in catalysing the circular transition. They recommend interventions like stricter regulations, tax breaks and subsidies. This resonates with the challenge of lack of policy frameworks and weak enforcement of environmental compliance currently. The GFA report states that the government of Bangladesh has not yet developed a clear policy and regulatory framework to support and incentivize the circular economy in the RMG sector. There are also gaps and inconsistencies in the existing laws and regulations related to environmental and social compliance, such as waste management, labour rights, and safety standards (Ishty & Tasneem, 2021). Moreover, the enforcement and monitoring of these laws and regulations are weak and ineffective.

4.5 Lack of infrastructure and facilities

While not explicitly highlighted by the interviewees, the lack of infrastructure and circular economy facilities likely manifests as a broader impediment to innovation and collaboration within the industry. The fragmented nature of the sector hints at infrastructural limitations. The RMG sector in Bangladesh faces many infrastructural challenges, such as poor road and port connectivity, unreliable and expensive electricity and gas supply, and inadequate water and sanitation services (*The Business Standard*, 2023). These challenges affect the efficiency and quality of the production and distribution processes, as well as the environmental and social performance of the sector. Furthermore, there are not enough facilities and services to support the circular economy, such as collection and sorting systems, recycling and remanufacturing plants, and sharing and leasing platforms.

4.6 Lack of market and product diversification

The heavy concentration on cotton-based garments and key export markets indicates that diversification has been a persistent challenge. The interviews focus on the dominant fast fashion model, implying market and product homogeneity. For circularity, exploring new materials, designs and markets will be imperative. The RMG sector in Bangladesh is heavily dependent on a few products and markets, such as cotton-based garments and the EU and US markets (Sustainable Synergy, n.d.). This makes the sector vulnerable to fluctuations in raw material prices, supply chain disruptions, and changing consumer preferences. To embrace the circular economy, the sector needs to diversify its products and markets, by

exploring new materials, designs, and functions, as well as new customers, regions, and channels.

5. Analysis

In this section, based on the responses of the interviewees and the literature review, this thesis will draw a picture of the current scenario and the future of the circular economy.

5.1 Lack of awareness and knowledge

Many stakeholders in the RMG sector, such as factory owners, managers, workers, suppliers, and customers, are not aware of the concept and benefits of a circular economy. They may also lack the knowledge and skills to implement circular practices, such as designing for durability and recyclability, using eco-friendly materials and processes, and managing waste streams. Therefore, there is a need for more education and training on circular economy for the RMG sector.

The lack of a clear and consistent definition and understanding of circular economy among the stakeholders. Different sources may use different terms and concepts to describe a circular economy, such as green business, sustainable development, environmental compliance, etc. This may create confusion and ambiguity among the stakeholders and prevent them from adopting a common vision and strategy.

The lack of adequate and reliable data and information on the current state and potential of the circular economy in the RMG sector. There is a need for more research and analysis on the environmental and economic impacts of the circular economy, as well as the best practices and success stories from other countries and sectors. According to Khatun, n.d. this would help the stakeholders to assess the opportunities and challenges of circular economy and make informed decisions

The lack of effective and accessible communication and dissemination channels to raise awareness and knowledge of the circular economy among the stakeholders. There is a need for more media coverage, publications, workshops, seminars, webinars, and online platforms to share and exchange information and knowledge on the circular economy. These channels should target different groups of stakeholders, such as policy makers, industry leaders,

workers, suppliers, customers, etc., and use appropriate languages and formats to suit their needs and preferences.

The lack of sufficient and relevant education and training programs on circular economy for the RMG sector. There is a need for more formal and informal learning opportunities for the stakeholders to acquire the knowledge and skills to implement circular economy practices. These programs should cover topics such as circular design, eco-friendly materials and processes, waste management, recycling and remanufacturing, sharing and leasing, etc. They should also be tailored to the specific needs and levels of the stakeholders, such as factory owners, managers, workers, etc.

