

Opportunities and Challenges for Bangladesh's Clothing Industry in the Circular Economy

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ABSTRACT

Textiles and clothing are essential human requirements. Every second, one garbage truckload of textiles is landfilled or burnt worldwide, with less than 1% of fibers used in garment manufacture recycled into new wearable clothes. This phenomenon is due to the linear economy in the textile industry, which is a one-way system: resources are converted into manufactured products, sold for use, and eventually discarded. This study aims to discover the barriers and scopes of implementing a circular economy in Bangladesh. For this, we conduct a qualitative analysis where we collect opinions from garment manufacturing industries stakeholders and partners to identify the practical challenges, scopes, and solutions for developing and establishing a circular economy in the garment manufacturing sector in Bangladesh. This study applied seven fundamental circular economy principles for the survey to discover the opportunities and challenges of the garments manufacturing industry inside. Interviews from different levels of industry experts summarized the actual situation of the industry. Most industry experts and stakeholders indicate that the cost of implementing greener production, technological obstacles, and lack of skilled workforce are the main barriers to effectuating the circular economy. This study definitively answers the questions regarding the current scenario of Bangladesh's clothing industry's circular economy. Furthermore, studies are required to find sustainable solutions to accomplish circular economy practice.

Keywords: Circular economy, technological barriers, greener practice, garment sector.

1. Introduction

After oil refineries, the textile and garment industry is the second most polluting sector. 17–20 percent of the world's water supply is tainted due to this process. It's the second biggest contributor to atmospheric carbon dioxide after burning fossil fuels. Clothing was once a basic need, but nowadays, it's more about being fashionable and practical. Clothing consumption has doubled in the last 15 years compared to the industry of the 19th century. Every year, the textile industry produces around 52,000,000 metric tons of fibers for manufacturing fresh garments. More than USD 100 billion is lost yearly in materials due to the low rate of recycling (1%) of textiles used in the production of clothes [2].

The phrase "Circular Economy" was coined by architect William McDonough. This idea is grounded in an economic, social, and environmental production and consumption paradigm with the end goal of establishing a closed-loop social system [3]. The seven tenets upon which the Circular Economy is founded are as follow:

- a) Sustainable purchasing
- b) Eco-design
- c) Industrial and territorial ecology
- d) The economics of functionality
- e) Responsible consumption
- f) Lifespan extension
- g) Waste prevention, management, and recycling improvements [4].

This research was conducted to weigh the pros and cons of adopting a circular economy in the fashion industry. In-depth interviews with experts in the field were conducted to collect the necessary information.

Large quantities of unwanted materials are produced throughout the production and cutting stages of the garment industry. If these leftovers are turned into new yarns and utilized in remanufactured garments, the market size might reach \$4 billion [5]. For an additional \$5 billion in revenue and almost 20,000 jobs, Bangladesh needs to receive used garments for recycling [6].

Textile garment manufacturers, as we all know, are polluting the environment. They need to be appropriately utilizing environmentally friendly materials. They are wasting many resources. They are polluting the environment by producing toxic gases. As a result, the only way to survive all of these is through the "Circular Economy." This case study aims to do a few things, like look at the current state of the circular fashion business, potential future developments, and how Bangladesh might join the circular economy in the garments sector.

2. Literature Review

The term "circular economy" is often used to describe efforts in the fashion industry to reduce waste by reusing materials as feasible. The current linear model of the fashion industry, "In which raw materials are farmed, manufactured into commercial products, then purchased, worn, and eventually discarded by customers," is threatened by a circular textile economy [7].

Essential companies have come together at the Copenhagen Fashion Summit to pledge to implement more sustainable practices by 2020 [8]. Companies are teaming with researchers and consultants to create guidelines and conduct experiments. Research and case studies have already established the feasibility of circular

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fashion in social, technological, and commercial contexts. In December 2017, the Ellen MacArthur Foundation published "A New Textile Economy: Redesigning Fashion's Future," a study that details how the textile industry might profit from adopting a more circular fashion model [2].

An analysis titled "German Textile Recycling Benchmarking" demonstrated that Finland's German textile recycling technology was feasible [8]. Furthermore, we conducted a feasibility study introducing a circular economy to the sector. Importing worn clothing from overseas and operating the complete phase recycling process is necessary to gain the most value from cloth recycling. Importing used clothing to developing nations is beneficial, according to a study co-authored by the German Ministry for Economic Cooperation and Development (BMZ) and the Swiss Academy for Development (SAD) [9]. According to the United Kingdom-based research organization OXFAM, importing SHC is generally beneficial for developing countries. This phenomenon occurred in some African countries for a considerable time [10]. However, these strategies have hurt their domestic textile production and retail outlets. They have banned the import of worn garments to help local garment manufacturers, and other African countries, including Rwanda, Uganda, Tanzania, and Ghana, are considering doing the same [9].

