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Community Participation In Sustainable Textile Recycling

Dr. S. Kavitha[1], Dr. S. Meena Priyadharshini[2], Dr. K. Kavitha[3]

[1]Professor & Head, Department of Home Science, Mother Teresa Women University, Kodaikanal

[2]Assistant Professor & Head, Department and Centre for Women's Studies, Mother Teresa Women University, Kodaikanal

[3]Assistant Professor, Department of Computer Science, Mother Teresa Women University, Kodaikanal.

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ABSTRACT

Community participation plays a pivotal role in fostering sustainable textile recycling practices, particularly in industrial hubs like Tiruppur District, Tamil Nadu, India. This study examined the extent of community engagement in textile recycling initiatives and its impact on sustainability outcomes. A descriptive research design was employed, and data were collected through a structured questionnaire from 100 respondents, including textile workers, community leaders, and technology specialists. This study underscores the significant role of community participation in fostering sustainable textile recycling initiatives. The major findings reveal that 77% of respondents recognized community leaders as key facilitators in mobilizing local participation, emphasizing their influence in driving engagement. Additionally, 81% of respondents agreed that community involvement is crucial for sustaining recycling efforts, while 85% believed that community engagement increases awareness about environmental sustainability. These findings highlight the positive impact of community participation on raising environmental consciousness and promoting responsible waste management practices The insights from this research contribute to the broader discourse on sustainable waste management and emphasize the importance of inclusive, technology-driven approaches in the textile industry.

Keywords: *Community Participation, Sustainable Textile Recycling,, Gender Inclusivity, Digital Technology*

1. INTRODUCTION

Textile recycling is an essential component of sustainable development, addressing the environmental and socio-economic challenges posed by the fast-growing textile industry. Tiruppur District, recognized as the "Knitwear Capital of India," plays a significant role in the global textile market. However, the rapid industrial growth in this region has led to environmental degradation, excessive water consumption, and substantial textile waste generation. Implementing sustainable textile recycling practices is crucial to mitigate these impacts and foster a circular economy.

Textile recycling is crucial for environmental sustainability and addressing the challenges posed by fast fashion and overconsumption (Shirvanimoghaddam et al., 2020; Chavan, 2014). The global textile industry, valued at $3 trillion, produces over 100 million tonnes of textiles annually, with only 15% being recycled (Shirvanimoghaddam et al., 2020). Recycling textile waste can provide economic, environmental, and social benefits (Chavan, 2014). Brazil is making progress in textile recycling, following global sustainability trends (Correa do Amaral et al., 2018). However, challenges remain, including improving collection systems, automating sorting processes, and developing new recycling technologies (Juanga-Labayen et al., 2022). Various recycling methods exist, such as mechanical and chemical processes, anaerobic digestion, and thermal recovery (Correa do Amaral et al., 2018; Juanga-Labayen et al., 2022). Implementing extended producer responsibility policies and circular economy principles can help address these challenges and increase textile waste diversion from landfills (Juanga-Labayen et al., 2022).

Community participation plays a crucial role in textile recycling, contributing to environmental sustainability and circular economy systems. Consumers' involvement in recovery, reuse, and recycling of textile waste is vital for these systems to function effectively (Grillo-Méndez et al., 2022). While there is high awareness about textile recycling, confusion between reuse and recycling concepts often leads to textiles ending up in landfills (Grillo-Méndez et al., 2022). The fast fashion culture has resulted in overconsumption and increased textile waste generation, emphasizing the need for recycling (Chavan, 2014). To address this, the fashion industry should produce environmentally friendly, recyclable products and encourage consumers to purchase recycled and organic textiles (Kamis et al., 2018). Designers must innovate in creating recycled apparel, while consumers should adopt positive attitudes towards eco-friendly products (Kamis et al., 2018). Raising awareness about ecological issues, disposal channels, and environmentally conscious business ethics can promote more sustainable textile use and disposal (Hawley, 2009).

Textile recycling in India faces several challenges but also presents opportunities for sustainable practices and community participation. Key barriers include lack of successful business models, poor demand for recycled goods, and absence of supportive policies (Ponnambalam et al., 2023). However, traditional techniques like Kantha, Sujani, and Patchwork are being used to upcycle textile waste, providing employment and contributing to sustainability (Singh & Rani, 2021). Channels for recycling post-consumer apparel waste include NGOs, small-scale industries, and online resale platforms (Bairagi, 2018). To promote sustainable practices, strategies such as organizing upcycling workshops, establishing community repair centers, and supporting local artisans are recommended (Soni & Srivastava, 2024). Additionally, hawkers play a crucial role in collecting and recycling used garments, making affordable clothing available to middle-class families (Soni & Srivastava, 2024). These efforts align with SDG 12, emphasizing responsible production and consumption in the textile industry.