5.2 Resistance to change

The RMG sector in Bangladesh has been operating for almost 40 years with a linear production model, which is based on the 'take-make-consume-waste' method of resource utilization. Changing this model to a circular one would require a radical shift in the mindset and behavior of the stakeholders. They may resist the change due to fear of losing their competitive advantage, lack of trust and collaboration, and inertia to adopt new technologies and practices.

The RMG sector in Bangladesh is highly competitive and price-sensitive, as it faces stiff competition from other low-cost producers, such as Vietnam, Cambodia, and Myanmar. The sector relies on its low labour cost and high-volume production to maintain its market share and profitability. Any change that may increase the cost of production or reduce the output may jeopardize the sector's competitiveness and survival.

The RMG sector in Bangladesh is fragmented and complex, as it involves a large number of stakeholders, such as factory owners, managers, workers, suppliers, buyers, government, NGOs, and consumers. These stakeholders have different interests, expectations, and power relations, which may create conflicts and mistrust among them.

For example, factory owners may be reluctant to invest in circular practices, such as green factories, waste management, and recycling, if they do not see a clear return on investment or a guarantee from the buyers. Workers may be fearful of losing their jobs or facing health and safety risks due to the introduction of new technologies and processes. Buyers may be

hesitant to pay a premium price or commit to long-term contracts with the suppliers who adopt circular practices.

Government may lack the political will or the institutional capacity to enforce and monitor the environmental and social regulations and standards (*The Business Standard*, 2023). NGOs and consumers may have limited awareness or influence on the RMG sector's practices and performance

The RMG sector in Bangladesh is conservative and risk-averse, as it has been following the same linear production model for decades. The sector has a low level of innovation and adaptation, as it mainly produces basic and standardized products, such as T-shirts, jeans, and sweaters. The sector has a low level of collaboration and learning, as it operates in a hierarchical and authoritarian manner, with little communication and feedback among the stakeholders. The sector has a low level of motivation and commitment, as it faces constant pressure and uncertainty from the external environment, such as the Covid-19 pandemic, the trade war, and the climate change.

5.3 Lack of government support and regulation

The government of Bangladesh has not yet developed a clear policy and regulatory framework to support and incentivize the circular economy in the RMG sector. There are also gaps and inconsistencies in the existing laws and regulations related to environmental and social compliance, such as waste management, labour rights, and safety standards. Moreover, the enforcement and monitoring of these laws and regulations are weak and ineffective.

The government of Bangladesh has been dragging its feet on creating a clear policy and regulatory framework to support and incentivize the circular economy in the RMG sector. This is a shame, because the circular economy could bring huge benefits to the country's economy, environment, and society.

The existing laws and regulations related to environmental and social compliance, such as waste management, labour rights, and safety standards, are outdated, inconsistent, and inadequate. They do not reflect the current challenges and opportunities of the RMG sector, nor do they align with the global standards and expectations. Moreover, the enforcement and monitoring of these laws and regulations are weak and ineffective. There is a lack of political

will, institutional capacity, and public awareness to ensure compliance and accountability. As a result, the RMG sector faces many risks and costs, such as environmental degradation, social unrest, legal disputes, and reputational damage.

5.4 Lack of Infrastructure and Facilities

The challenge in advancing circular practices within the industry stems from inadequate infrastructure and facilities. According to respondent F9, the industry lacks proper sorting, recycling, and remanufacturing facilities crucial for effective circular implementation. The sector's fragmented nature is likely a result of these infrastructural limitations, as explained by respondent D6, citing challenges like poor roads affecting distribution. The RMG industry in Bangladesh faces various infrastructure-related difficulties, including unreliable electricity noted by respondent A1 and a shortage of water and sanitation services highlighted by respondent C4. These issues directly impact the efficiency and quality of production and distribution processes. Furthermore, there is a notable absence of facilities and services necessary for promoting a circular economy, encompassing collection and sorting systems, recycling and remanufacturing plants, and sharing platforms.