In a circular economy, which also places a premium on the utilization of renewable energy sources and systems thinking, the value of raw materials, components, and completed commodities is preserved to the greatest extent possible. The three pillars of the circular economy are reducing, reusing, and recycling materials and components. The circular economy depends on three elements: closed cycles, renewable energy, and system thinking [11]

The Seven Tenets of a Resource-Responsive Economy according to William McDonough ("father of the circular economy"), the seven key concepts are:

(1) Sustainable Purchasing: Sustainable purchasing is a strategy for satisfying a company's needs for products, services, works, and utilities that prioritizes long-term financial viability and social and environmental benefits over short-term profit or gain [12-13].

(2) Eco-Design: The goal of eco-design is to lessen a product's toll on the natural world. It is a way of designing things that consider the product's effects on the planet throughout its existence. To put it simply, the development of a product takes into account the means and materials employed, intending to reduce the product's adverse effects on the environment. Eco-design is aided by life cycle assessment since it gives designers more environmentally friendly options [14].

(3) Industrial and Territorial Ecology: The focus of industrial and territorial ecology is material and energy flow in industrial systems. The global industrial economy is a network of factories that extract raw materials from the ground and refine them into consumable goods [15].

(4) The economics of functionality: An economy based on functionality seeks to maximize utility for the most prolonged period with the least amount of material and energy input. Thus, this functional economy is more sustainable, or dematerialized, than the current economy, which primarily focuses on manufacturing as a means of generating wealth and material flow. The circular economy often plans to do away with goods sales and replace them with a rental property system. After a product has fulfilled its original purpose and been returned to the manufacturer, it is dismantled so that any salvageable components can be put to new use [16-17].

(5) Responsible Consumption: It is a broad concept that incorporates monetary, social, health, and environmental considerations. Responsible consumption is defined as consumption that meets one or more of the following standards:

- a) Having less of an effect on the environment through the usage of eco-friendly items.
- b) Buying products because of their positive effect on society.
- c) To make a positive economic impact, product usage.
- d) Buying and using products with a focus on moral or ethical principles [18].

(6) Lifespan extension: Planned obsolescence, in which items are designed to break down after a set amount of time, is the polar opposite of the goal of extending a product's useful life. Several techniques increase a product's longevity (and hence, value): Products should be designed with repairability, maintenance, reuse, and remanufacturing in mind. More prolonged use of an item's intended function is possible because of extra features that designers can add. When products are designed to break down after a specified time, this practice is known as planned obsolescence [19].

(7) Waste prevention, management, and recycling improvements: Enhancing Waste Avoidance, Administration, and Recycling Garment waste reduction, recycling, and disposal management is essential due to the rising cost and limited availability of dumping space and the depletion of natural resources. Raw materials go through several procedures throughout production to be transformed into final products. Byproducts from each stage of production are thrown away. Understanding the current solid waste reduction, recycling, and disposal practices in the readymade garments industry, as well as the industry's attitude and willingness to recycle, perception of the feasibility of recycling, barriers to recycling, and marketing strategies, is essential for

improving waste prevention, management, and recycling [20].

Bangladesh's garment industry has been there since the 1980s and has come a long way. Following only China, Bangladesh is the world's second-largest exporter of RMG. Approximately 81% of RMG's annual export revenues of over 31 billion USD come from RMG. The textile and garment sector generates roughly twenty percent of Bangladesh's gross domestic product. An estimated 20 million people have some direct connection to the industry. These obstacles include:

1. Weak Infrastructure
2. Reliance on Primary Sources
3. there is a lack of utilities, fuel, or electricity.
4. Deteriorating Environment
5. Inadequate use of resources
6. Failure to Ensure Social Compliance and Safety [10]

The term "fashion" refers to adorning one's person following established norms or general preferences. Simply put, fashion is the art of making standard garments look sophisticated. Being trendy involves more than just buying and wearing the latest trends; it also involves tailoring one's wardrobe to fit one's lifestyle and the occasion, culture, and setting in which one finds oneself. The apparel industry relies heavily on the latest trends. As clothing trends shift, so do industry requirements. In addition, a circular fashion must be adopted to complete the textile and clothing's circular economy. The modern fashion industry produces two distinct types of clothing trends:

- a) Slow Fashion and b) Fast Fashion [21].