The textile industry in Tiruppur, India, has experienced rapid growth, contributing significantly to the regional economy but also causing severe environmental degradation (Prakash Nelliyat, 2007). The district faces challenges in sustainable development, particularly in managing water pollution from dyeing and bleaching processes (J. Sarathi et al., n.d.). While efforts have been made to implement effluent treatment plants, more work is needed in policy and implementation to address environmental issues (J. Sarathi et al., n.d.). The industry also grapples with barriers to textile recycling, including lack of successful business models, poor demand for recycled goods, and insufficient policy support (S. G. Ponnambalam et al., 2023). These challenges are further complicated by the trend of fast fashion and overconsumption, highlighting the need for responsible production and consumption practices (S. G. Ponnambalam et al., 2023). Despite these issues, there is potential for green textile sourcing from Tirupur, which could contribute to more sustainable global textile chains (Camilla Cecilie Valeur, 2013).

Community participation is a critical factor in the successful implementation of sustainable textile recycling initiatives. Engaging local communities not only enhances waste collection and segregation but also promotes awareness, behavioral change, and long-term sustainability. In Tiruppur District, the active involvement of various stakeholders, including local residents, self-help groups (SHGs), and non-governmental organizations (NGOs), can contribute significantly to reducing textile waste and creating a more sustainable production-consumption cycle. This study aims to examine the role of community participation in sustainable textile recycling in Tiruppur District. It explores how collaborative efforts between local governance bodies, community groups, and industries can foster effective recycling systems. Furthermore, it investigates the socio-economic benefits of involving the community, such as employment generation, skill development, and the empowerment of marginalized groups, particularly women.

2. RELATED STUDIES

Shirvanimoghaddam et al. (2020), in his study explores challenges and opportunities in textile waste recycling worldwide. It emphasizes the need for technological advancements like mechanical and chemical recycling and highlights policy frameworks such as Extended Producer Responsibility (EPR) to improve recycling rates and reduce textile waste in landfills.

Chavan (2014), discusses the environmental impacts of the textile industry and advocates for sustainable recycling practices. It emphasizes that textile recycling not only reduces environmental degradation but also provides economic benefits through job creation and resource efficiency, especially in industrial hubs like Tiruppur.

Ponnambalam et al. (2023) case study identifies barriers to textile recycling in Tiruppur District, including poor demand for recycled goods, lack of supportive policies, and inefficient collection systems. The study suggests that community participation and policy support are essential to overcome these barriers and promote sustainable practices.

Grillo-Méndez et al. (2022) examines the role of consumers in textile waste management. It finds that while awareness of textile recycling is growing, there is confusion between reuse and recycling. The research recommends consumer education programs and community engagement to promote sustainable textile disposal practices.

Singh & Rani (2021) highlights traditional Indian upcycling techniques like Kantha and Patchwork as sustainable solutions for textile waste. It emphasizes that community-driven approaches can empower local artisans, preserve cultural heritage, and reduce textile waste, contributing to the circular economy.

Objectives

1. To elicit the personal profile of the respondents in recycling initiatives in Tiruppur District
2. To analyze the extent of community participation in sustainable textile recycling initiatives.
3. To examine the socio-economic benefits of community engagement in textile recycling.

3. METHODOLOGY

This study adopted a descriptive research design to investigate community participation in sustainable textile recycling initiatives in Tiruppur District. A pilot study was conducted with a sample of 100 respondents selected through purposive sampling to ensure the inclusion of key stakeholders such as textile workers, community leaders, local government officials,

and technology specialists. Data were collected using a structured questionnaire, which comprised sections on demographic information, community engagement, socio-economic benefits, and barriers to participation. Quantitative analysis was employed to interpret the responses, utilizing descriptive statistics such as frequencies and percentages to summarize the data. The questionnaire focused on eliciting personal profiles, assessing the extent of community participation, and identifying socio-economic impacts arising from engagement in textile recycling initiatives. The study ensured data validity through a pilot test to refine the questionnaire for clarity and reliability. Findings from the analysis provided insights into the role of community participation in enhancing sustainable practices and addressing socio-economic challenges in the textile recycling sector.

