

The Reclaim Process of Used Gamcha: An Innovative Circular Fashion-Based Application for the Global Market

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Abstract

Rooted in sustainable design principles, the circular fashion hypothesis proposes that repurposing fabrics from abandoned Gamcha garments into distinctive cloth patterns can significantly preserve cultural heritage, minimize textile waste, and mitigate environmental degradation. Gamcha, a traditional South Asian cotton cloth, is commonly used for cleaning, wiping, and towel-ing. This study aims to explore upcycling techniques, which involve collecting old and damaged Gamcha fabrics, separating usable components, and creatively repurposing them into new textile products. Creating contemporary clothing designs using reclaimed Gamcha fabric potentially increases the life cycle of textile materials and promotes reuse and resource efficiency. However, the younger generation often disregards Gamcha's traditional use due to the prevalence of mass-produced textiles and fast fashion. This approach also has the potential to promote regional handicrafts and preserve traditional textile skills while opening up new economic opportunities. As part of this study, a brief online survey was administered to explore the challenges and complexities of applying circular fashion principles to Gamcha textiles. Additionally, participants highlighted several key findings related to sustainable fashion concepts and current market demands. However, the effectiveness of implementing circular fashion with Gamcha textiles depends on various factors, including the availability of recycled materials, the advancement of efficient recovery and processing techniques, and the development of a viable market for upcycled, fashion-forward garments. Despite these challenges, this method can contribute meaningfully to the goals of the circular fashion movement by

advancing environmental sustainability and fostering a positive social impact.

Keywords

Gamcha, Circular Fashion, Khadi, Upcycling, Patch Work, Cultural Heritage

1. Introduction

Sustainability has emerged as a “megatrend” in recent years and in the international fashion landscape the shift toward a more responsible system has given rise to the prominence of sustainable fashion. The public’s engagement in sustainability is also increasing as consumers and the shift in consumer behavior highlight the need to address the issues of fashion sustainability as they are becoming significant determinants in final purchasing decisions [1]. Circularity is a concept that originates from the field of industrial ecology, combined with circular design concepts such as cradle to cradle. Having recycling and upcycling as its drivers for sustainable innovation, circular fashion emphasizes a closed-loop system of “design, produce, use, and recycle” [2]. The circular economy framework defines reusing, repairing, reconditioning, and recycling as critical processes to shift the linear model into a circular one, emphasizing the importance of extending the life cycle of resources, residual waste, and other materials as much as possible, and thus creating a closed-loop system. This article addresses the importance of design in altering the fashion supply chain to promote circularity. A purpose-driven model is naturally design-driven because it has a design goal. The design process with Gamcha and Khadi fabric is used to develop strategy, solve problems, and create value. In the emerging sustainability transition, the role of design becomes significant in its technical function in designing the fashion-system circle(s) where the majority of sustainability benefits are obtained.

In traditional market Gamcha has a long and rich history in South and South-east Asia, dating back centuries. Originally used primarily as a towel due to its soft texture and excellent absorbency, it remains widely used in rural areas and among those who prefer its lightweight feel over heavier, western-style towels. Beyond its functional roots, the Gamcha has taken on a broader cultural and aesthetic role over time. One of the earliest and most iconic uses of Gamcha was as a head wrap, often seen in black-and-white photographs from the 1980s, where roadside vendors and laborers used it to shield themselves from the sun and absorb sweat. This practical application is still common today, underscoring the fabric’s enduring utility [3].

In recent years, the use of Gamcha has expanded significantly, particularly in the realms of fashion and interior design. Its vibrant patterns and colors make it a popular choice for home décor, where it adds a traditional, eye-catching touch that reflects Bangladeshi culture and heritage. From cushion covers to wall hang-

ings, Gamcha fabrics are increasingly used to infuse homes with cultural identity and character. Moreover, the beauty of Gamcha has been expressed in contemporary fashion, especially in sarees and other garments worn during cultural festivals and events. The fabric has gained popularity among women of various ages, reflecting a growing appreciation for traditional textiles in modern design. As fashion trends become more inclusive and sustainability-focused, Gamcha's role continues to evolve, bridging heritage with innovation.

Today, the fashion industry is undergoing a significant shift in its production paradigm. The negative environmental and social impacts generated throughout the supply chain have become increasingly visible, prompting consumers to demand greater transparency and responsibility from brands. As a result, there is growing momentum toward adopting organizational strategies and supply chain models that prioritize the conservation of natural resources and uphold respect for human rights [4]. Driven by these developments, fashion brands are increasingly transitioning from market-driven to purpose-driven strategies. In this context, the circular economy (CE) has emerged as a leading entrepreneurial model for addressing sustainability-related challenges within the fashion supply chain. However, despite growing interest, the implementation of circular practices on a large scale remains in its early stages [5].

Significant gaps persist in achieving comprehensive environmental, economic, social, and cultural sustainability. Current efforts often lack integration, and the linear "take-make-dispose" system continues to dominate industry practices. Recent experiences highlight the urgent need to rethink this model and foster collaboration among various stakeholders to support the transition toward a circular fashion system. Moreover, bridging this gap will require a systemic approach that not only redefines production and consumption but also values heritage, innovation, and inclusivity as core components of sustainable fashion [6].