3. Methodology

As a qualitative study, this one focuses on answering specific questions. Our study intends to make subjective judgments based on collected data such as garment firms' steps toward circularity, managerial skills, industry owners' opinions, and suppliers' interactions. We applied the case study technique to understand better the opportunities and limitations of adopting the circular economy in Bangladesh's garment industries.

3.1 Data Sourcing

Respondents' opinion

3.2 Mode of Interaction

- a) Interviews conducted via Telephone
- b) Interviews conducted via Electronic Mail
- c) Interviews conducted by Face to Face

3.3 Interview in Detail

Standard methods of interviewing included:

- a) Free-form discussion (open-ended)
- b) Conclusive (Closed-ended)

3.4 Focus group

Manufacturers of clothing and other interested parties are the primary focus group.

3.5 Method of Data Collection

- a) Two free-form and fifteen closed-ended questions about the use of tools, advantages, and disadvantages of implementing a circular economy, and the results were used to collect information.
- b) Information for the interview schedule was acquired through phone interviews, emails with explanatory text, and in-person interviews with stakeholders who requested such a meeting.
- c) The same researchers collected data via note-taking and in-person observation of the case study.
- d) Data from a third-party archive was also used, which contained information about the case company and its vendors.

3.6 Questionnaire Design:

For open-ended inquiries, specific answers to "How?", "Why?" and "What?" are required to assess causes and defects.

We grouped closed-ended questions into seven areas to determine the consequences or purpose of circularity based on the company's essential beliefs. They are presented in table 1.

Table 1 Questionnaire for Circular Economy survey

Key sections	Questionnaire
Sustainable Purchasing	Do you believe in the statement, "Sustainable purchasing is essential for cost-effectiveness"?
	Do you agree with the statement, "Improved worker rights are crucial for sustainable procurement, and our company maintains this"?
	Do you believe that developing ties with suppliers is essential for sustainable procurement?
	Please comment on the statement, "Implementing and administering a sustainable procurement plan typically implies large investment costs."
Eco-Design	Do you agree with the statement, "For successful eco-design, our company uses ecologically friendly technology that requires little energy, material, and fuel consumption"?
	Is a lack of information about the advantages of circular models one of the most significant obstacles to implementing eco-design?

Industrial and Territorial Ecology	Industrial ecology theories can assist in optimizing or redesigning waste management (logging, polluted water, and more). Therefore, they do not harm the natural ecology.
The Economics of Functionality	Do you agree with the statement, "Root-cause analysis can be utilized to improve the process and product quality"?
	Please comment on the statement, "Implementing circular economy is the best approach to boost firm productivity."
	Do you agree that "Many suppliers differ on the promotion of a green supply chain"?
Responsible Consumption	Do you agree with the statement, "The manufacturing line is extended due to responsible consumption"?
Lifespan Extension	Do you concur with the statement, "Theoretical lifetime extension is necessary for the circular economy"?
	Do you believe that extending the life cycle of a garment by nine months can reduce its carbon, waste, and water impact by 5-10 percent?
Waste prevention, management, and recycling improvements	Do you agree with the statement, "Preventing waste is an effective means of meeting environmental regulations"?
	Do you agree with the statement, "Our production costs will rise due to increased waste prevention efforts"?

The respondents' opinions were collected using a Likert chart with five scales, as shown in Table 2.

Table 2 Likert Chart [22].

Scale	Opinion
5	Strongly Agree
4	Agree
3	Neutral
2	Disagree
1	Strongly Disagree

The primary reasons for implementing seven essential circular economy concepts have been identified to understand the hurdles to the circular

economy comprehensively. They are categorized as follows:

- a) Local Market
- b) Government Support
- c) Cost
- d) Equipment
- e) Unskilled Laborers
- f) Technical Obstacles

4. Result and Discussion

We interviewed 45 manufacturers, stakeholders, and suppliers and summarized the feedback in Fig.1 and Fig.2. The questionnaire of the circular economy survey has been segmented into seven fundamental principles in Table 1. From the survey, we have found that 52% of respondents agreed and 34% strongly agreed with the importance of sustainable procurement in economical cost efficiency, improving worker rights, and developing relationships with suppliers, but this plan entails high investment costs. All the respondents' have agreed that eco-design by the circular model will help to reduce energy consumption. Industrial and territorial ecology helps to minimize wastage which does not cause any harm to the natural ecology. Most respondents have agreed that implanting a circular economy can improve the process and product quality and increase productivity. 64% of respondents agreed that responsible consumption would extend the production line. Extending lifespan, we can save resources like energy and water by 5-10%, which is strongly agreed by 36% of respondents and 32% remaining neutral. Waste prevention is another effective way of compliance attainment, agreed by 33% of respondents.

