Transforming A Discarded Denim Jeans into Crafted Products: A Zero-Waste Approach

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Abstract

The increase in textile waste, particularly within the apparel sector, underscores the need for innovative approaches in resource management and a focus on sustainability-oriented methods. This article delves into a groundbreaking methodology for repurposing textile waste, specifically targeting discarded denim jeans, with the aim of generating multiple value-added craft products. At the heart of this investigation lies the zero-waste approach, directing each stage of the process towards minimizing adverse environmental impacts. A pivotal emphasis is placed on the zero-waste approach as a cornerstone, yielding favorable outcomes in adding value to discarded denim garments. Research objectives are delineated to identify the transformation potential of discarded denim jeans, develop zero-waste methodologies in the transformation process, and generate seven innovative and practical craft products. Methodological frameworks encompass studio practices for crafting to gauge the impact of zero-waste approaches at each transformation phase. Findings demonstrate the efficacy of zero-waste techniques in repurposing discarded denim, thereby reducing waste and ecological footprints. Discussions highlight positive implications for the textile industry and broader sustainability endeavors. Conclusively, embracing zero-waste methodologies in textile waste transformation presents novel avenues for waste reduction and the creation of innovative craft products, offering a promising outlook on global textile waste management.

Keywords: Crafted Product; Discarded Denim Jeans; Sustainable; Zero-Waste.

1.0 Introduction

The global crisis in textile waste management has become a critical issue requiring innovative solutions. With the rapid growth in the garment industry, particularly denim jeans, there has been a significant increase in discarded textiles. In this context, traditional approaches to waste management are no longer sufficient to address the negative environmental impacts. This growth emphasizes the need to seek alternative approaches that not only reduce the amount of textile waste but also add value to the discarded materials (Periyasamy et al., 2017: Behera et al., 2021). This article aims to explore opportunities in embracing the concept of zero-waste in transforming discarded denim jeans into useful craft products. The concept of zero-waste, as the core of this study, requires a holistic and structured approach to textile waste management. In the context of denim jeans, which often contain high-

quality materials, the potential for creative and beneficial transformation becomes more pronounced (Bhattacharjee et al., 2019). This approach not only provides a solution to the issue of waste management but also offers opportunities to create added value in the realm of craft art (Sandin & Peters, 2018). Transforming a discarded pair of denim jeans into 7 innovative craft products represents a unique approach with the potential to have a positive impact on the environment and the economy.

This study aims to fill the gap in existing research by exploring opportunities in embracing the concept of zero-waste in transforming discarded denim jeans into useful craft products. While some research has addressed the reuse of denim, there is a notable gap in the application of resist techniques on discarded denim fabric to enhance its creative potential and sustainability. This study introduces a novel methodology that integrates resist techniques with zero-waste principles to create value-added craft products from discarded denim. By addressing the shortcomings of existing approaches in textile waste management and embracing the concept of zero-waste, this study opens the door to critical thinking about how to perceive and utilize textile waste. By understanding the creative potential inherent in each discarded pair of jeans, it can establish a foundation for more effective and sustainable industry practices.

1.1 The Concept of Zero-Waste in the Textile Industry and Textile Waste Management

The concept of zero-waste in the context of the textile industry emerges as a response to global resource management challenges and awareness of environmental impacts (Italiano et al., 2022). The emphasis on waste reduction and increased efficiency in material utilization takes center stage (Eike et al., 2020). This literature delves into aspects such as designing functional products, selecting effective materials, and employing production methods that minimize waste. This review also depicts the research landscape in textile waste management. In the context of textile waste from the garment industry, issues such as textile preservation, recycling, and reuse take center stage. The zero-waste approach to textile waste management is recognized as a holistic approach that involves a paradigm shift from "disposal" to "reuse" (Arora et al., 2021).