2. A Sustainable Solution to Textile Waste

In an era of fast fashion and increasing textile waste, sustainable design principles are more vital than ever. This project explores the possibilities of Gamcha cloth, a culturally significant and traditionally handwoven textile, as a medium for upcycling and sustainable design. By recycling rejected or underutilized Gamchas from domestic households and improving them with dyeing and creative patchwork techniques, the initiative not only decreases environmental effect but also protects cultural heritage. This approach bridges the gap between eco-conscious design and traditional craftsmanship, offering a viable solution to modern textile challenges.

However Bangladesh is a global hub for circular textile initiatives, with projects reclaiming pre- and post-consumer scraps (including from Gamcha production) back into yarn and new fabrics and the partnerships like Circular Fashion Partnership (involving BGMEA, UNIDO, brands like Bestseller, H&M, and recyclers Cyclo) trace and recycle cotton waste by saving CO₂ and water, and creating 153+

tons of recycled textiles [7] [8]. Currently, in Gazipur, entrepreneurs are operating vertically integrated, low-waste factories that reflect Gamcha's ethos of reuse, with an eye toward Circular Fashion Industries. Using the fabric's vivid designs, artists in Bangladesh, like Mohammad Abdul Wares (Warez) and people in Dhaka, are creating Gamcha sarees, hoodies, kaftans, and even experimenting with sneakers and canvas shoes [9]. Using it in dresses, shirts, and accessories, designers like Bibi Russell have elevated it in international fashion while collaborating with weavers to improve rural communities [10].

3. Purpose of the Study

With a particular focus on the Bengali tradition, this research is thoughtfully designed to function as a comprehensive investigation of the complexities of circular fashion within the fashion business. The main goal is to research, evaluate, and suggest practical solutions to the problems associated with circular fashion in order to support sustainable business practices in the fashion sector.

1) The use of Gamcha fabrics that have been repurposed to create a sustainable circular fashion framework that prioritizes resource efficiency, cost effectiveness, and waste reduction.

2) This practice-led research addresses the preservation and celebration of cultural heritage by designing eco-friendly, fashionable apparel-rooted in traditional Gamcha textile techniques.

3) The reclaim process serves as an educational tool, raising awareness about sustainable practices, recycling, and the environmental impact of textile production, thereby promoting more conscious consumer behavior by strengthening traceability systems so consumers can confidently buy circular, Gamcha-based pieces.

4) This study is driven by the ambitious goal of developing a comprehensive, sustainable framework tailored specifically for circular fashion. At its core lies a focused commitment to the principles of Reduce, Reuse, Recycle, and Repair emphasizing their critical role in achieving both environmental sustainability and economic viability within the fashion industry.

4. Materials and Methods

A range of materials, such as discarded Gamcha and khadi fabrics, sewing thread, buttons, rope, dye, zippers, sewing machines, gloves, and rubber bands or strings, were employed in this research design to create the finished upcycled fashion items. The study's goal as a practice led research project was to create a fresh perspective on upcycled fashion design and how it is used in mass production settings.

To gather data, opinions, and insights on recycled and environmentally friendly clothing, an online Google Form was developed as the primary survey method. The purpose of this form is to understand respondents' individual perspectives on sustainable design concepts, as well as their purchasing tendencies toward eco-friendly fashion products. While the use of an online survey facilitated convenient

and timely data collection from a targeted audience, but the modest sample size of 57 respondents represents a significant limitation. Given the niche focus on sustainable fashion and circular design practices, this sample may not adequately reflect the diversity of perspectives necessary for broader generalization. Moreover, the digital format may have excluded individuals with limited internet access or varying levels of technological literacy, potentially introducing response bias. As a result, the small sample size could limit the depth and reliability of statistical analysis. Nonetheless, the data provides valuable preliminary insights into emerging consumer attitudes toward upcycling and the use of traditional textiles.

