Proceedings of ICFTBA 2025 Symposium: Data-Driven Decision Making in Business and Economics
DOI: 10.54254/2754-1169/2025.BL30573

Reusing and Remaking Old Clothes: Building a Better Circular Economy

Zhuyi Shen

Overseas Chinese Academy of Concord, Suzhou, China
Shenzhuyi2007@outlook.com

Abstract. The rapid growth of the fashion industry, coupled with the pervasive 'fast fashion' model, has precipitated a severe global textile waste crisis. This study systematically assesses the detrimental effects textile waste has on the environment and calculates the significant carbon emission reductions that can be achieved through organized recycling programs. Employing a mixed-methods approach that includes case study analysis and literature review, the study highlights several major implementation obstacles, such as a disjointed infrastructure for collection, technological limitations in automated sorting and fiber separation, low levels of public involvement, and inadequate regulatory frameworks. To address these interconnected challenges, the paper suggests an integrated approach, combining extended recycling networks, technological advancements, extensive public involvement, and strong policy backing, especially through Extended Producer Responsibility (EPR). Case studies from Guangzhou, Zhejiang, and Shanghai provide practical evidence of the efficacy of these coordinated strategies. The findings underscore that a sustainable, resource-efficient future in the textile sector is contingent upon the consistent collaboration between governments, businesses, and the general public to successfully convert textile waste into valuable resources and close the loop in a circular economy.

Keywords: Clothing Recycling, Circular Economy, Textile Waste, Public Engagement, EPR

1. Introduction

The fashion industry is growing quickly, but it is also causing a serious waste issue that cannot be disregarded. Millions of tons of clothing are thrown away carelessly every year. Either these worn-out dresses, shirts, and pants are burned, releasing toxic pollutants into the air, or they wind up clogging landfills for decades. The 'fast fashion' model further exacerbates climate change by consuming large amounts of natural resources such as water, cotton, and energy, while producing inexpensive garments with short lifecycles. In order to address this growing problem before it becomes unmanageable, experts stress time and again that managing textile waste is an essential part of a circular economy and that creative solutions are urgently needed [1]. Recycling used clothing is essential for maintaining a healthy and sustainable planet for future generations. Research indicates that recycling one kilogram of clothing can reduce carbon emissions by approximately 3.6 kilograms—a significant impact given the volume of discarded textiles [2]. This aligns with global

DOI: 10.54254/2754-1169/2025.BL30573

sustainability goals and national initiatives, such as China's plan to recycle 25% of textile waste by 2025 to achieve meaningful environmental progress [3].

However, recycling clothing is not a simple task. Many individuals are uncertain about where to take their used jeans or jackets, often resulting in disposal in regular waste bins. The process is costly in both time and resources, and it requires advanced technology to be effective [2]. Currently, most recycling processes downgrade old T-shirts into low-value products like cleaning rags or insulation material. Promising innovations, such as automated sorting with computers or chemical processes to break down fabrics into reusable components, are in development but remain limited due to high costs, technical complexity, and lack of widespread access.

2. Challenges in clothing recycling

2.1. Underdeveloped recycling infrastructure

China's clothing recycling system has significant deficiencies that hinder participation. Many neighborhoods lack designated drop-off points, and there are insufficient companies to manage the volume of clothing people wish to recycle. For example, in Shanghai, only 30% of residential areas have specialized bins for clothing, which is insufficient to meet public demand and leaves many residents frustrated [4]. This situation underscores the inadequacy of current infrastructure to address a problem of this magnitude.

2.2. Technological bottlenecks constrain development

Clothing recycling faces numerous technical challenges that impede progress. Sorting is primarily manual, which is slow, labor-intensive, and accounts for over 60% of operational costs. Separating blended fabrics, such as cotton-polyester blends commonly found in comfortable shirts, remains a global challenge that researchers are still addressing [5].Furthermore, most recycled clothing is downgraded into low-value products rather than being remade into items of equal or greater value, which fails to address the core issue and fails to capture the full value of the materials, resulting in a net loss of resources.

