# Post-Consumer Level App-Based Circularity Framework in Apparel and Fashion Industry: A Case Study of Bangladesh

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## Abstract

With the rapid growth in the textile fashion Industry during the last two decades, raw materials consumption along with the excessive use of non-renewable resources rose significantly. As a result, the fashion and textile industries are facing crucial challenges to deal with limited natural resources. In the case of Bangladesh, circular fashion is completely a new concept and is yet to explore along with significant changes in technical frameworks and policies of the textile industry. The objective of this study is to design a post-consumer level circular economy framework in Bangladesh using reselling, repairing services, sharing platforms, and reusing concepts. The case study of that paper is done considering the local resale markets of Chittagong, Bangladesh. A real-world customer survey was done in that paper to analyze the consumer perspective toward circular fashion in Bangladesh and to identify potential opportunities for establishing an integrated model following post-consumer apparel products. After gathering and analyzing survey data and consumer perception, we developed an integrated model to establish a framework for CE in the fashion industry in the local market. While many research studies have already developed considering the consumer perspective in European countries and U.S., we tried to develop a circular model for Bangladesh. Because consumer perception varies in different demographic and geographic locations.

## Keywords
Circular fashion, Circular textiles, Sustainability and Sharing economy.

## 1. Introduction
The inception of the post-consumer circular economy takes place right after a product is used first-hand. The tendency is to maximize the use of a single garment or clothing via reuse until the product comes down to its least value. The current consumption-based market of the apparel industry would only pave the way for waste generation in large numbers. The apparel industry has been one of the major reasons for the large consumption of energy and clean water. In return Each year millions of tons of post-consumer apparel waste are generated due to the inefficiency in the management of after-use of apparel. As a result, a huge sum of energy, resources, and time is wasted. The wasted materials keep on occupying landfills. The work aims to classify and describe wastes generated in solid form after consumption and reshape them for extended commercial use. We put our emphasis on collecting, sorting, and converting the used product into appropriate second-hand use. The environmental, social, and economic criteria would also need to be fulfilled before we move on to further processes. The ready-made clothing sector is a major contributor to Bangladesh's fast economic expansion and urbanization. During the 2020-21 fiscal year, this industry contributes over 80% of Bangladesh's total export profits (Rahman 2015). As the second biggest RMG exporter in the world, the inhabitants of this nation have access to an abundance of inexpensive apparel, which leads to irresponsible consumption and trash exposure ( Khan 2017). More than 30 percent of the population in Bangladesh is young, and they are more interested in fashion trends than any other age group (Pingki and H.N. K.

2021). The rising popularity of fast fashion and cheap pricing among the younger generation has led to customers acquiring and discarding bigger amounts of items. In recent years, the quantity of wasted material has grown dramatically due to the 'quick fashion trend (Uddin 2019). Consumers are discarding an ever-increasing number of clothing as a result of the rapid production of clothing, resulting in an enormous volume of textile waste. Every year, about 500 million kg of unwanted clothes are discarded in Australia alone (Thomas 2019).

Waste management has been a burning issue for the world for a long period. It is not possible to completely get rid of this problem early. We tend to delay the time for the accumulation of waste apparel in the dumping zone by applying the proposed method. In this way, we will be able to meet the clothing crisis for the underprivileged. Our proposal also includes door to door collection of used garments so that it would be convenient for everyone to exchange their used apparel for some incentives.

## 1.1 Objectives
The main purpose of this paper is to propose an integrated circular framework in the fashion and textile industry at the post-consumer level. Our model aims to prolong the waste generation process in apparel wastage by reselling, reusing, and sharing second-hand products in a consolidated sales center with the help of digitalization via a mobile app. The stakeholders of our model are also consolidated in a single framework: the mobile app users, municipal agents, local second-hand retailers, and also local government along with environmental non-profit agencies.