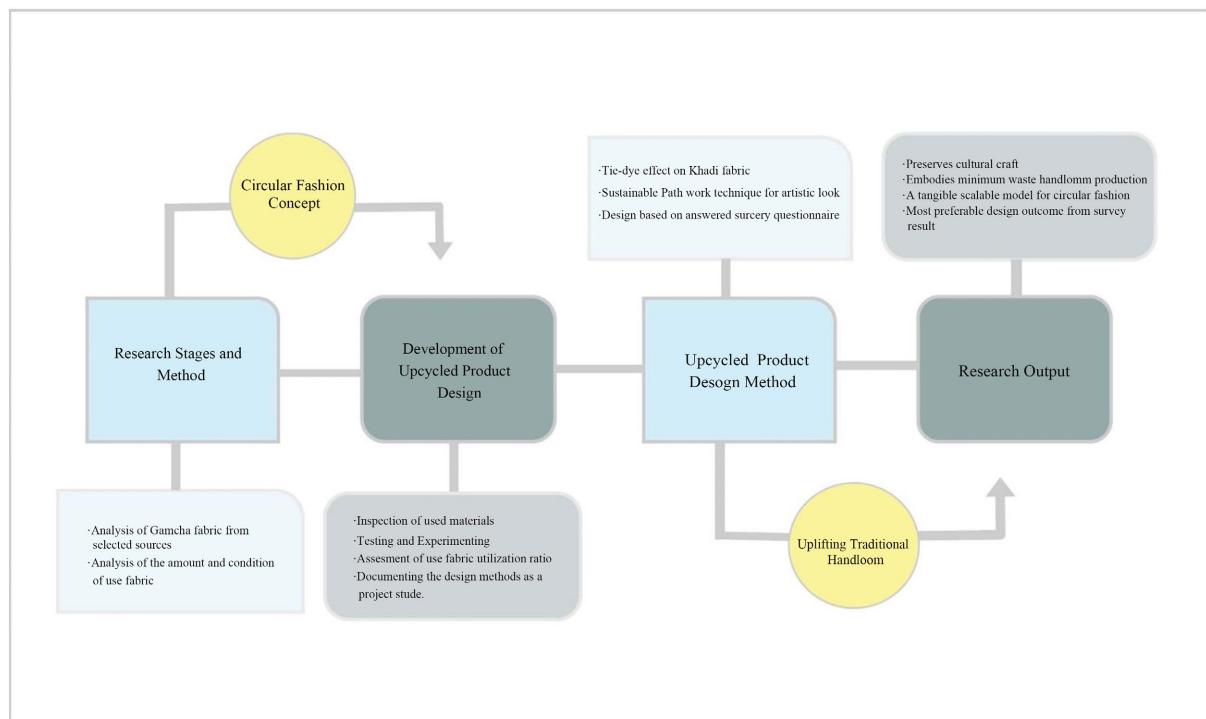


Figure 1. Overview of research stages and methods.

Above **Figure 1** depicts about the overall research project starting from stages and methods to project outcome. Initially textile waste and leftover assessments were conducted through frequent factory inspections, interviews with key personnel, and screenings of Enterprise Resource Planning (ERP) data extracts from local factory (M/s Helal & Brothers), as well as material and waste inventory data for both the investigated factory and home products. The types and reasons of manufacturing-related fabric leftovers and loss generation were also investigated at the factory throughout the waste analysis process. From one batch (200-1000 + pieces) an estimate total material wastage for powerloom gamcha production was around 10% - 15%, where dyeing, especially for gamcha's striped patterns accounted for 5% - 10% loss, mechanical waste in spinning and weaving range around 10% - 20%, depending on skill and equipment quality. Since the fabric waste collected from factory was in piece form, the author suggests that patchwork

would be the most suitable construction technique for the designed outfit of this study. According to the most popular clothing categories in Gamcha check—Punjabi/Kurta, Trousers, Bath Towels (Gamcha fabric), Traditional Gamcha Sarees, and Grameen Check Lungi's—the amount of old, thrown out fabric during domestic inspections was also determined. Because of their frequent use and occasionally fading color, Punjabi and Kurta clothing had the greatest in waste percentage. Since individuals repurpose towels and lungi's for various daily chores like wiping and table cleaning, the discarded these two category displayed the least amount of fabric waste.

The types of utilized Gamcha fabric with the most potential for upcycling were determined from the recycling study, and they were further matched with developed design approaches. Upcycling clothing ideas were tested for effectiveness and applicability on each selected fabric category. During the testing, the suitability of the upcycled Gamcha fabric for sustainable design was assessed in terms of total available material, as well as size, shape and other parameters. Moreover, to ensure standard quality, several tests were conducted like GSM (grams per square meter) test, colorfastness test, tensile strength calculation for wear and tear of used Gamcha and also chemical testing for tie dying validation.

4.1. Data Collection

The most effective and convenient method for gathering feedback was through a Google Form survey, which was distributed to friends, family, doctors, teachers, teenagers, and social media users. The survey contained 15 questions. However, some participants were either unwilling or uncooperative, which posed minor challenges. Ultimately, 57 individuals responded to the survey. Of these, 70% expressed a preference for sustainable clothing, 10% responded negatively, and 20% were neutral. This helped assess how widely accepted the sustainable circular fashion concept was.

4.2. Quality Testing

During the sampling process using reused Gamcha fabric, several tests were conducted to ensure the quality and suitability of the materials. The following key tests were performed:

4.2.1. GSM Test

The Gram per Square Meter (GSM) of the Gamcha fabric was found to be 90, while the khadi fabric had a higher GSM of 120, indicating it is slightly denser and thicker.

4.2.2. Tensile Strength Test

The tensile strength of the Gamcha fabric was evaluated to determine its durability under regular wear and tear. Three samples were tested in both warp and weft directions to determine their mechanical strength. The samples measured 120 N, 115 N, and 118 N in the warp direction, and 90 N, 95 N, and 92 N in the weft direction.