In Fig.2, we have identified the six significant challenges from respondents' acknowledgment of implementing sustainable procurement in the garment manufacturing sector. From there, they were asked to choose the most critical causes from six and segment them into seven fundamental principles of the circular economy. These six challenges are the local market, government support, cost, equipment, unskilled laborers, and technical obstacles. From the respondents' feedback in Fig.2 for sustainable procurement, we have found that 29% of respondents suggest technical challenges, 24% suggest cost, and 23% of respondents identified government support as the barrier to implementing a circular economy. 32% of respondents identified the cost, and 27% of respondents pointed out technological obstacles as the significant barriers to implementing eco-design. Furthermore, 23% of respondents clearly show they do not have advanced equipment. Other 19% of respondents are with government support, and the rest with r unskilled laborers and the local market.

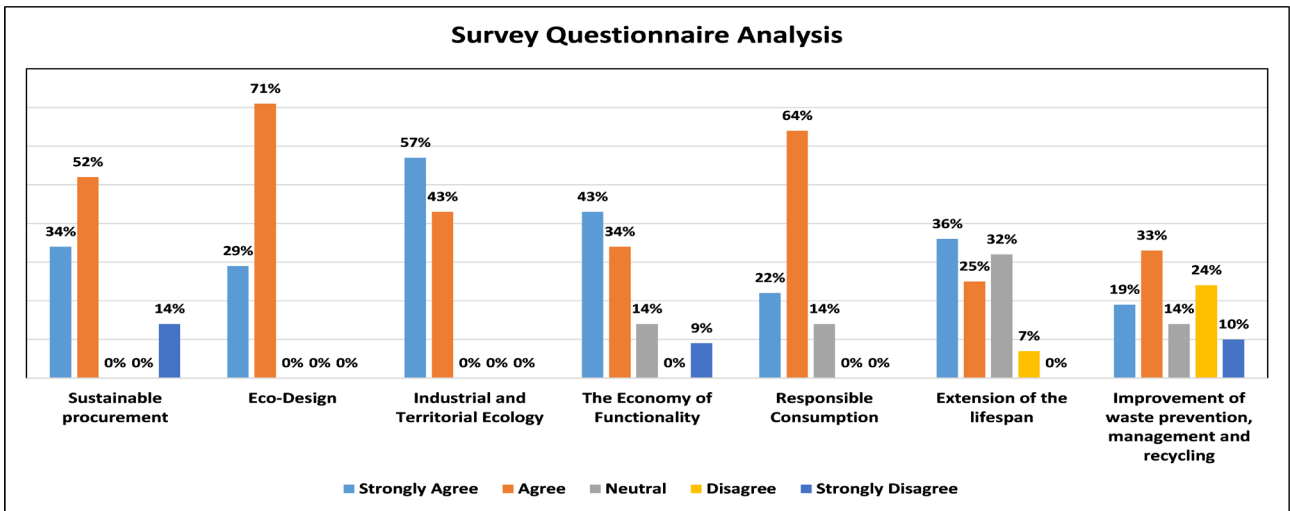


Fig.1 Survey questionnaire analysis using Likert chart.