4. RESULTS

Table 1: Gender

Gender			
Variables		Frequency	Percent
Gender	Male	78	78.0
	Female	19	19.0
	Others	3	3.0
	Total	100	100.0

Table 1 shows that 78% of respondents in textile recycling initiatives in Tiruppur District were male, while 19% were female, and 3% identified as others, indicating a male-dominated sector. The lower participation of women and other gender identities may result from socio-cultural norms, limited access to technology, and economic barriers. This reflects broader gender disparities in industrial work and decision-making roles. To address these gaps, targeted interventions such as capacity-building programs, policy support, and technological training are essential to enhance gender inclusivity and promote sustainable textile recycling practices.

Table 2: Age

Age			
Variables		Frequency	Percent
Age	Under 20	12	12.0
	20 - 29	37	37.0
	30-39	21	21.0
	40-49	17	17.0
	above 50	13	13.0
	Total	100	100.0

Table 2 shows the age distribution of respondents in textile recycling initiatives in Tiruppur District. The 20-29 years age group formed the largest share at 37%, highlighting young adults' significant involvement, likely due to their adaptability to technology and interest in sustainability. 21% of respondents were 30-39 years, and 17% were 40-49 years, contributing experience and practical knowledge. 13% were above 50 years, indicating lower participation due to physical demands or technological barriers. 12% were under 20 years, reflecting early youth engagement in sustainable practices. The findings suggest a need for targeted training programs and policy interventions to increase participation across all age groups, ensuring long-term sustainability and inclusive community involvement in textile recycling.

Table 3: Level of Education

Level of education			
Variables		Frequency	Percent
	No formal Education	24	24.0

Level of Education	Primary school	25	25.0
	Secondary school	26	26.0
	Undergraduate degree	17	17.0
	Post graduate degree	8	8.0
	Total	100	100.0

Table 3 shows the educational levels of respondents in textile recycling initiatives in Tiruppur District. 26% had secondary school education, followed by 25% with primary education and 24% with no formal education, indicating that 75% of respondents had basic or no education. Only 17% held an undergraduate degree, and 8% had a postgraduate degree, reflecting limited participation of highly educated individuals. This low educational profile aligns with the manual nature of textile recycling work, which emphasizes practical skills over academic knowledge. The findings suggest a need for skill development programs, vocational training, and digital literacy initiatives to bridge knowledge gaps and enhance technological adoption. Policy interventions promoting inclusive education could further support socio-economic mobility and community engagement in sustainable textile recycling.

Table 4: Occupation

Occupation			
Variables		Frequency	Percent
Occupation	Textile worker	55	55.0
	Community Leader	14	14.0
	Local Government officials	9	9.0
	Technology specialist	22	22.0
	Total	100	100.0

Table 4 shows the occupational distribution of respondents in textile recycling initiatives in Tiruppur District. Textile workers comprised the largest group at 55%, reflecting the labor-intensive nature of recycling. Technology specialists accounted for 22%, indicating a growing reliance on digital tools and technological innovations to improve efficiency. Community leaders made up 14%, emphasizing their role in mobilizing participation and promoting sustainable practices. Local government officials represented 9%, highlighting their essential role in policy implementation and supporting sustainability programs. The findings suggest that successful textile recycling requires collaboration between textile workers, technology experts, community leaders, and government authorities to enhance sustainability and address socio-economic challenges.

Table 6: Year of Experience

Years of experience in textile recycling sector			
		Frequency	Percent
Valid	less than 1 year	22	22.0
	1-3years	23	23.0
	3-5 years	24	24.0
	moe than 5 years	31	31.0
	Total	100	100.0

Table 6 shows the years of experience of respondents in textile recycling in Tiruppur District. The largest group (31%) had more than 5 years of experience, highlighting the presence of seasoned professionals who contribute operational efficiency and mentorship. 24% had 3-5 years of experience, and 23% had 1-3 years, reflecting a balanced mix of mid-level professionals who bring both practical insights and innovation. 22% had less than 1 year of experience, indicating a steady influx of new workers, likely driven by increased employment opportunities and sustainability awareness. The findings suggest that continuous skill development, knowledge transfer, and technology-focused training are essential to optimize growth and ensure long-term sustainability in the textile recycling sector.