The average tensile strength was found to be 117.6 N for the warp and 92.3 N for the weft. These values are within the acceptable range for wearable fabrics, indicating that the used Gamcha cloth has enough tensile strength for regular usage.

4.2.3. Color Fastness Test

A colorfastness test was conducted to ensure that the fabric retains its color when washed or exposed to light. The results confirmed that the fabric maintained the desired color and did not bleed or fade.

4.2.4. Chemical Testing

The tie-dye process utilized only non-pesticide, safe chemicals, ensuring the fabric remains environmentally friendly and skin-safe.

4.3. Process Overview

The process began by identifying and sourcing used Gamcha fabric. Each piece was carefully inspected to ensure it was in a reusable condition. The selected fabrics were then thoroughly cleaned to remove any dirt, stains, or contaminants. On the other side, the tie-dyeing process was carried out on six yards of khadi which is also a sustainable cotton fabric to achieve the desired color and pattern. The vat dyeing method was chosen due to its effectiveness, particularly on khadi fabric, yielding vibrant and lasting results.

Vat dyeing Recipe:

Vat dye—4%.

Wetting agent—4 g/L.

Sequestering agent—0.75 g/L.

Caustic—8%.

Hydrose—7%.

M:L—1:10.

Temp—60°C - 100°C.

Following the dyeing procedure, the final sample clothing was made by pattern cutting. The final product satisfied both practical and aesthetic requirements. Customer feedback confirmed a strong preference for sustainable garments, validating the project's direction and alignment with market demand.

5. Results and Discussion

This study used Google Form to conduct an online survey about consumers buying habits for eco-friendly clothing. 57 participants provided their thoughts on the questionnaires that were created for the survey procedure. The findings are displayed in pie chart below.

5.1. Understanding with Sustainable Concept

In **Figure 2**, the survey results revealed that 91.2% of respondents are aware of the fashion industry's harmful impact on the environment and, as a result, prefer sustainable clothing. Conversely, 8.8% indicated they had never heard of sustainable fashion.

Are you familiar with the concept of sustainable fashion ?

57 responses

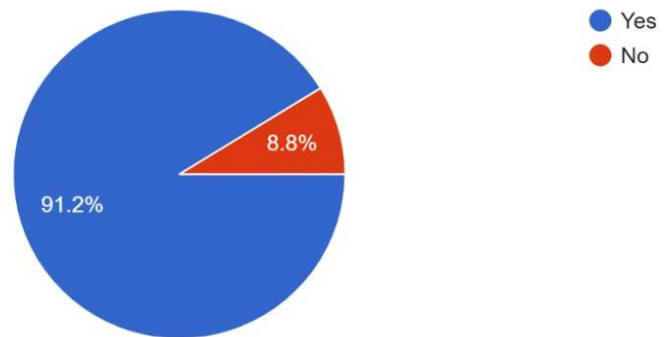


Figure 2. Familiarity with sustainable concept.

These findings suggest that while a significant majority are familiar with sustainable fashion and its principles such as eco-friendly materials, ethical labor practices, and reducing environmental impact but a portion of the population still lacks clarity or awareness. This highlights the need for continued education and awareness campaigns to promote a deeper understanding of sustainability in the fashion industry.

5.2. Social, Ethical and Market Place Considerations in Clothing Choices

According to the survey result in **Figure 3**, over 89.3% of respondents consider social and ethical factors such as fair labor practices, ethical sourcing, and environmental impact when choosing clothing. In contrast, only 10.7% of participants reported that they do not take these factors into account when making their fashion purchases. This strong majority highlights a growing consumer awareness of the broader implications of fashion choices, signaling a shift toward more responsible and conscious consumption.

Do you consider social & ethical factors when purchasing clothes ?

56 responses

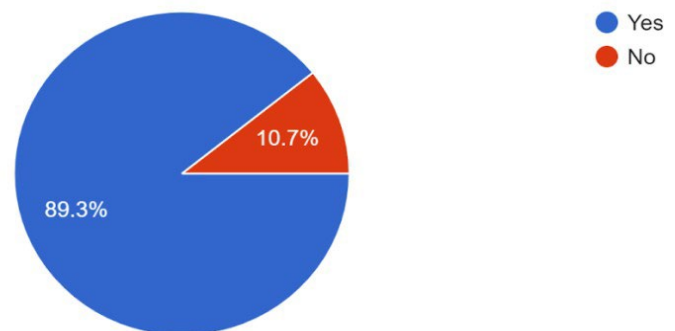


Figure 3. Factors consideration while purchasing product.

Where do you usually shop for sustainable garments ?

54 responses

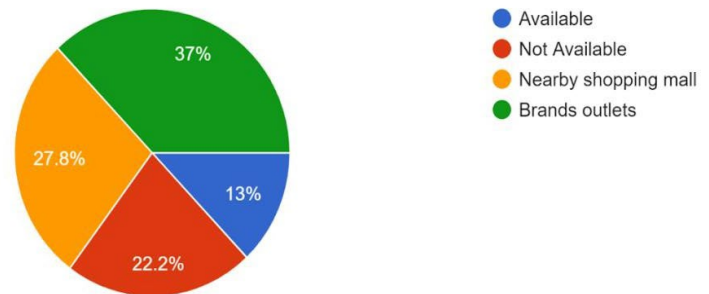


Figure 4. Place consideration to buy sustainable cloth.