2.3. Insufficient public participation

Surveys indicate that over 65% of individuals want to recycle their clothing, but fewer than 30% know where or how to do so [6]. Consequently, many clothes end up in regular trash bins, destined for landfills or incineration, with people unaware of the missed opportunities. Most individuals do not recognize the environmental value of their old sweaters, viewing them merely as waste to discard. This gap between intention and action is further widened by a lack of immediate and tangible incentives for consumers to participate in recycling programs. Moreover, public education campaigns are often sporadic and lack the sustained intensity needed to fundamentally change deep-seated consumption and disposal habits, leaving a significant portion of the population disengaged.

2.4. The policy support system is not sound

Currently, China lacks a national law mandating textile recycling, with no clear goals or responsibilities defined for stakeholders. Global research highlights that robust regulations, guidelines, and incentives are essential for promoting textile reuse [7]. While China has set a target to achieve a 25% recycling rate by 2025, local governments lack sufficient support, tools, or

DOI: 10.54254/2754-1169/2025.BL30573

incentives to implement it effectively, resulting in widespread gaps. The absence of a standardized monitoring and reporting mechanism makes it difficult to track progress and hold relevant parties accountable, leading to inconsistent enforcement across different regions. Furthermore, without clear financial mechanisms or penalties, both producers and local authorities often prioritize short-term economic gains over the long-term investments required for building a circular textile economy.

3. Solution: take multiple measures to promote the recycling of old clothes

To address these interconnected challenges, a multi-pronged strategy is proposed, which encompasses the following key measures:

3.1. Improve the recycling network system

A user-friendly recycling system is essential for widespread adoption. By 2025, every urban neighborhood should have bins for dropping off used clothing conveniently. Partnering with delivery companies to collect clothing from homes could reduce costs and increase convenience. Retail stores, malls, and supermarkets could establish drop-off points and offer coupons or discounts to encourage participation. Shanghai's "Internet + Recycling" app, which allows residents to schedule pickups, recycled 35,000 tons of clothing in 2023—a 35% increase from the previous year—demonstrating the potential of effective systems [4].

3.2. Strengthening technological innovation and breakthroughs

Beyond infrastructure, technological innovation is equally critical. Advanced technology is pivotal for improving the recycling process. Automated sorting systems using computers and high-tech cameras can process clothing faster and more accurately than manual methods, reducing errors. Researchers must continue developing methods to separate blended fabrics, such as cotton-polyester blends, to enhance recycling efficiency. A blockchain-based system could track clothing from collection to reuse, ensuring transparency and accountability. In Zhejiang, a company developed a machine that sorts 2 tons of clothing per hour with 95% accuracy, significantly reducing labor costs and highlighting technology's potential [2].

3.3. Enhance public participation

Raising awareness about the importance of clothing recycling is critical. Neighborhood signs and social media platforms like WeChat can educate residents on its environmental impact. Workshops teaching people how to transform old shirts into items like bags or quilts can spark enthusiasm and hands-on involvement. Schools should incorporate environmental education to instill sustainable habits in children early on, fostering a culture of environmental stewardship. Influencers on platforms like Douyin and Xiaohongshu, demonstrating how to repurpose old clothing, are already inspiring widespread interest in recycling. Furthermore, establishing a transparent public feedback mechanism that shows how donated clothing is processed and its final environmental impact can significantly boost trust and long-term engagement in recycling initiatives.

DOI: 10.54254/2754-1169/2025.BL30573

3.4. Improve the policy support system

Robust policies are essential for driving meaningful change. A system requiring clothing companies to manage their products' entire lifecycle, including disposal, is necessary. Providing tax breaks or subsidies to recycling businesses would support their growth and sustainability. Integrating clothing into waste-sorting regulations, as Beijing did in 2023 when it recycled 50,000 tons of clothing with a 70% reuse rate, provides a strong model for other cities to emulate [8]. Additionally, the government could establish a tiered reward system for municipalities that exceed recycling targets, fostering healthy inter-city competition and accelerating the nationwide adoption of best practices.