## 2. Literature Review
According to the World Economic Forum, 85% of worn clothing is sent to landfills annually, where it either burns or adds to landfills (Hossain 2021). This kind of waste has a devastating effect on the ecosystem. Youth-oriented garments of poor quality are allegedly produced by laborers receiving unlawfully low salaries and are discarded nearly immediately, causing mountains of non-recyclable rubbish to accumulate ("Fast fashion and low prices are responsible for clothing disposals,"2018). Owing to product qualities such as performance or feature, garments and clothes are less efficient and sustainable, and due to the chemicals and dyes employed, this unsustainable clothing disposal behavior has devastating impacts on the global ecosystem. Open landfills leak methane gas into the atmosphere and leach water into the surrounding ecosystem (El-Fadel 1997). Priority should be given to rehabilitating the current municipal solid waste management systems if Bangladesh is to achieve sustainable development without sacrificing the livability of its metropolitan regions.

Due to Uncertainty and lack of digitalization, the circular economy in the fashion industry still needs some significant framework changes. The role of digitalization is yet to be explored on a vast scale in the field of consumer research (Otero et al. 2018). To achieve environmental and economic sustainability, Shrivastava et al. (2021) investigated the feasibility of online-renting platforms with the help of Instagram influencers. Nine hypotheses were developed in that work including behavioral influence, attractiveness, social influence, etc. To strengthen consumer trust in online renting, Kim et al. (2021) surveyed 238 customers and showed that, the product history database of an individual customer bolsters the trust of new consumers to buy second-hand products from online sites. Besides, brand status is also a notable factor to influence consumers toward circular fashion (Ramkumar et al. 2021). Upcycled fashion products also carry some perceived financial and psychological risks: Confusion, expectation, social norms, performance risks, etc.

Moreover, to increase the sales amount in upcycled fashion industries, it is necessary to raise the environmental knowledge of the potential customers (Yoo et al. 2021). By doing a group discussion, Sijtsema et al. (2020) showed that emotional attachment and alignment with consumer feelings play a significant role in circular fashions. A conceptual framework was developed by Diddi et al. (2019) to identify barriers in clothing repair and the sharing economy. After collecting data from 254 participants, four hypotheses were developed and solved in that study.While many publications discuss sustainability and waste management challenges in the textile and fashion industries, few give a comprehensive knowledge of the cyclical fashion phenomena like Consumers' attitudes and perceptions toward circular fashion, sustainable design strategies, drivers/challenges, clothes swapping, online renting, and textile-to-textile recycling. This study emphasizes the requirement for information to be consolidated to facilitate a better transition from a linear to a circular fashion system with stakeholders. By adding to a cutting-edge, thorough assessment of circular fashion literature, this study seeks to close this gap in the literature.

## 3. Proposed Methodology

A theoretical framework is developed in this work after a real-world survey of the consumers. Besides, a face-to-face interview was also done with the local second-hand retailers and municipal agents. The purpose of the customer survey is to ensure that before proposing an integrated CE model in the fashion industry, we have sufficient positive vibes and responses from the end-users of second-hand apparel. Because any business or idea always starts first with customer demand or end-user acceptability. A complete framework of our work is shown in Figure 1:

| Developing a consolidated mobile app for local end users of apparels after customer survey | → | Distribution of local municipal agents who will collect second-hand or used products before disposal | → | Collection of used apparels from local app users who dispose products before reaching end-of-life cycle |