The lack of infrastructure and circular economy facilities likely manifests as a broader impediment to innovation and collaboration within the industry. The fragmented nature of the sector hints at infrastructural limitations. The RMG sector in Bangladesh faces many infrastructural challenges, such as poor road and port connectivity, unreliable and expensive electricity and gas supply, and inadequate water and sanitation services (*The Business Standard*, 2023). These challenges affect the efficiency and quality of the production and distribution processes, as well as the environmental and social performance of the sector. Furthermore, there are not enough facilities and services to support the circular economy, such as collection and sorting systems, recycling and remanufacturing plants, and sharing and leasing platforms. To overcome these challenges, the RMG sector in Bangladesh needs to invest in improving its physical and digital infrastructure, as well as fostering innovation and collaboration among its stakeholders. According to a report by Remy et al. (2016), the RMG sector in Bangladesh can benefit from digitizing its operations, such as using digital platforms for sourcing, production, and logistics, as well as adopting automation and artificial intelligence for enhancing productivity, quality, and flexibility. Digitization can also enable greater transparency and traceability along the value chain, which can improve the

sustainability and circularity of the sector. Moreover, the RMG sector in Bangladesh can leverage its existing strengths, such as its large and skilled workforce, its entrepreneurial spirit, and its strong relationships with global buyers, to foster a culture of innovation and collaboration. For instance, the RMG sector can partner with academia, research institutions, and innovation hubs to develop new solutions and technologies for the circular economy, such as new materials, designs, and functions. Additionally, the RMG sector can collaborate with other sectors, such as the textile, plastic, and ship recycling industries, to create synergies and opportunities for circular use of resources.

The RMG sector in Bangladesh faces many infrastructural challenges, such as poor road and port connectivity, unreliable and expensive electricity and gas supply, and inadequate water and sanitation services. These challenges affect the efficiency and quality of the production and distribution processes, as well as the environmental and social performance of the sector. Furthermore, there are not enough facilities and services to support the circular economy, such as collection and sorting systems, recycling and remanufacturing plants, and sharing and leasing platforms. The road and port connectivity in Bangladesh is often congested, damaged, and inefficient, which causes delays, losses, and higher transportation costs for the RMG sector. According to a report by the World Bank, the average speed of trucks in Bangladesh is only 18 km/h, and the average time to clear customs at the port is 11 days (Saha et al., 2024). These factors reduce the competitiveness and profitability of the RMG sector, as well as increase the carbon footprint and waste generation.

The electricity and gas supply in Bangladesh is unreliable and expensive, which affects the productivity and quality of the RMG sector. The RMG sector consumes about 15% of the total electricity and 38% of the total gas in the country, but faces frequent power cuts and gas shortages (Sarkar et al., 2020). The RMG sector also has to pay high tariffs for electricity and gas, which increases the production cost and reduces the profit margin. Moreover, the dependence on fossil fuels for energy generation contributes to greenhouse gas emissions and climate change.

The water and sanitation services in Bangladesh are inadequate and unsustainable, which affects the health and safety of the RMG sector. The RMG sector uses about 1,500 billion liters of groundwater annually, which is equivalent to the water needs of 11 million people (Sakib, 2023). The excessive withdrawal of groundwater causes land subsidence, saltwater intrusion, and reduced water quality. The RMG sector also generates about 4 million tons of

textile waste per year, most of which ends up in landfills or is burned. The improper disposal of waste causes water pollution, soil contamination, and air pollution, which pose serious risks to the health of workers and the surrounding communities.

The facilities and services to support the circular economy in the RMG sector are scarce and underdeveloped, which limits the potential of the sector to reduce waste and reuse resources. There are not enough collection and sorting systems to separate and recover the textile waste from the RMG sector. There are not enough recycling and remanufacturing plants to process and transform the textile waste into new products or materials. There are not enough sharing and leasing platforms to enable the RMG sector to access or provide the products or services without owning them. These factors prevent the RMG sector from adopting circular practices, such as designing for durability and recyclability, using eco-friendly materials and processes, and managing waste streams.