Figure 4 shows that respondents had various levels of accessibility and buying preferences for sustainable clothes. 13% of respondents said they could readily get sustainable apparel in their neighborhood. About 22.2% reported difficulty finding such items, indicating a lack of availability or visibility in specific locations. 27.8% stated that they buy sustainable items from local malls, indicating a rising presence in mainstream retail settings. Around 37% stated they prefer to shop at brand retailers that specialize in or offer specialized sustainable fashion collections. Labels and certificates were also deemed significant, with 85.7% of respondents appreciating them and 14.3% indifferent.

These insights reflect the importance of improving both the availability and visibility of sustainable clothing options. While branded stores lead in offering such products, expanding access through local malls and making sustainable choices more convenient could encourage broader adoption.

5.3. Consumer Preferences for Disposing of Used Clothing

How do you currently dispose of your clothing when you no longer use it ?

57 responses

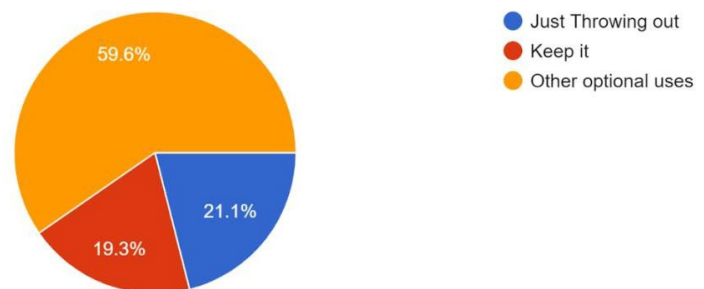


Figure 5. Consumer's preference about disposing the used clothing.

The survey also examined how consumers handle their clothing after it is no longer in use. The results revealed the following disposal habits: 59.6% of respondents prefer to reuse their clothing in various ways such as repurposing, donating,

or upcycling demonstrating a strong inclination toward sustainable practices. On the other side 21.1% reported that they discard their used clothes, indicating a need for more awareness around eco-friendly disposal methods and 19.3% said they simply store their old clothing in closets, suggesting indecision or lack of convenient disposal options (Figure 5).

5.4. End-User Buying Behavior: Locally Produced vs. Recycled Materials

In Figure 6, 78.6% of respondents preferred garments made from recycled materials, indicating a strong interest in sustainability and reducing environmental impact through circular fashion. Again 8.9% expressed a preference for locally produced products, showing some support for community-based manufacturing, local artisans, and reduced carbon footprints. The remaining percentage either did not specify a preference or remained neutral.

Would you be more likely to purchase a sustainable garments if it was produced locally or made from recycle materials ?

56 responses

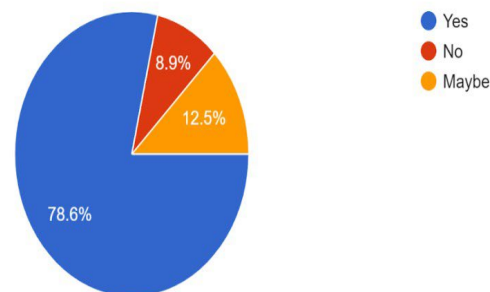


Figure 6. End users buying behavior.

These findings suggest that recycled materials are more appealing to end-users than simply local production. However, both categories reflect environmentally and ethically conscious behavior. Brands looking to align with consumer values should consider combining both elements locally produced garments made from recycled fabrics to enhance appeal and market relevance.

After analyzing the survey data, a comprehensive understanding of consumer attitudes toward circular sustainable fashion have developed. The majority of respondents strongly support the concept behind this practice-led study.

6. Design Based on Circular Fashion Concept

Among the various questions included in the survey, one key focus was understanding respondents' preferences regarding categories of recycled attire. The final sketch (Figure 7) was developed based on their responses. Since approximately 75% of the participants were young individuals, primarily students aged 16 to 25, they expressed a preference for trendy, unique outfits that are versatile

for different occasions, comfortable to wear, and visually appealing. In **Figure 7** the sketch was created in alignment with the respondents' demands and preferences for recycled outfits.



Figure 7. Flat sketch of designed outfit.

6.1. Design Features

6.1.1. Koti with Bell Bottom Pant—A Sustainable Indo-Western Fusion

The koti, a traditional short jacket or vest-style garment commonly worn in South Asian fashion, serves as an elegant layering piece typically paired with kurtas, lehengas, or sarees. In this design (**Figure 7**), the koti is reimagined in a modern Indo-Western fusion, paired with bell bottom pants to create a stylish outfit suitable for both festive and formal occasions. To add a sustainable twist, the koti is crafted using upcycled Gamcha fabric, offering a unique, eco-friendly statement that blends cultural heritage with contemporary fashion sensibilities.