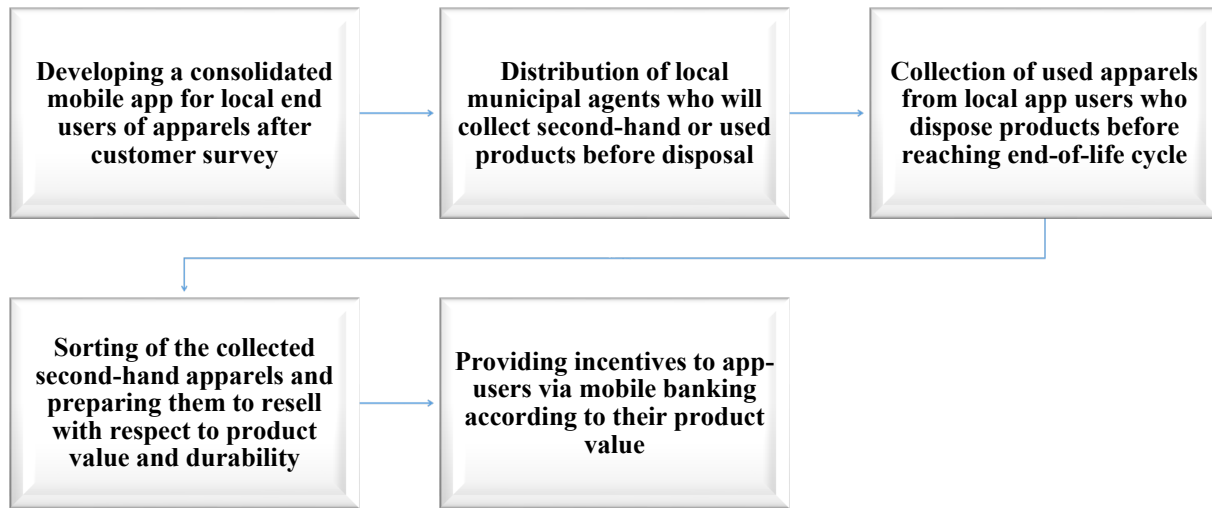| Sorting of the collected second-hand apparels and preparing them to resell with respect to product value and durability | → | Providing incentives to app-users via mobile banking according to their product value |

Figure 1. Theoretical model and frameworks

Traditional non-circular models always end with either dumping waste in landfills or donating second-hand apparel products to charity foundations. But in Bangladesh, charity organizations are too much fragmented and are not well-organized. As a result, most of the second-hand products go to the dumping sites after their end-of-life uses or even before reaching the life cycle. In our case study, the dumping sites of the city of Chittagong are located in the Sher shah and Aturer dipo areas. Local areas around the dumping sites face severe odor and air pollution due to a large amount of waste. Traditional linear models entail not only social but also environmental consequences (Figure 2). Therefore, the 'Use-dispose' philosophy needs to be replaced by regenerating and circular economic model in the fashion industry (Figures 3 and 4). The accelerated growth in population and also in material use has worsened the environmental problems recently in Bangladesh. Preservation of natural resources along with optimization of the current resources and risk reduction is very important to preserve the environment. Besides, it will also help the government to achieve sustainability in the long run.