5.5 Lack of market and product diversification

The industry faces a persistent challenge due to the lack of diversification in products and markets, as explained by respondent C5, emphasizing a focus on basic cotton items for export orders. This concentration on cotton-based garments and specific export markets signals a notable absence of diversification. Respondent E8 further contributes to this perspective by noting a predominant focus on catering to US and EU buyers. The interviews underscore a prevailing fast fashion model, highlighting homogeneity in both markets and products. To foster circularity, there is a critical need to explore new materials, designs, and markets. The industry's reliance on a limited range of products and markets exposes it to vulnerabilities from external shocks. Transitioning to a circular economy requires diversification into new materials, designs, functions, customers, regions, and distribution channels

The RMG sector in Bangladesh is heavily dependent on a few products and markets, such as cotton-based garments and the EU and US markets. This makes the sector vulnerable to fluctuations in raw material prices, supply chain disruptions, and changing consumer preferences. To embrace the circular economy, the sector needs to diversify its products and markets, by exploring new materials, designs, and functions, as well as new customers, regions, and channels.

The heavy concentration on cotton-based garments and key export markets indicates that diversification has been a persistent challenge. The interviews focus on the dominant fast fashion model, implying market and product homogeneity. For circularity, exploring new materials, designs and markets will be imperative. The RMG sector in Bangladesh is heavily dependent on a few products and markets, such as cotton-based garments and the EU and US markets (Sustainable Synergy, n.d.). This makes the sector vulnerable to fluctuations in raw material prices, supply chain disruptions, and changing consumer preferences. To embrace the circular economy, the sector needs to diversify its products and markets, by exploring new materials, designs, and functions, as well as new customers, regions, and channels. Some examples of new materials that are being used in the fashion industry are organic cotton, recycled cotton, hemp, linen, bamboo linen, cork, mushroom leather, cactus leather, and econyl (Bell, 2023). These materials are more sustainable and eco-friendlier than conventional fabrics, as they use less water, energy, chemicals, and land, and reduce waste and greenhouse gas emissions. They also offer new aesthetic and functional possibilities, such as durability, breathability, biodegradability, and antimicrobial properties (Broom, 2021). Some of these materials are also vegan and cruelty-free, which can appeal to ethical consumers who avoid animal-based products.

By using these innovative fabrics, the RMG sector in Bangladesh can create more value for its products, differentiate itself from competitors, and access new markets that demand more sustainable and ethical fashion. For instance, the European Union has recently adopted a new Circular Economy Action Plan, which aims to make textiles more circular and sustainable, and to support the market for sustainable and circular textiles (European Commission, 2020). This could create new opportunities for the RMG sector in Bangladesh, if it can align its production.

5.6 The Way Forward

To overcome these challenges, the sector needs to adopt a holistic and collaborative approach, involving all the relevant stakeholders, such as the government, the industry associations, the brands and buyers, the suppliers and manufacturers, the workers and unions, the civil society and NGOs, and the consumers and media.

Together, they can create a shared vision and strategy, develop and implement innovative solutions, and monitor and evaluate the progress and impact of the circular economy in the RMG sector. The RMG sector in Bangladesh is heavily dependent on a few products and markets, such as cotton-based garments and the EU and US markets (Razzaque, 2023). This makes the sector vulnerable to fluctuations in raw material prices, supply chain disruptions, and changing consumer preferences. To embrace the circular economy, the sector needs to diversify its products and markets, by exploring new materials, designs, and functions, as well as new customers, regions, and channels.

Product diversification can help the RMG sector to reduce its dependence on cotton, which is a water-intensive and pesticide-intensive crop, and to use more eco-friendly materials, such as man-made fibers (MMF), organic cotton, hemp, bamboo, etc. These materials can offer better quality, durability, and recyclability, as well as lower environmental impacts (*What's next for the Readymade Garments (RMG) Sector in Bangladesh?*, n.d.). Product diversification can also help the RMG sector to produce higher-value products, such as functional garments, smart textiles, and fashion items, which can increase the profit margin and competitiveness of the sector.