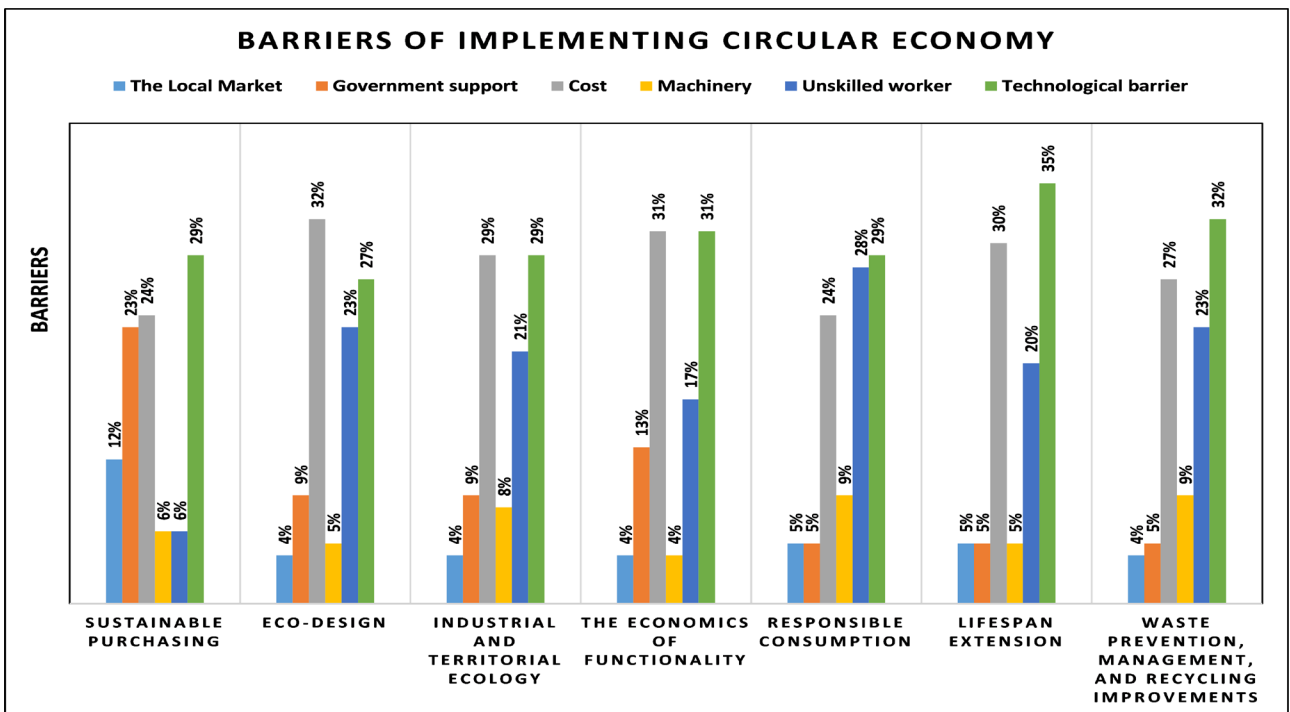


Fig.2 Challenges of implementing circular economy concerning seven fundamental principles of the circular economy.

A combined 29% of respondents cited technological obstacles and costs as the most significant obstacles. The rest are with unskilled laborers, machines, and government support for adopting industrial and territorial ecology systems. Three-quarters of respondents said that cost and technology hurdles were the biggest obstacles to implementing an economy of functionality. Unskilled workers were cited by 17% of respondents as a factor that impedes the implementation of economic functionality. 29% and 28% of respondents cited technical barriers and unskilled labor as significant barriers to enforcing policies that encourage conscious consumption. 24% of respondents cited the lack of funding, while the lack of modern equipment was by 9%. One-third of

respondents cited technology as the most significant barrier. 30% of respondents listed financial limitations as a critical barrier to life span extension. 20% of respondents agreed that there is a dearth of skilled labor. We can see that 32% of respondents cited technological barriers as the primary issue. The cost was cited by 27% of respondents as another obstacle to implementing waste prevention, management, and recycling improvements. Moreover, 23% of respondents concurred that they lack skilled labor.

From the survey analysis, we have found that most respondents agreed with the seven fundamental principles of circular economy, which helps to implement the circular economy in the garments

industries of Bangladesh. Most respondents pointed out that cost, technological barriers, and unskilled labor are the significant challenges of implementing the circular economy concerning seven fundamental principles of the circular economy. Currently, this industry gets a decent government local market and is equipped with modern machinery. So, manufacturers and stakeholders should develop sustainable solutions to overcome cost issues, technological barriers, and proper workforce training.

5. Conclusion

This study concentrated on finding significant barriers and opportunities to implement the circular economy in the garments industry of Bangladesh. The outcomes of this research work unveil that many obstacles emerge concerning a considerable number of circular economy performance indicators. Many industries need substantial initial investment and a significant length of time before they begin to enjoy the results, as we have seen in the cases analyzed. The resources around the world are decreasing, and inflation and manufacturing costs are increasing daily. So, everyone is concerned about the circular economy for existence. Bangladesh's clothing industry is also suffering from this issue. The seven fundamental principles of the circular economy must be followed and executed for proper implementation in this industry. Most of the respondents' responses indicate that the cost of implementing greener production, technological obstacles, and lack of skilled workforce are the main hurdles to effectuating the circular economy. So, we need to focus on these areas for improvement. We can also deduce that improved implementation of the circular economic model is possible if all of us, consumers and producers alike.

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