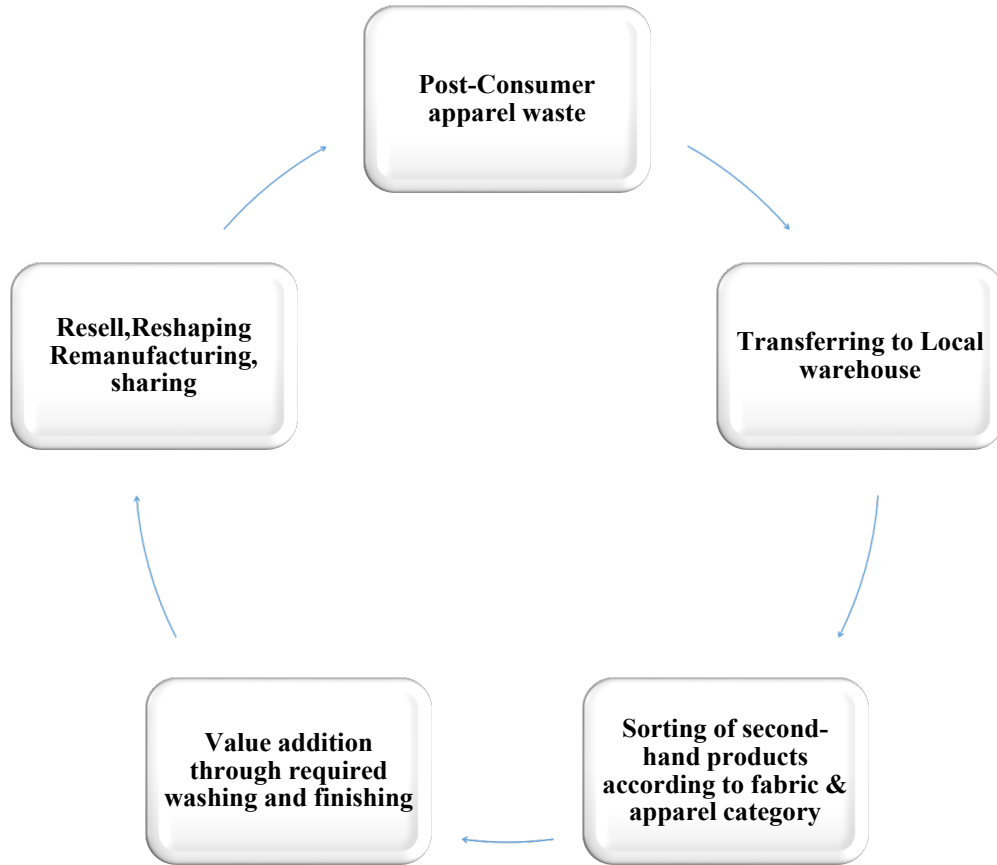| Apparel waste from end-users | > | Collection by Municipalties | > | Landfill |

Figure 2. Traditional linear model

Figure 3. Proposed Circular Model



Figure 4. Stakeholders of the Integrated circular fashion model

## 4. Data Collection

As the survey strategy is often implemented in business research and is typically associated with a deductive research methodology, we applied it in this paper. Additionally, the survey approach is frequently applied to respond to "what" queries. This method is best suited for our purposes because our research questions fall within this group. In the social sciences, beliefs about certain behaviors are linked to attitudes toward those behaviors in terms of

favorable or unfavorable sentiments and impressions. Theories of consumer behavior might be based on buying patterns or involvement with values- and demographics-related issues. The respondents were questioned about their thoughts regarding whether they would consider renting, sharing, or purchasing used versions of various clothing products. We decided to analyze the factors that motivate the consumption of used clothing because it is a pretty well-established alternative consumption mode, based on pre-determined possibilities found in the literature review and survey data (Figure 5). Whether they were positive or negative, respondents could articulate their precise opinions in open remarks.
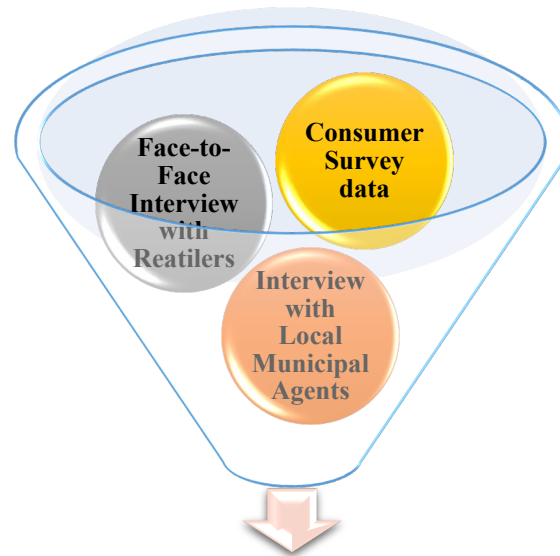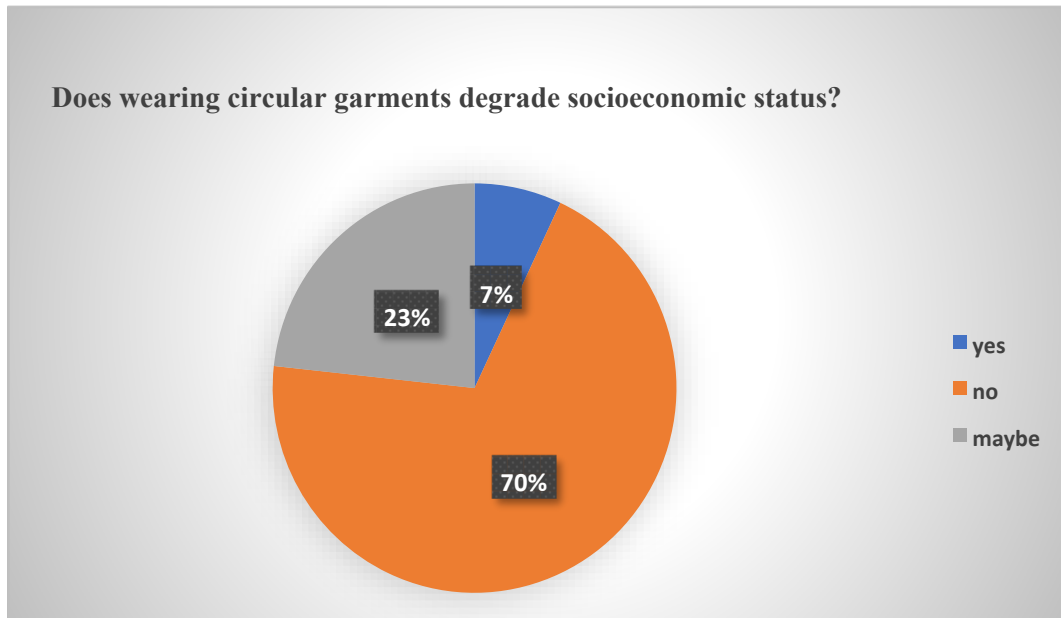