Market diversification can help the RMG sector to expand its customer base and reach new regions and channels, such as Asia, Africa, Latin America, online platforms, etc. These markets can offer higher growth potential, lower trade barriers, and more diversified demand patterns, which can reduce the risk of market saturation and demand shocks (Razzaque, 2021). Market diversification can also help the RMG sector to build stronger and more sustainable relationships with the buyers and consumers, who are increasingly demanding more environmental and social responsibility from the sector.

6. Conclusion

In this final chapter, the answer to the study's research question based on the empirical data analysis, and the theoretical framework will be presented. The answer will then be followed by the recommendations and limitations of the study. Some suggestions for future studies in the same field will also be included in this chapter.

6.1 Answer to the Research Questions

At the start of this thesis, the following research questions were chosen:

- What are the current sustainability practices within the Bangladeshi RMG industry?
- What are the key barriers and challenges hindering the transition to a circular economy within the industry?
- What are the potential economic, environmental, and social benefits of adopting circular economy principles in the Bangladeshi RMG industry?

Through literature review and interview responses, the following answers were revealed:

What are the current sustainability practices within the Bangladeshi RMG industry?

The current scenario of sustainability practices Bangladeshi RMG factories is not promising at all. Very few garment factories follow environmental protocols to keep pollution in check. Moreover, more often than not labours work in harmful working conditions in poorly maintained facilities. Despite tragic events like the Rana Plaza Tragedy, very little has been done so far to improve the scenario. On top of that, there is no news of promising innovations that can drive sustainability practices in the Bangladeshi RMG industry. One of the key concerns of the people in the industry is that maintaining sustainability is expensive, and the key selling point of Bangladeshi RMG products is the low cost. If the prices of the products increase due to increased production cost, many fear that the competitors will steal their business in markets where local products are exported.

Apart from the production and supply chain, the waste disposal section does not follow sustainability practices either. Due to the lack of infrastructure and awareness, wastes are disposed of without following sustainability practices. Some factories directly dump their wastes in waterbodies, which causes further pollution in the local neighbourhood. Some previous studies identified a lack of options to recycle as one of the key obstacles in RMG waste disposal in Bangladesh.

What are the key barriers and challenges hindering the transition to a circular economy within the industry?

Initial Investment Costs

Adapting to a circular economy requires significant investments in new technology, infrastructure, and processes. Many RMG manufacturers in Bangladesh may face financial constraints in making these initial investments.

Lack of Awareness and Education

There is evident lack of awareness and knowledge about circular economy principles and practices among industry stakeholders. Education and training are essential to ensure that workers, managers, and policymakers understand the benefits and methods of circularity.

Resistance to Change

Resistance to change is a common challenge in any industry. The RMG sector in Bangladesh has established practices, and shifting to circular models may face resistance from stakeholders who are comfortable with the current scenario.

Supply Chain Complexity

RMG supply chains can be complex and geographically dispersed. Implementing circular practices across the entire supply chain, from raw material sourcing to production to distribution, the process can be challenging and require coordination among various actors.

Infrastructure and Technology

Circular economy practices often require advanced technologies and infrastructure for recycling, remanufacturing, and waste management. Bangladesh needs to invest in upgrading its infrastructure to support these processes.

Regulatory and Policy Barriers

Existing regulations and policies may not be conducive to circular practices. The government needs to revise or create new policies to facilitate the adoption of circular economy principles.

Consumer Behaviour

Consumer demand for fast fashion and low-cost clothing is high and is most likely to stay the same. Shifting consumer behaviour toward sustainable and circular fashion choices may be a gradual process and a significant challenge.

Access to Sustainable Materials
Securing a consistent and affordable supply of sustainable and recycled materials can be a challenge, as the availability of such materials may be limited in Bangladesh.

Measurement and Reporting

Tracking and reporting circular economy metrics can be complex. Establishing standardized measurement practices for circularity in the RMG industry may require effort and cooperation.

Scaling Solutions

Pilot projects and small-scale initiatives are essential for testing circular economy solutions. However, scaling up these solutions across the entire industry can be a challenge, requiring careful planning and coordination.