1.2 Discarded Denim Fabric and Sustainability

With the increasing awareness of sustainability, the textile industry is increasingly focusing on effective textile waste management practices (Fletcher, 2013; Diabat, 2014; Thompson, 2017). Among the materials targeted for recycling initiatives and waste reduction, discarded denim fabric stands out as a primary choice (Dissanayake et al., 2015; Rathinamoorthy, 2019). While some research has acknowledged the potential for reusing discarded denim (Rodriguez, 2020; Eike et al., 2020), there is a notable gap in exploring resist techniques applied to these specific materials. This study aims to address and fill this knowledge gap by focusing on the use of resist techniques on discarded denim fabric. Despite previous research laying the groundwork for denim reuse, the specific application of resist techniques to

enhance the creative potential and sustainability of discarded denim has been relatively overlooked. By exploring these uncharted methods, this study aims to provide valuable insights and methodologies that can enhance the integration of resist techniques into the textile recycling process and textile design improvement.

1.3 The Development of Sustainability-Oriented Craft Art

Amidst the shift towards sustainability, craft art is increasingly assuming a pivotal role as a medium for conveying messages of sustainability (Periyasamy et al., 2017). This review delineates the development of craft art related to the utilization of textile waste materials, emphasizing creativity in embracing existing resources. Craft art serves not only as a vessel for self-expression but also as a medium for conveying sustainability messages to society (Che Ya et al., 2019). Encompassing these aspects, this literature review provides a comprehensive insight into the theoretical landscape that underpins this research. It establishes a foundation for understanding the concept of zero-waste, textile waste management strategies, and the role of craft art within the context of sustainability.

2.0 Methodology

This methodology is meticulously designed to elucidate the approach utilized in conducting this research, particularly in transforming a discarded pair of denim jeans into 7 craft products using the zero-waste method. The methodology approach is a studio practice (figure 1). The studio practice approach is employed to stimulate creativity in designing and crafting craft products from a discarded pair of denim jeans. This process involves several key steps.

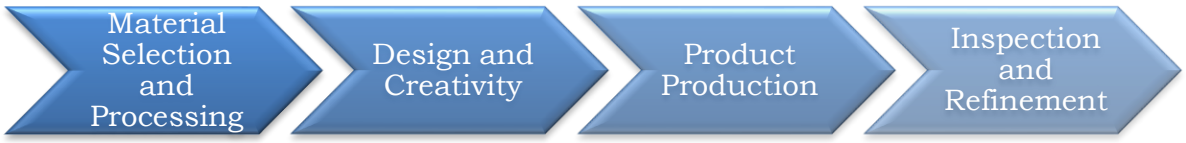


Figure 1: Studio Practice Process

This study employs a studio practice methodology to transform discarded denim jeans into seven craft products using the zero-waste method. The model introduced in this methodology, inspired by Che Ya et al. (2019), involves several key steps: material selection and processing, design and creativity, product production, and inspection and refinement. First step is material selection and processing, a discarded pair of denim jeans is carefully selected and processed to ensure its usability in the transformation process. Second step is Design and Creativity. This process involves creative thinking in designing innovative craft products. Design aspects focused on sustainability and usability are applied. Third step, product production. Craft products are realized through studio practice skills. Each production step is closely monitored to ensure compliance with the zero-waste principle. Lastly, inspection and refinement. Craft products are continuously inspected to ensure quality and durability. Any shortcomings are rectified following waste

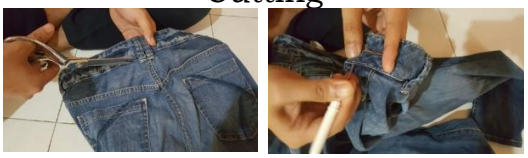
reduction principles. This approach provides a holistic method to conducting this study. The integration of studio practice allows researchers not only to achieve research objectives in terms of creativity and product outcomes but also to measure the positive impact of the zero-waste method in terms of waste reduction and environmental sustainability.

3.0 Results and Discussion

Studio practice successfully produces craft products that exhibit high creativity and aesthetics. These products not only fulfill functional aspects but also demonstrate that the zero-waste method can be effectively combined with craft art elements. The studio practice process is meticulously conducted, emphasizing quality and efficiency. Besides, the careful selection of discarded denim jeans and meticulous processing yield high-quality materials for reuse. The processing methods focused on waste reduction demonstrate the effectiveness of the zero-waste approach (Sandin & Peters, 2018). Additionally, the crafted products showcase creative design and high aesthetics. This approach provides flexibility in creating products that are not only practical but also visually appealing, and the product production process involves careful practices, ensuring efficiency and quality outcomes (Fletcher, 2013). Each production step is executed meticulously to ensure craft products that meet desired standards. Table 1 shows the process of treatment and improvement method that used in this research.