**Qualitative theoretical model**

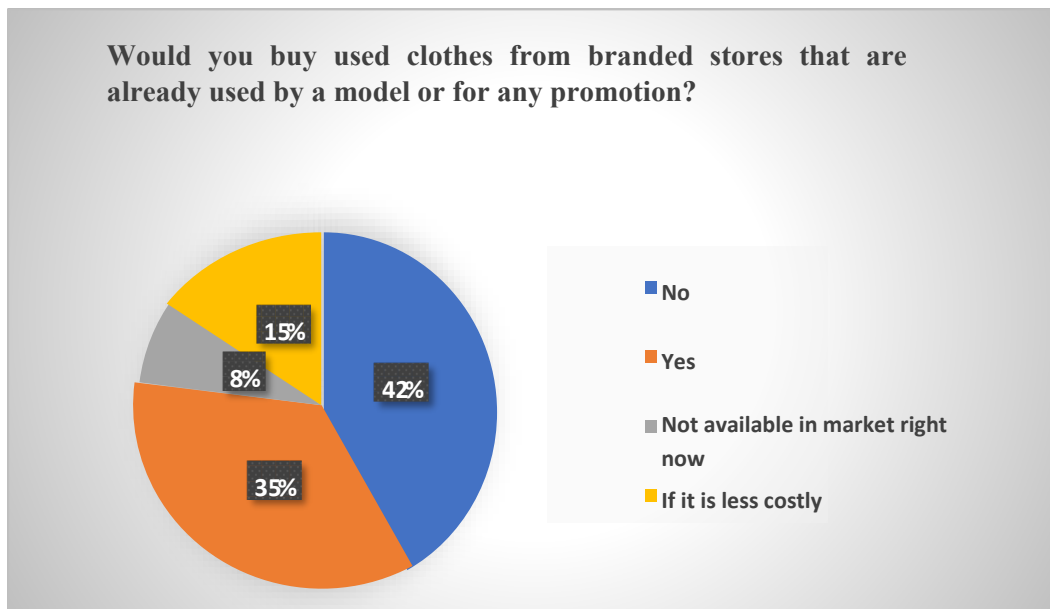Figure 5. Survey data from Stakeholders

We employed self-administered, web-based surveys in our study. Respondents provide their responses in self-completed questionnaires. Because it is conducted online, respondents are encouraged to participate. By sending them a link to the survey's online form, you can have them fill it out. However, the advantages of the questionnaire method outweigh the disadvantages. An interpretive technique was used in this research to acquire a more sophisticated and in-depth perception of consumers' thoughts and opinions about Circular Fashion products. A 20% response rate for electronic surveys is considered adequate in the literature, however, this number can be increased to roughly 30% by sending follow-up reminder emails to non-respondents. In an attempt to bolster response rates, the survey was available for two weeks and a reminder was sent out after one week. Here are the queries that were posed to respondents during the survey.

1. Does wearing circular garments degrade your socioeconomic status?
2. How much can circular fashion of garments contribute to environmental protection?