6.1.2. Bell Bottom Sleeve—A Statement of Flowy Elegance

A bell bottom sleeve is a distinctive sleeve style that is fitted at the shoulder and upper arm, but flares out dramatically from the elbow or midarm to the wrist, resembling the shape of a bell—similar in concept to bell-bottom pants. This design element adds a flowy, dramatic aesthetic, often associated with bohemian, retro, or vintage-inspired styles. It enhances movement and brings a touch of elegance and individuality to any garment (**Figure 7**).

6.1.3. Bell Bottom or Boot Cut Pant with Patchwork—Retro Meets Handmade Craft

A bell bottom or boot cut pant is designed with a fitted waist and thigh, gradually flaring out from the knee to the hem, creating a flowing, retro-inspired silhouette. When enhanced with patchwork detailing, it brings a layer of artisanal craftsmanship, showcasing the beauty of handmade elements. This design not only reflects individuality and creativity but also supports the values of slow fashion by promoting upcycling and the appreciation of handcrafted aesthetics (**Figure 7**).

6.2. Fabric Selection

6.2.1. Khadi

Khadi is hand-spun and hand-woven typically from cotton, sometimes silk or wool on a charkha, embodying simple cottage-industry methods [11]. Mahatma Gandhi championed khadi during the independence movement as a Swadeshi tool, encouraging Indians to boycott foreign-made factory cloth and revive local weaving skills. He called it the “livery of freedom”. Gandhi saw khadi as a way to empower rural artisans, keep villagers employed, and provide work for semi-starved women, enabling economic self-sufficiency. The movement revived cottage industries, spurred rural employment, and fostered community-based, small-scale production. Initially slightly coarse, khadi softens beautifully with wear and washing a quality noted even in Gandhi’s description of its texture. Despite its roughness, the fabric is highly versatile it remains cool in summer and warm in winter. Made manually (no electricity) with minimal water usage, khadi is environmentally friendly and biodegradable [12] [13]. Gandhi’s economic philosophy prized labor-intensive, needs-based production, opposing mechanization and promoting ethical values.

In this study Khadi cloth is used to make the bootcut bottoms and the upper top Koti. This khadi fabric aligns with this study because it’s biodegradable natural fibers solidly supports emphasis on sustainability. Hand-crafted production empowers local artisans and preserves cultural heritage. Moreover, the symbolism and ethics amplify any garment as not just functional, but meaningful and narrative-rich. Over time, Khadi’s softening texture and comfort strengthen user appeal.

6.2.2. Gamcha

Gamcha is a traditional, lightweight, and very absorbent textile commonly used as a towel or scarf in South Asia, notably in India and Bangladesh. Made of cotton, this fabric is distinguished by its distinctive checkered or striped patterns, which are typically in vibrant colors. Gamcha was originally employed as a bath towel due to its remarkable absorbency, but it has now grown into a multifunctional textile [14]. It may also be used as a sweat towel, a headband, or an improvised sling or purse. Its breathable nature makes it ideal for hot and humid environments. Despite its submissive roots, Gamcha has gained appeal due to its practicality, affordability, and versatility. Many people still consider it an essential part of their daily lives [15] [16].

Gamcha isn't just a fabric it represents a powerful intersection of culture, sustainability, and circular economy. By turning what was once a humble towel into high-value, zero-waste apparel, Gamcha-centered initiatives are paving the way for ethical fashion rooted in tradition and closed-loop principles.

6.3. Tie-Die Process

In recent years, tie and dye has seen renewed popularity because of its ability to combine age-old methods with contemporary design. This traditional craft has been reinterpreted by fashion designers worldwide, who have produced stylish and current tie-dye collections. Designers and customers both are still drawn to tie-dye, whether it's in high-end catwalk fashion or casual streetwear. The adaptability of tie and dye is one of the factors contributing to its ongoing appeal. Cotton, silk, and synthetics are just a few of the many textiles that it may be applied to. Additionally, no two items are precisely the same due to the unpredictable nature of the technique, which lends originality and uniqueness to tie-dye clothing. Customers who care about the environment are also drawn to tie and dye, particularly when sustainable textiles and natural colors are utilized [17].

In this study Suji Shibori technique was utilized (**Figure 8**). It is made by washing and drying Khadi cloth to get rid of sizing and contaminants. Parallel pleats were produced by utilizing rubber bands to fold the cloth in the appropriate manner. After preparing the fabric dye as directed on the container, transferred it into plastic syringes or squeeze bottles. Then applied the green dye along the bound areas of the folded and bound Khadi cloth afterwards placed it on a protective work surface. To fix the color and get rid of extra dye, rinse the fabric under cold water. The Shibori design may be seen by carefully snipping or removing the rubber bands. In **Figure 8** the cloth hangs to air dry or lay it flat on a clean surface after giving it one last wash in cold water.



Figure 8. Tie dye on Khadi fabric.