Table 7: Occupation

The community engagement influences the success of textiles recycling initiatives in Tirupur		
Variables	Frequency	Percent
Strongly Disagree	1	1.0
Disagree	7	7.0
Neutral	21	21.0
Agree	44	44.0
Strongly Agree	27	27.0
Total	100	100.0

The data in Table 7 reveals that 71% of respondents agreed or strongly agreed that community engagement plays a crucial role in the success of textile recycling initiatives in Tiruppur District. This reflects a broad consensus on the positive impact of community involvement in enhancing recycling processes, raising awareness, and fostering collective responsibility. While 21% remained neutral, suggesting that other factors like technology or government policies may also influence outcomes, only 8% (7% disagreed and 1% strongly disagreed) expressed skepticism about the effectiveness of community participation. The findings emphasize that community engagement is a key driver of sustainable textile recycling. To strengthen participation, targeted outreach, educational programs, and collaborative efforts among local leaders, technology experts, and government bodies are essential to enhance sustainability and improve long-term outcomes.

Table 8

Community members play significant roles in the success of textile recycling programs in Tirupur		
	Frequency	Percent
Disagree	6	6.0
Neutral	19	19.0
Agree	45	45.0
Disagree	30	30.0
Total	100	100.0

Table 8 shows that 45% of respondents agreed that community members play a crucial role in the success of textile recycling programs in Tiruppur District, highlighting the importance of grassroots participation in mobilizing resources and ensuring sustainability. However, 30% disagreed, indicating a belief that other factors—such as technology, government policies, or institutional support—may have a greater impact on program outcomes. 19% of respondents were neutral, suggesting uncertainty about the decisiveness of community involvement, while only 6% strongly disagreed, showing minimal opposition. Overall, the findings suggest broad support for community participation, though there are perceived gaps in its effectiveness. To enhance community involvement, capacity-building programs, inclusive decision-making, and collaborative partnerships with local authorities and technology experts are crucial for achieving sustainable outcomes in textile recycling.

Table 9

The involment of community members in crucial for sustainable textile recycling initiatives		
	Frequency	Percent
Disagree	4	4.0
Neutral	15	15.0
Agree	49	49.0
Strongly Agree	32	32.0

Total	100	100.0

Table 9 shows that 81% of respondents agreed or strongly agreed that community involvement is crucial for sustainable textile recycling in Tiruppur District. This reflects a widespread belief that active participation supports long-term sustainability, improves waste management, and promotes environmental responsibility. 15% of respondents were neutral, suggesting that some view other factors—such as technology, government regulations, or private sector involvement—as equally important. Only 4% disagreed, showing minimal skepticism, possibly due to inconsistent participation or limited resources. Overall, the findings highlight community involvement as a key driver of sustainable textile recycling. Strengthening community participation requires inclusive policies, awareness campaigns, and capacity-building programs to empower and engage local communities effectively.

Table 10

Community engagement in textile recycling programms helps increase awareness about evironmental sustainablity			
		Frequency	Percent
Valid	Disagree	4	4.0
	neutral	11	11.0
	Agree	43	43.0
	Strongly agree	42	42.0
	Total	100	100.0

Table 10 shows that 85% of respondents agreed or strongly agreed that community engagement in textile recycling programs increases awareness about environmental sustainability in Tiruppur District. This indicates a broad consensus that active participation helps in disseminating information, promoting behavioral change, and encouraging sustainable practices. 11% of respondents were neutral, suggesting uncertainty or a belief that other factors, such as policy interventions or technological innovations, also play a role. Only 4% disagreed, reflecting minimal skepticism, possibly due to inconsistent outreach or limited educational resources. Overall, the findings highlight community engagement as a key driver in raising environmental awareness. To maximize impact, stakeholders should invest in community-driven educational programs, interactive workshops, and collaborative initiatives to empower local populations and promote sustainable textile recycling.