Collaboration and Stakeholder Engagement

Implementing circular practices involve collaboration among various stakeholders, including government, industry, NGOs, and consumers. Building and maintaining these partnerships can be challenging.

Worker Skills and Training

Workers may need new skills and training to work with circular economy technologies and processes. Ensuring that the workforce is adequately prepared for these changes is essential.

Market Demand

The market may not yet fully embrace circular fashion, making it challenging for RMG companies to sell circular products at competitive prices.

Waste Management Infrastructure: Bangladesh needs to invest in improved waste collection and recycling infrastructure to support circular practices effectively.

Despite these challenges, the adoption of circular economic models in the Bangladeshi RMG industry is critical for its long-term sustainability and resilience. Overcoming these obstacles will require a combined effort from industry stakeholders, government, and international partners.

What are the potential economic, environmental, and social benefits of adopting circular economy principles in the Bangladeshi RMG industry?

Even though most people in the RMG industry of Bangladesh don't see any immediate benefits of adopting a circular economic model, there are some obvious benefits that the industry can enjoy in the long run. By adopting the circular economic model, the industry can decrease its dependency on imported raw materials. Even though Bangladesh is one of the top RMG exporters of the world, raw materials are not mostly produced in the local economy. As a result, a high-dependency on exported raw materials is prevalent in the industry. If circular economic model can be adopted by and large, recycling the wastes of finished goods can be a great way to produce more products or secondary products. This will help reduce the import-dependency to some extent.

The environmental benefits will be almost instantaneous and obvious. Bangladesh is one of the top-ranked countries in the world in terms of air pollution. On top of that, Poor waste management is responsible for soil and water pollution as well. A circular economic model will make the waste management process more advanced. This will help the authorities put a leash on pollution. Over time, this will even improve the fertility of the cultivable lands in nearby areas of the factory location. Public health will significantly improve as well if water and air pollution can be kept in check.

As the RMG industry is the core of the Bangladeshi economy, it is responsible for the lion's share of the employment opportunities in the country. Adopting sustainable practices in this

industry will bring a crucial social change too. If people involved in this industry can be encouraged to practice sustainability, it can be a great way to promote sustainability in society as well. Most of the labourers who work in the Bangladeshi RMG industry come from the lower class of the society. It is really difficult to make them aware of caring about the environment and sustainable living. If their workplaces start such practices, they can be reached in the easiest way.

6.2 Initiatives in Bangladesh

Bangladesh, as the second-largest global sourcing destination for Ready-Made Garment (RMG) products, confronts significant environmental challenges associated with the production of textile waste, amounting to an annual output of 5.77 lakh tons (Wing, 2024). Notably, a substantial portion of valuable post-industrial waste, constituting two-thirds of the total, is exported (Wing, 2024). In response to these challenges, Bangladesh has embarked on several initiatives aimed at fostering circularity and sustainability within the RMG industry.

One noteworthy endeavour is the Bunon 2030 project, designed to empower women employed in the garment sector while simultaneously addressing multifaceted challenges posed by automation, geopolitics, and decarbonization (Wing, 2024). This initiative reflects Bangladesh's commitment to enhancing both social and environmental dimensions within the RMG industry. Furthermore, external stakeholders, such as the Nordic Chamber of Commerce and Industry (NCCI) in Bangladesh, have played a role in promoting circular economy practices within the country's RMG sector.

In March 2023, the NCCI, in collaboration with the European Union and Nordic Embassies, organized a pivotal event titled 'Promoting Circularity for a Sustainable Ready-Made Garment (RMG) Industry in Bangladesh'. This event served as a platform for fostering discourse and collaboration towards sustainable practices in the RMG sector. The involvement of international entities underscores the global recognition of the importance of circularity in addressing environmental concerns associated with the RMG industry in Bangladesh.