6.4. Patch Work

The technique of patchwork involves piecing together smaller fabric pieces to form larger design. Patchwork has historically developed out of need as people constructed garments and quilts out of leftover fabric. Patchwork, however, has evolved into a sustainable fashion technique and a form of artistic expression in the modern world [18].

The fact that patchwork is an upcycling technique derived from our traditions is its greatest benefit. Old clothing, bedspreads, and even upholstery materials may be repurposed to make beautiful patchwork pieces rather than purchasing new fabric. Patchwork gives it a creative touch while simultaneously lowering waste and its negative effects on the environment. Creating patchwork pieces from Gamcha fabric is a vibrant, creative way to transform this traditional cloth into unique, sustainable accessories and garments. Here, **Figure 9** shows that the innovative patchwork on the planned garment section was done using grid-based designs. Out of 310 old Gamcha pieces, selected 250 - 280 pieces were used that have been pre-washed, GSM approved, and quality-tested. The traditional red, green, blue, orange, and yellow checks and stripes provide dynamism to the costume. The inner top, Koti sleeves, lower section (from knee to ankle), and the upper bottom waist area accented with a decorative bow were all creatively patched together to form a cohesive and artistic design (**Figure 9**).

The patches were made into slightly larger squares or rectangles than intended, with a seam allowance of near 5 to 8 mm, in order to ensure color and pattern contrast, such as striking stripes against muted checks for visual appeal. The patch layer was then strengthened with lining fabric, and the ornamentation was completed using basic running stitches. This sustainable ensemble is made more striking and contemporary by the patch craftsmanship, as the strong checks paired in asymmetrical patterns to give a distinctive aesthetic look (**Figure 9**).



Figure 9. Patch work and final outfit made by khadi and used Gamcha based on sustainable circular fashion concept.

7. Limitations of the Study

The limited sample size ($n = 57$) of this study is one significant drawback that could compromise the findings generalizability. With a limited number of respondents, the data may not fully represent the broader population's views or behaviors. Future research should seek a larger and more demographically diverse sample to enhance the validity and generalizability of the findings across different sectors of the fashion industry. A key limitation encountered was the unavailability of consistent or identical Gamcha fabric designs, which made it challenging to create a complete dress from a single pattern. Since Gamcha fabrics are traditionally handcrafted and vary in weave, color, and motif, sourcing multiple pieces of the same design in sufficient quantity proved difficult. This limitation affected design uniformity and scalability, particularly in developing cohesive full outfits.

Additionally, further research on circular sustainable Gamcha fabric can build upon how upcycling models with this fabric can adapt across markets like Europe, North America, and Asia, each with different consumer preferences, regulations, and cultural attitudes. Besides future studies could also investigate how this concept competes with existing alternatives or similar sustainable fashion initiatives in the market. The research recognizes the potential for innovation in Gamcha repurposing, emphasizing its creative use within the circular fashion concept. It indicates a primary focus on sustainability, which is consistent with the expanding worldwide demand for environmentally friendly and ethical fashion practices. The observation indicates that the Gamcha regain method has a possibility to enter the global market, implying that there is scope for market growth and acceptance.

8. Conclusions

This study highlights the crucial function of clothes reuse and upcycling in driving circular fashion and indicates its main developmental issue scaling up from the niche stage to the present fashion regime. This research examines the concept of circular economy within the context of the fashion industry, since in typical linear economies, resources are harvested, used to make the product, and then discarded as garbage. As a result, authors strive to reduce waste and maximize resource use by encouraging reuse, recycling, and sustainable practices. The author employed Gamcha as a sustainable material for clothing. Gamcha is a symbol of Bangladeshi perseverance and adaptation, and it is widely used in daily life, from serving as a towel to being fashioned into traditional garb. During festivals and events, it is a typical present, emphasizing its cultural relevance. Overall, Gamcha threads itself into the fabric of Bangladesh, integrating tradition, pragmatism, and economic influence. Besides the low pricing makes Gamcha-made clothing accessible to a wide range of people. It is often breathable and comfortable, making it appropriate for casual and everyday use. In hot climates, it can give comfort and ease of movement. It has the potential to integrate with sustainability goals. Designers are creating sustainable Gamcha collections using recycled materials and eco-conscious

dyeing which is the reason for emerging trends and market opportunities for local artisans [15].

Gamcha's vibrant checks and traditional handloom craft make it a compelling symbol of circular fashion rooted in community, authenticity, and regenerative practices. Contemporary designers and collectives (e.g., 145 East, Rangila Dhaga, Asmita Marwa) are integrating this fabric into avant-garde silhouettes, zero-waste systems, and global design narratives, reinforcing its relevance [16]. On the other hand, Crafting with Gamcha promotes local artisanal economies. Its natural cotton composition and low-tech production further amplify its ecological value.