3.5. Implementing Extended Producer Responsibility (EPR)

Complementing these efforts, the role of businesses must be formally integrated through policy. An Extended Producer Responsibility (EPR) framework should be established, legally mandating brands to manage the entire lifecycle of their products, from design to end-of-life. At the design stage, companies should be encouraged to adopt circular design principles, such as using durable, mono-material fabrics that are easier to recycle and incorporating recycled materials into new collections. In the post-consumer phase, brands can take responsibility by setting up in-store take-back schemes, funding city-wide collection infrastructure, or partnering with specialized recycling firms to process returned garments. This approach not only internalizes the environmental cost of waste but also creates economic incentives for brands to design longer-lasting, more recyclable products, thereby driving innovation and sustainability from the source.

4. Successful case studies

The following practical cases from multiple cities across China provide strong evidence for the effectiveness of the aforementioned solutions.

First, 80% of Shanghai's neighborhoods are served by the "Internet + Recycling" system, which allows citizens to arrange door-to-door pickups through a mobile application. It successfully implemented the strategy to improve recycling accessibility and demonstrated the significant potential of digital tools by recycling 35,000 tons of used clothing in 2023, a 35% year-over-year increase.

Second, the Zhejiang "Uniform Inheritance" project, [2,9]in which local schools arrange for older students to pass down uniforms to younger ones, exemplifies the strength of public participation. In addition to promoting sustainability and saving more than 5 million RMB in 2023 by reusing 100,000 uniforms, this program was a model for integrating the importance of resource circulation into the classroom.

Additionally, Guangzhou's innovative clothing repurposing program takes a unique tack by working with volunteers and designers to turn old clothing into stylish new items for charity sales. The program effectively demonstrates the dual environmental and social benefits of recycling by repurposing 10,000 garments and raising 500,000 RMB in 2023 to aid those in need [10], thereby transforming waste into priceless community assets.

5. Conclusion

The successful examples of Guangzhou's innovative repurposing, Zhejiang's uniform reuse, and Shanghai's digital recycling show that, with methodical approaches, used clothing can be transformed into valuable social and environmental assets. Building on these successful models

DOI: 10.54254/2754-1169/2025.BL30573

requires a phased approach. National integration of digital platforms and the growth of convenient recycling networks should be the top priorities in the near future. The development of a thorough Extended Producer Responsibility (EPR) framework and the removal of technical obstacles to blended fabric recycling must be the main goals of mid-term initiatives [11]. Long-term development of a strong circular economy necessitates the establishment of a widespread sustainable culture in which recycling and reuse are accepted as social norms. Governments, corporations, and citizens must work together relentlessly to turn used clothing from waste into useful resources. We can guarantee that used clothing is valued in a circular economy and pave the way for a more resource-efficient and sustainable future by steadfastly committing to technological innovation, enacting supportive laws, and fostering broad public participation.

References

[1] Sandin, G., et al. (2025). Handling Textile Waste for Circular Systems. Trash Research Journal, (8-12).
[2] Zhejiang Tech Department. (2023). New Tech for Textile Recycling, (3-15).
[3] National Development and Reform Commission. (2022). Plan to Boost Textile Waste Recycling, (5-7).
[4] Shanghai Ecology Bureau. (2023). Shanghai Rules for Trash, (4-6).
[5] Choudhury, K., et al. (2024). Reusing Mixed Fabrics for a Circular Economy. Sustainability, 16(3), (102-115).
[6] China Environmental Federation. (2023). Survey on People's Green Habits, (5-9).
[7] Saif, M., et al. (2024). Challenges and Rules for Textile Reuse. ACS Sustainable Resources, 1(2), (110-125).
[8] Beijing Urban Management. (2023). Report on Clothes Recycling, (9-11).
[9] Zhejiang Education Department. (2023). School Recycling Stories, (2-4).
[10] Guangzhou Civil Affairs. (2023). Charity Clothes Project Report, (11-13).
[11] China Circular Economy Group. (2023). Report on Textile Trash, (4-10).