6.3 Circular Economy Initiatives in Denmark, Norway and China

6.3.1 Denmark

Denmark has emerged as a frontrunner in the realm of circular fashion, positioning itself as a vanguard in the integration of innovation and sustainability within the sector. The nation's commitment to advancing circularity is evidenced by its active involvement in global initiatives such as the Circular Fashion Partnership facilitated by P4G (Partnering for Green Growth and the Global Goals) and the Danish Global Fashion Agenda. The Circular Fashion Partnership is a cross-sectoral initiative to support the development of effective circular fashion systems in textile, garment and footwear manufacturing regions, including Denmark (Armitage, 2022). The objective of the partnership is to capture and recycle post-industrial apparel and footwear waste. The ultimate goal of this partnership was to ensure the highest value output by maintaining a waste hierarchy process. These initiatives collectively strive to augment the utilization of recycled textiles in the production of new garments while concurrently mitigating the voluminous waste generated by the fashion industry.

Particularly noteworthy is Denmark's dedicated engagement in the Circular Fashion Partnership, a collaborative effort that underscores the country's commitment to fostering sustainable practices within the fashion domain. This initiative is indicative of Denmark's proactive stance in addressing the environmental challenges posed by the conventional linear fashion model, aiming to instigate a paradigm shift towards circularity (Armitage, 2022).

Furthermore, Denmark's diplomatic presence in Bangladesh, as exemplified by the Danish Embassy in Dhaka, extends beyond mere participation in global partnerships. The embassy has strategically allocated resources, including a specialized team, to ensure the sustainability and greening of value chains within the fashion sector. This multifaceted approach underscores Denmark's holistic commitment to driving sustainable change within the fashion industry.

6.3.2 Norway

In a similar vein, Norway, another Nordic nation, has demonstrated a keen interest in circularity and environmental preservation within the Ready-Made Garments (RMG) sector.

The Norwegian Embassy in Dhaka has forged collaborations with the United Nations Industrial Development Organization (UNIDO) to address the pressing issue of water pollution, a significant externality arising from the RMG sector in Bangladesh. This collaborative effort is realized through the 'Integrated approach towards sustainable plastics use and marine litter prevention in Bangladesh' project, exemplifying Norway's dedication to tackling environmental challenges associated with the fashion industry (Development cooperation, n.d.).

The proactive engagement of both Denmark and Norway in international collaborations underscores a broader global momentum towards embracing circular practices within the RMG industry. These endeavours reflect a collective commitment to fostering sustainability, innovation, and environmental stewardship within the intricate fabric of the fashion sector, transcending national boundaries in pursuit of a more circular and sustainable future.

6.3.3 China

While China is not renowned for sustainable practices within its RMG industry, China has been taking initiatives to implement circular economic models in this sector. Sustainable fashion is becoming increasingly popular among Chinese customers, fashion designers, and companies as a means of addressing the difficulties that have been presented. Chinese organizations, as well as the government is reevaluating conventional manufacturing methods. Environment friendly materials are being sourced- such as organic cotton, recycled textiles, hemp, bamboo, etc., are becoming more popular among Chinese fashion manufacturers (Transitions to Circular Economy Practices in Textile and Apparel MSMEs along the Lifecycle in Huzhou and Shaoxing › GRANTS PROGRAMME, n.d.).

Some apparel manufacturers use fewer amounts of chemicals, pesticides and water during the manufacturing process. It makes waste management a lot easier. The government is also trying to bring more accountability and transparency in the fashion supply chain. The government forms partnerships with manufacturers who apply ethical sourcing methods and environment friendly manufacturing practices. While China has a long way to go, they are taking some crucial steps in making their fashion industry sustainable.

6.4 Advantages and Disadvantages for Bangladesh

As the second-largest global sourcing destination for RMG products, contributing over 10% to the country's GDP, Bangladesh presents a substantial opportunity for circular practices. This paper examines both positive factors, such as global demand and civil society engagement, and challenges, including infrastructure limitations, regulatory gaps, and a lack of consumer awareness.

6.4.1 Global Demand and Incentives

International buyers and brands present in Bangladesh's RMG industry create a favourable environment for circular practices. Initiatives like the Circular Fashion Partnership demonstrate a commitment to sustainability, aiming to increase the use of recycled textiles and reduce waste.