Table 11

Local Community leaders play a pivotal role in mobilizing community members for textile recycling activities		
	Frequency	Percent
Disagree	5	5.0
Neutral	18	18.0
Agree	44	44.0
Strongly agree	33	33.0
Total	100	100.0

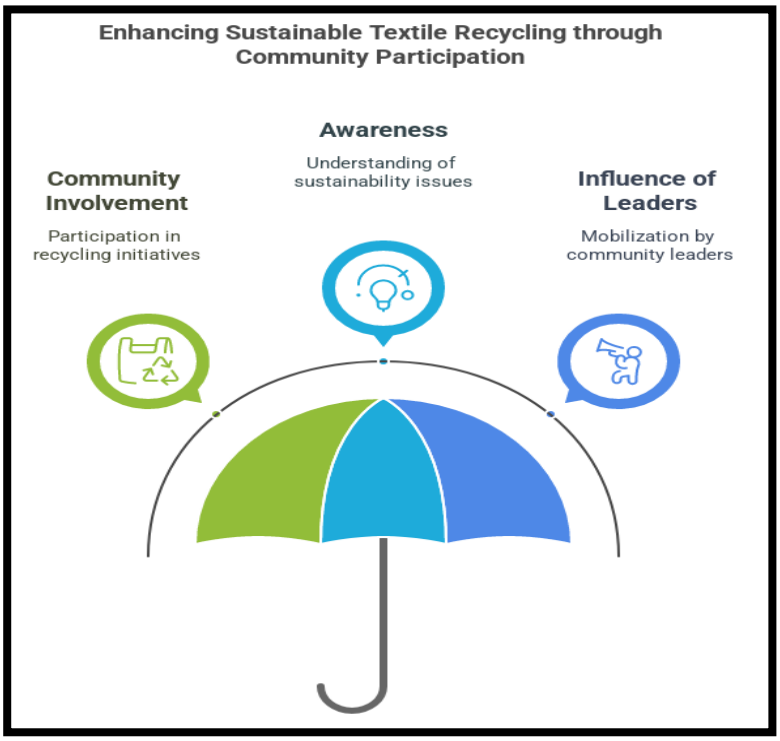
Table 11 shows that 77% of respondents agreed or strongly agreed that local community leaders play a key role in mobilizing community members for textile recycling in Tiruppur District. This highlights their influence in raising awareness, organizing initiatives, and promoting participation. 18% remained neutral, suggesting that some view other actors, like government bodies or technology experts, as equally important. Only 5% disagreed, reflecting minimal skepticism, possibly due to leadership limitations or resource constraints. The findings emphasize the pivotal role of community leaders in driving grassroots participation. Capacity-building programs, leadership training, and collaborative partnerships with government and technology experts are essential to strengthen and sustain community-led recycling initiatives.

Enhancing Sustainable Textile Recycling through Community Participation

Community participation plays a vital role in enhancing awareness and promoting sustainable practices in textile recycling initiatives. Active involvement from local residents, workers, and leaders fosters a deeper understanding of environmental

sustainability and responsible waste management. The level of community involvement significantly influences the success of recycling programs, as greater participation leads to increased awareness and accountability. Additionally, community leaders serve as key facilitators in mobilizing local participation, ensuring that individuals recognize their role in sustainable textile waste practices. When communities are well-informed and engaged, they are more likely to adopt eco-friendly behaviors, support waste reduction efforts, and advocate for long-term sustainability solutions. Ultimately, strengthening community engagement results in a more inclusive, participatory, and environmentally conscious society, driving the success of textile recycling initiatives.

Figure 1



5. CONCLUSION

This study underscores the significant role of community participation in fostering sustainable textile recycling initiatives in Tiruppur District. The major findings reveal that 77% of respondents recognized community leaders as key facilitators in mobilizing local participation, emphasizing their influence in driving engagement. Additionally, 81% of respondents agreed that community involvement is crucial for sustaining recycling efforts, while 85% believed that community engagement increases awareness about environmental sustainability. These findings highlight the positive impact of community participation on raising environmental consciousness and promoting responsible waste management practices.

However, the study also identified gender disparities within the sector, with 78% of respondents being male, indicating a male-dominated workforce. 75% of participants had basic or no formal education, which may limit their ability to adopt advanced technologies and innovative practices. Despite these challenges, 53% of respondents had 3 or more years of experience, suggesting a strong base of skilled professionals who contribute practical knowledge and operational efficiency.

The findings emphasize that multi-stakeholder collaboration—involving community members, technology specialists, and government bodies—is essential to enhance sustainability outcomes. To strengthen community engagement, it is crucial to implement targeted capacity-building programs, digital literacy initiatives, and inclusive policy interventions. By addressing educational barriers, gender inequality, and technology gaps, sustainable textile recycling practices can be advanced, contributing to environmental conservation and socio-economic development in Tiruppur District.

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