Table 1: The Process of Treatment and Improvement Method.

Process	**Treatment and improvement method**
The selection 	Selecting the appropriate pair of jeans for the project
Soaking and Washing 	The jeans are soaked in hot water and detergent to remove bacteria before being washed. After the soaking process, the denim material is washed.
Drying 	Drying process is carried out before the improvement process.

Cutting 	After that, the selection of potential sections of the jeans is done by a process of drafting and cutting the necessary parts for a product
Top Stitch 	Top Stitching is a stitching technique that in this study we apply to jeans to create patterns and textures.
Embellishment 	The embellishment technique we apply to the product involves sewing and attaching beads to the product to provide a fresh breath, added value, and texture to the jeans.

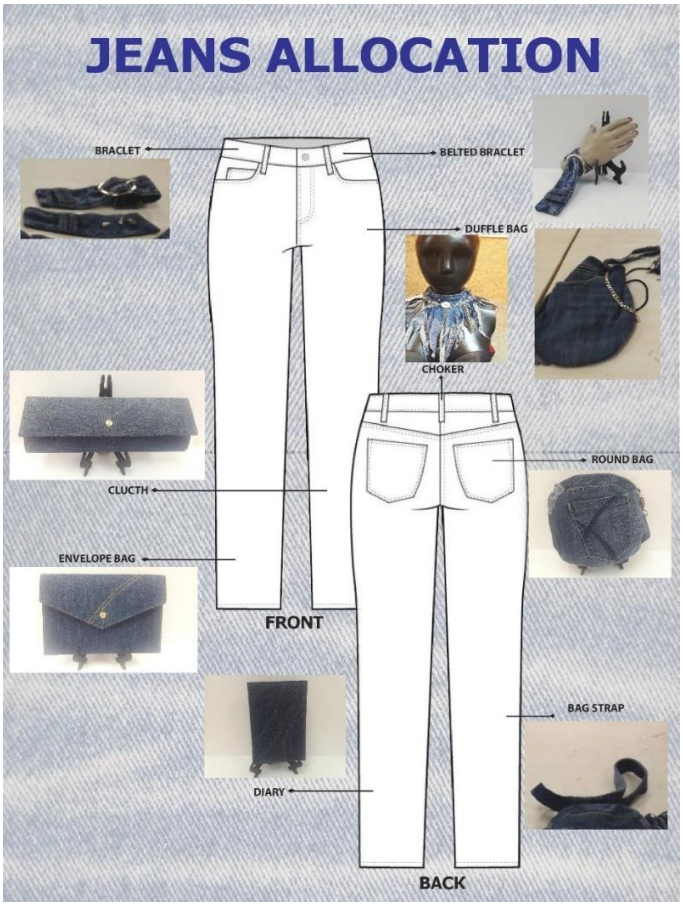


Figure 2: Illustrates the Layout for Allocating Jeans in The Development of Craft Products.

Figure 2 depicts the arrangement or layout designed specifically for the allocation of jeans in the process of developing 7 craft products. The organization ensures optimal utilization of the fabric without any waste, aligning with the principles of the zero-waste approach. Each segment of the fabric is meticulously allocated to correspond with the production requirements of the craft items, thereby maximizing efficiency and minimizing any excess material. This allocation strategy not only facilitates the seamless production of the desired craft products but also underscores the commitment to sustainable practices by eliminating any wastage in the manufacturing process (Chowdhury et al., 2023).

Table 2: The Development Of 7 Craft Products.

Product Name	**Craft Product**
Envelop Clutch	
Ladies Clutch	
Diary	
Installation Choker	

Belted Bracelet	
Round Bag	
Duffle Bag	

Table 2 delineates the development of seven craft products within this research, including the Envelop Clutch, Ladies Clutch, Diary, Installation Choker, Belted Bracelet, Round Bag, and Duffle Bag. The findings of this study present a favorable outlook on the efficacy of the zero-waste method in textile waste management. Creative studio practices not only enhance craft art but also offer sustainable solutions for textile waste management. The reduction of waste and the resultant positive environmental impact further reinforce sustainability principles (Periyasamy et al., 2017). Additionally, the economic benefits and added value of craft products provide a foundation for integrating this method into the context of a sustainability-oriented textile industry (Wanniarachchi et al., 2020). The findings of this study make a significant contribution to understanding the zero-waste method and how it can be applied to transform textile waste into useful and creative products.