3. Would you buy used clothes from branded stores that are already used by a model or for any promotion project?
4. Why will you support or negate the idea of the circulation of garments?
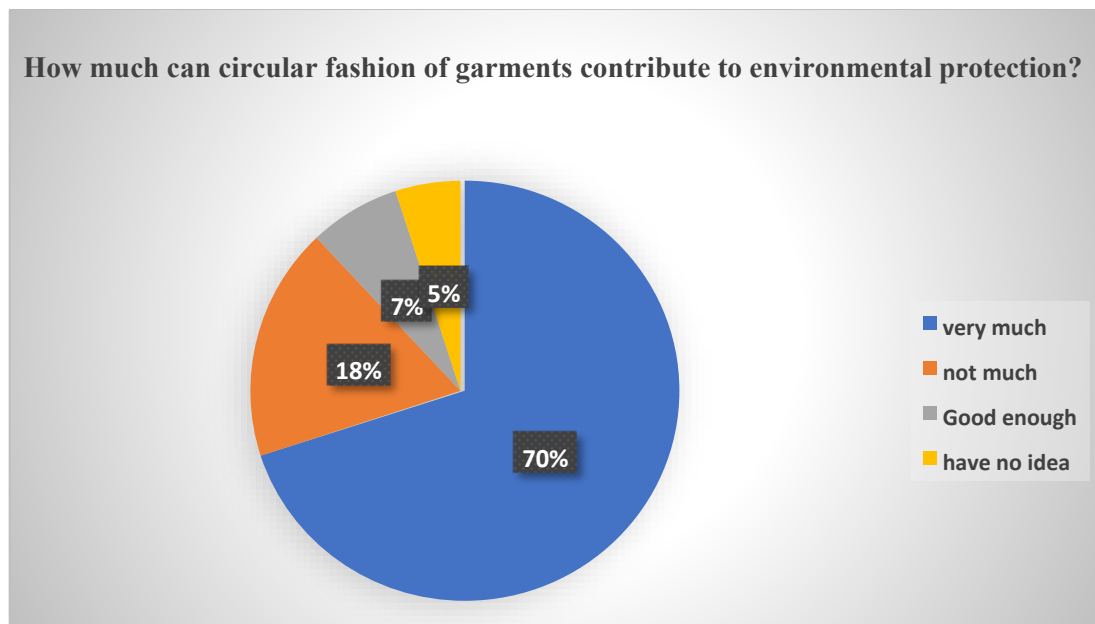
Besides, physical survey data was collected from retailers of two local existing fragmented local second-hand product sales markets. One of them is the Newmarket area of Chittagong and the other is Agrabad commercial area. A face-to-face interview was done with local sellers and retailers about how they collect these second-hand apparel products and at what prices they sell to local lower-middle-class, middle-class, and poor people. According to our study, most of the sellers don't have any benchmark or price range for sales. They just think of their profits and sometimes they can't sell at all. As a result, wasted apparels pollute the environment significantly. Because of the lack of a consolidated framework and market structure, the local fragmented resell business is facing losses due to wastage and improper reach to potential customers. Survey data with pie charts are shown in Figure 6:
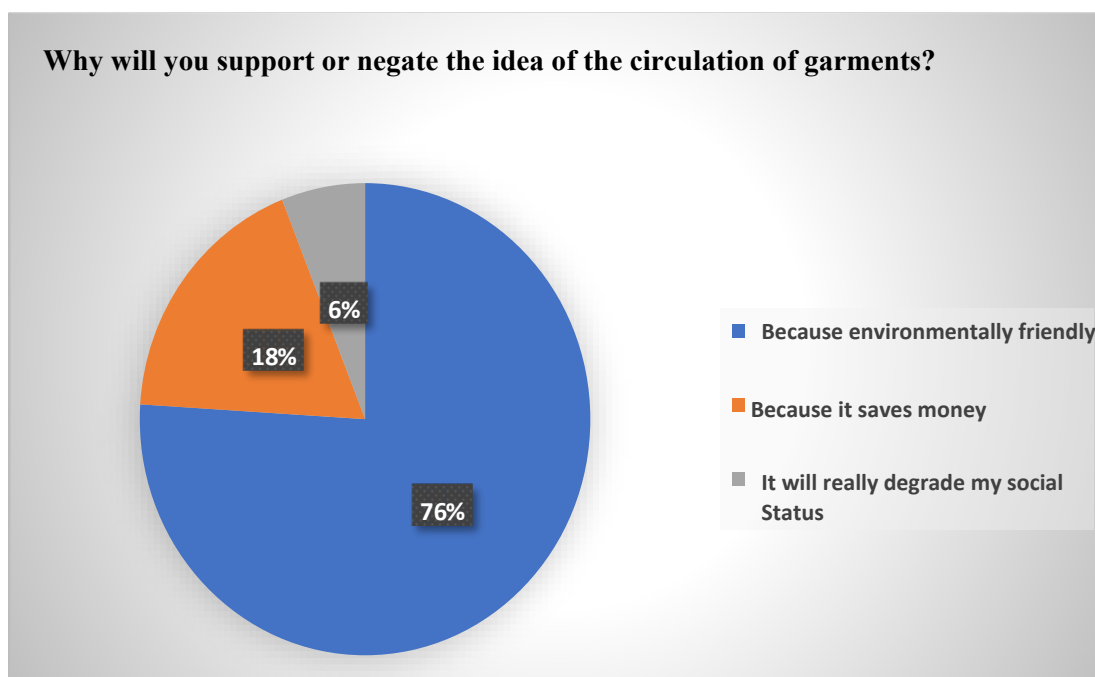