6.4.2 Civil Society and NGO Sector

The active civil society and NGO sector in Bangladesh can play a vital role in advocating for circular economy principles, addressing environmental and social concerns related to the RMG sector.

6.4.3 Infrastructure and Technological Limitations

The lack of infrastructure and technology for recycling textile waste poses a significant challenge. Investment and innovation are crucial for successful circular design and production techniques.

6.4.4 Regulatory Gaps and Enforcement

Despite existing environmental laws, challenges persist in effective implementation and monitoring. Strengthening regulatory frameworks, political will, and institutional capacity is essential for enforcing circular practices.

6.4.5 Lack of Consumer Awareness and Demand

The dominance of low-cost and low-quality items in the domestic market impedes circularity. Addressing this requires concerted efforts in consumer education about the benefits of circular products and services.

6.5 Recommendations for Improvement in Bangladesh

Bangladesh can enhance its Ready-Made Garment (RMG) sector by adopting circular economy principles. Through collaboration, investment, regulatory improvements, and consumer awareness, the country can drive sustainability in the industry.

6.5.1 International Collaboration

- Engage with global buyers to adopt circular standards.
- Use eco-friendly materials and practices.
- Promote waste recovery and product lifespan extension.

6.5.2 Infrastructure and Technology Focus

- Invest in recycling facilities and support projects like Bunon 2030.
- Foster innovation in circular design using technology.

6.5.3 Regulatory Enhancement

- Revise laws to align with circular economy principles.
- Introduce fees on waste generation and restrict hazardous substances.

6.5.4 Strengthen institutions for effective implementation

6.5.5 Consumer Awareness

- Educate consumers on environmental impacts and benefits of circular products.
- Introduce circular brands with eco-friendly packaging and information.

Strategically advancing collaboration, investment, regulations, and consumer awareness will propel Bangladesh's RMG sector toward sustainability. Initiatives like Bunon 2030 exemplify the commitment to circular practices, contributing to the industry's evolution (Wing, 2024).

6.6 Limitations

The study comes with a few limitations that need to be addressed. The first limitation is the way the interviews were conducted. As it was not possible for the researcher to travel to Bangladesh and conduct the interviews face-to-face, all the interviews were conducted online. This did not give the researcher with enough opportunities to have observations on the respondents. Secondly, the interviews had a lot of unstructured data, as the questions were open-ended. It was challenging to include all the data provided by the interviewees in the research, and the most relevant data to the study was included in the empirical setting. Thirdly, different perspectives from different demographics were taken into account for the study, which made the research area broad in some aspects. And lastly, the sample size could have been larger for the research to be more conclusive. With a larger sample size, the accuracy of the research findings would have been significantly improved.

6.7 Contribution and Future Research

This research attempted to give an overall picture of sustainability practices and the potential for circular economic model in the Bangladeshi RMG industry. However, more research and study are needed in order to understand why innovation on circular economic models doesn't yet occur in the country. Besides, apart from Bangladesh, some more countries have a significant problem with maintaining sustainability and implementing circular economic models. More studies can be conducted to identify if similar problems also affect the sustainability of those countries as well (India, for example). With further studies in these countries, more conclusive answers can be discovered.

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8. Appendix 1 - Interview Questions

- Can you provide an overview of the current waste management practices within your company and the extent to which circularity is considered?
- What are the main barriers or challenges you perceive in implementing a circular economic model in the Bangladeshi RMG industry?
- How do you envision the adoption of a circular economic model benefiting the overall sustainability and competitiveness of your company?
- What specific strategies or initiatives do you believe would be effective in promoting circularity within the RMG value chain in Bangladesh?
- What role do you think product design and innovation can play in facilitating the transition to a circular economic model in the Bangladeshi RMG industry?
- In your opinion, what policies or regulations should be put in place to support and incentivize circular practices within the RMG sector?
- How do you perceive the readiness of the current recycling and waste management infrastructure in Bangladesh to support a circular economic model in the RMG industry?