This study's results are consistent with previous research on the benefits of zero-waste approaches in textile waste management (Eike et al., 2020). However, it also presents a novel contribution by applying resist techniques to discarded denim, a method relatively overlooked in past studies (Che Ya, 2024). The implications of these results extend from a sustainability, craft art, and economic sustainability perspective, paving the way for further development in this field. Studio practice successfully integrates craft art creativity with the principles of zero-waste in a synergistic manner. This discussion highlights how this approach can serve as a model for the creative industries seeking to adopt more sustainable approaches.

Besides, experiment results indicate significant waste reduction at each transformation phase. This discussion elucidates how the effectiveness of the zero-waste method can be measured and enhanced to embrace more sectors within the textile industry. Meanwhile, the discussion involves the need to enhance public awareness and education about the importance of the zero-waste method. Educational initiatives involving the community and craft designers can lead to attitude and behavior changes towards sustainability (Li et al., 2019).

Implications of this study open opportunities for the growth of a more sustainable creative industry. The adoption of the zero-waste method not only provides a solution to waste management issues but also creates new opportunities in creating beneficial products. The implications of this study spark discussions on how the zero-waste method can be integrated on a larger industrial scale. How the success of studio and experimentation practices can be expanded and applied more widely in the fashion industry. The discussion covers economic benefits and added value of craft products. The implications of this study highlight the potential for economic growth and social development in adopting the zero-waste method as a model in the textile industry (Akter et al., 2022).

The discussion and implications of this study conclude that the zero-waste method is not only an effective textile waste management method but also plays a significant role in creating innovative and useful craft art products. The implications of this study spark extensive discussions about the potential transformation in the textile industry and provide impetus for further research and development in this direction. Overall, this study provides valuable insights and guidance for industries and researchers eager to engage in the zero-waste method in their approach to textile waste management.

4.0 Conclusions

Research findings indicate that the zero-waste method successfully reduces textile waste significantly. The use of carefully selected materials and precise transformation processes has demonstrated the effectiveness of this method in managing textile waste. Furthermore, studio practice successfully integrates craft art creativity with the zero-waste principle. The crafted products reflect the uniqueness and beauty of art while adhering to waste reduction principles. Additionally, experiments show a positive decrease in carbon footprint, making a positive contribution to environmental preservation. This reinforces the zero-waste method as a useful approach in reducing ecological impact. Implications of this study demonstrate the potential for the growth of a more sustainable textile industry. Integration of the zero-waste method can open opportunities for the development of more efficient and sustainable industrial models.

In conclusion, this study makes a significant contribution to the knowledge of the zero-waste method in the context of textile waste management and craft art. With the hope that the findings of this study can inspire and guide future research and practices towards achieving a more sustainable and innovative textile industry.

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Author Contributions
M. S. Che Ya: Conceptualisation, Studio Practice, Writing- Original Draft Preparation; **M. A. S. Jamaludin:** Studio Practice, Writing-Reviewing and Editing.

Conflicts of Interest
The manuscript has not been published elsewhere and is not under consideration by other journals. All authors have approved the review, agree with its Submission and declare no conflict of interest in the manuscript.

References
Akter, M. M. K., Haq, U. N., Islam, M. M., & Uddin, M. A. (2022). Textile-apparel manufacturing and material waste management in the circular economy: A conceptual model to achieve sustainable development goal (SDG) 12 for Bangladesh. *Cleaner Environmental Systems*, *4*, 100070. https://doi.org/10.1016/j.cesys.2022.100070

Arora, S., Sethi, J., Rajvanshi, J., Sutaria, D., & Saxena, S. (2021). Developing "zero waste model" for solid waste management to shift the paradigm toward sustainability. In *Handbook of Solid Waste Management: Sustainability through Circular Economy* (pp. 1-20). Singapore: Springer Singapore. https://doi.org/10.1007/978-981-15-7525-9_20-1