Scalable Circular Practices aligning culture, design, and circular business strategies demonstrate Gamcha's capacity to transcend local markets and resonate globally, validating its mainstream potential. Despite its promise, Gamcha-based fashion must navigate infrastructure & traceability-systems for collecting, sorting, and certifying small-batch textiles, cultural perception barriers-transitioning from utilitarian textiles to high-fashion prestige and tech integration, infusing digital transparency (QR, blockchain) and scalable processing methods. Addressing these through design-for-sustainability and leveraging its artisanal pathways can drive lasting circular impacts.

Lastly, Gamcha is more than a cloth, it's a circular catalyst. It preserves cultural craft and uplifts artisans, it embodies zero-waste, hand-loomed production and offers a vibrant, modern aesthetic rooted in tradition. By bridging the gap between niche sustainability and mainstream fashion, Gamcha presents a tangible, scalable model for circular fashion deeply connected to people, place, and purpose.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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Appendix

Table 1. Google form survey details.

Name	Years of interviewers	Occupation	Are you familiar with the concept of sustainable fashion?
Mim	22 years	Student	knows about it
Nafi	30 years	Teacher	Never heard of it
Pavel	29 years	Manager	Somehow knows it
Mashruba	25 years	Student	Knows about it
Sharif	23 years	Student	knows about it
Akifa	20 years	Student	Never heard of it
Marjan	30years	Teacher	Somehow knows it
Mariom	24 years	Manager	Knows about it
Tasnim	29 years	Student	knows about it
Richi	22 years	Student	Never heard of it
Mawa	30 years	Student	Somehow knows it
Shopnil	28 years	Teacher	Knows about it
Tajminur	25 years	Manager	knows about it
Naba	23 years	Student	Never heard of it
Mahdi	20 years	Student	Somehow knows it
Sagor	29 years	Teacher	Knows about it
Inka	26 years	Police	knows about it
Liona	29 years	Student	Never heard of it
Ridhi	30 years	Manager	Somehow knows it
Ethin	30 years	Doctor	Knows about it
Arman	29 years	Teacher	knows about it
Asif	25 years	Student	Never heard of it
Arif	23 years	Manager	Somehow knows it
Tahmid	20 years	Student	Knows about it
Nushrat	29 years	Teacher	knows about it
Rafi	27 years	Manager	Never heard of it
Liza	29 years	Student	Somehow knows it
Niloy	22 years	Student	Knows about it
Ony	30 years	Fashion vlogger	knows about it
Jui	21 years	Student	Never heard of it
Siam	25 years	Student	Somehow knows it
Sayma	23 years	Teacher	Knows about it
Mahmudul	20 years	Manager	knows about it
Sayeemum	16 years	Student	Never heard of it

Continued

Araf	24 years	Student	Somehow knows it
Dipita	29 years	Teacher	Knows about it
Tripta	22 years	Teacher	knows about it
Modhu	30 years	Student	Never heard of it
Tonmoy	21 years	Teacher	Somehow knows it
Easin	25 years	Manager	Knows about it
Kamrul	23 years	Student	knows about it
Masuma	20 years	Student	Never heard of it
Tani	16 years	Student	Somehow knows it
Tushar	24 years	Student	Knows about it
Noor	29 years	Teacher	knows about it
Rion	17 years	Manager	Never heard of it
Durjoy	18 years	Student	Somehow knows it
Afif	22 years	Student	Knows about it
Naboni	30 years	Student	knows about it
Rumky	21 years	Teacher	Never heard of it
Suma	25 years	Manager	Somehow knows it
Sabbir	23 years	Student	Knows about it
Sanjida	20 years	Student	knows about it
Afridi	16 years	Student	Never heard of it
Ahnaf	24 years	Manager	Somehow knows it
Sakib	29 years	Doctor	Knows about it
Kaushik	30 years	Police	Knows about it

Table 2. Survey questions and answers.

Proposed Questions	Answers
Do you know what sustainable fashion means?	78% yes 10% no 10% maybe
Have you purchased sustainable garments?	70% yes 30% no
What motivates you to buy sustainable garments?	Long lasting 9.3%
Are you concerned about the environmental impact of the fashion industry?	40% yes 25% no 35% maybe
Do you consider social and ethical factors when purchasing clothes?	89.3% yes 10.7% no
Are you influenced by certifications or labels that indicate a garment's sustainability?	85% yes 15% no

Continued

Are you willing to pay a premium for sustainable?	50% yes 50% no
What other factors influence your decision to buy sustainable garments?	Long lasting 70 % Fashionable 30 %
Where do you usually shop for sustainable garments?	Available 13% Not available 22%
Do you tend to buy from local or international sustainable brands?	70% yes ,30% no
Do you plan to increase your purchases of sustainable garments in the future?	60% yes, 20% no and 20% maybe
Is price an important factor when purchasing sustainable garments?	75% yes, 25% no
What sustainable clothing brands or products are you currently aware of or have purchased before?	Aarong 68% Other brand 28%
How do you currently dispose of your clothing when you no longer use it?	21% Just throwing out Other optional uses 60% Keep it 19%
Would you be more likely to purchase a sustainable garment if it was produced locally or made from recycled materials?	79% yes, 9% no and 12% maybe