(a) Pie Chart 1



(b) Pie Chart 2

**How much can circular fashion of garments contribute to environmental protection?**



(c)  Pie Chart 3

**Why will you support or negate the idea of the circulation of garments?**



(d)  Pie Chart 4

Figure 6. Survey data with pie charts

## 5. Discussion and Proposed Improvements

77 people responded to our survey. 7% of the people who responded to the survey think that using second-hand apparel products degrades social status. Whereas 30% of them are not sure about that. Raising awareness among these groups could lead to a boom in the circular fashion industry in the local areas of Chittagong, Bangladesh. From the second pie chart, it can be inferred that cost is a key factor in the decision of people to buy second-hand apparel products. 35% of the respondents only care about less cost of those products. However, the majority of the respondents showed positivity about the circular fashion concept. 76% of them supported it because of its environmental friendliness. The sorting method will be done manually and a tentative process of the sorting process is shown below in a table. The sorting process we have shown below may take a long period to segregate products based on their quality as the full process is completed manually. With a proper labor force, we may shorten the time length of the sorting procedure. In the case of incentives, we would rely on initial Govt. support. The Govt. more often receives funds for protecting the environment. A portion of these funds could be used for providing incentives to second-hand clothes sellers. As obsolete apparels tend to end up in dumping zone or may waste uselessly in large numbers, proper incentives to the seller could encourage them to exchange their used clothes for a greater cause. Our provision of incentives heavily relies on the quantity and quality of the clothes provided by the sellers. Our quality team would ensure a rating on the checked clothes and then send it to the relevant costing dept. for approving appropriate price sets for a specific set of products. Our proposed manual sorting method is given in Table 1 and Figure 7:

Table 1. Proposed Sorting Methods

| Apparel Types | Separation Criteria | Method |
|---|---|---|
| Polo Shirt | 1. Less used | |
| T-Shirt | 2. Frequently Used | Manually |
| Denim | 3. Heavily Used | |
| Baby wear | | |

After the manual sorting process based on the second-hand apparel conditions (longevity, color, durability, etc.), we propose a flexible final categorization for each cloth. The below flowchart shows our idea in a nutshell:
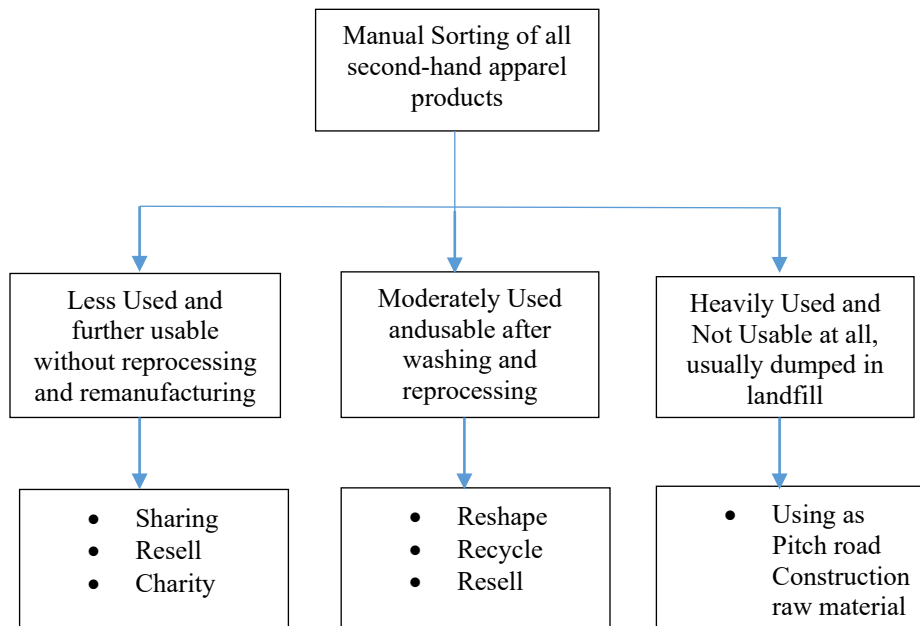


Figure 7. Proposed Improvements after Sorting

## 6. Conclusion

The biggest challenges to pre-processing post-consumer apparel waste in our model are to make concern the mass people and to consolidate all stakeholders properly. The fast fashion industry is changing rapidly with the passage of time as well as the choice and tastebuds of customers. Raising awareness among general people, companies, designers, producers, and entrepreneurs is very important to establish a successful and viable CE model. This study suggests collaborating with all the stakeholders associated with the post-consumer level fashion and apparel sector. A qualitative model and integrated framework have been developed in this study with a view to reducing environmental degradation and prolonging the waste generation time of end-of-life products. From our perspective, we can say that most clothes would remain unused for a long period after first-hand use. These clothes would somehow reach the landfills quickly and keep on occupying the area. We tend to reduce environmental disasters posed by dumping clothes into landfills by putting them in the proposed post-circular framework. In a way, it would help low earners to have better clothes at a reasonable price. A standard set of incentives would be ensured for the sellers of the used clothes based on a digital system. In this way, we would ensure a smooth flow of money from the buyer to the seller.

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## Biographies

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