Behera, M., Nayak, J., Banerjee, S., Chakrabortty, S., & Tripathy, S. K. (2021). A review on the treatment of textile industry waste effluents towards the development of efficient mitigation strategy: An integrated system design approach. *Journal of Environmental Chemical Engineering*, *9*(4), 105277. https://doi.org/10.1016/j.jece.2021.105277

Bhattacharjee, M., Dhar, A. K., Islam, M. M., & Rashid, M. A. (2019). Development of washing effects on reactive dyed denim fabrics: a value-added approach of denim wash. *Int J Text Sci*, *8*(2), 41-48. http://article.sapub.org/10.5923.j.textile.20190802.03.html

Che Ya, M. S., Jamaluddin, M. A. S., & Shaharuddin, R. (2019). Penggunaan Semula Jeans Terpakai Bagi Produk Kraf. *INSPIRED 1.0: 2019*, 56 – 64. https://kkmasgading.mypolycc.edu.my/v1/files/Inspired-E-Book.pdf#page=64

Che Ya, M. S. (2024). Exploring Resist Techniques for Repurposing Discarded Denim Fabrics. *E-Digest Perkaya Inovasi PMM, 3*(1), 51-60. http://www.pmm.edu.my/pusatdata/zxc/2024/library/digest/FinaleE-DigestEdisi3.pdf

Chowdhury, N. R., Paul, S. K., Sarker, T., & Shi, Y. (2023). Implementing smart waste management system for a sustainable circular economy in the textile industry. *International Journal of Production Economics*, *262*, 108876. https://doi.org/10.1016/j.ijpe.2023.108876

Diabat, A., Kannan, D., & Mathiyazhagan, K. (2014). Analysis of enablers for implementation of sustainable supply chain management–A textile case. *Journal of cleaner production*, *83*, 391-403. https://doi.org/10.1016/j.jclepro.2014.06.081

Dissanayake, G., & Sinha, P. (2015). An examination of the product development process for fashion remanufacturing. *Resources, Conservation and Recycling*, *104*, 94-102. https://doi.org/10.1016/j.resconrec.2015.09.008

Eike, R., Irick, E., McKinney, E., Zhang, L., & Sanders, E. (2020). Repurposing design process. *Sustainability in the textile and apparel industries: Sustainable textiles, clothing design and repurposing*, 189-239. https://doi.org/10.1007/978-3-030-37929-2_9

Fletcher, K. (2013). *Sustainable fashion and textiles: design journeys*. Routledge. https://doi.org/10.4324/9781315857930

Italiano, I. C., Kauvauti, L. S., & Marcicano, J. P. P. (2022). Zero waste in the apparel industry: limitations and alternatives. *Sustainability in Debate*, *13*(2). https://doi.org/10.18472/SustDeb.v13n2.2022.40716

Li, W. T., Ho, M. C., & Yang, C. (2019). A design thinking-based study of the prospect of the sustainable development of traditional handicrafts. *Sustainability*, *11*(18), 4823. https://doi.org/10.3390/su11184823

Periyasamy, A. P., Wiener, J., & Militky, J. (2017). Life-cycle assessment of denim. In *Sustainability in denim* (pp. 83-110). Woodhead Publishing. https://doi.org/10.1016/B978-0-08-102043-2.00004-6

Rathinamoorthy, R. (2019). Circular fashion. In *Circular economy in textiles and apparel* (pp. 13-48). Woodhead Publishing. https://doi.org/10.1016/B978-0-08-102630-4.00002-9

Rodriguez, M. (2020). Utilizing repurposed denim to create apparel for those with Cerebral Palsy. *Apparel Merchandising and Product Development Undergraduate Honors Theses* Retrieved from https://scholarworks.uark.edu/ampduht/15

Sandin, G., & Peters, G. M. (2018). Environmental impact of textile reuse and recycling–A review. *Journal of cleaner production*, *184*, 353-365. https://doi.org/10.1016/j.jclepro.2018.02.266

Thompson, N. (2017). Textile waste & the 3R's: Textile waste strategy recommendations for the city of Toronto. http://hdl.handle.net/10315/34835

Wanniarachchi, T., Dissanayake, K., & Downs, C. (2020). Improving sustainability and encouraging innovation in traditional craft sectors: the case of the Sri Lankan handloom industry. *Research Journal of Textile and Apparel*, *24*(2), 111-130. https://doi/10.1108/RJTA-09-2019-0041