Journal of Creative Arts, Vol. 2, No. 2 (Special Theme 1), 2025
e-ISSN: 3030-6086
Page: 87-96

Circular Economy: Designing A New Seater Using Upcycled Material

Fahmi Ahmad[1], Linda Hamid[2], Farah Nadhirah Enjafri[3]
[1-3] Industrial Design Department, Universiti Teknologi MARA, Malaysia
Corresponding Author: fahmiahmad@uitm.edu.my

Received: November 10th, 2025
Accepted: December 19th . 2025
Published: December 22nd , 2025

ABSTRACT

The furniture industry largely depends on linear production systems, contributing to resource depletion, greenhouse gas emissions, and landfill waste. This research explores the design and development of a seater using upcycled materials guided by circular economy principles, including reuse, repairability, and disassembly. The study proposes a material sourcing framework from post-consumer and post-industrial waste, and a modular design methodology that enhances product longevity and end-of-life recovery. A prototype seater was developed and evaluated for material diversion, carbon footprint reduction, durability, functional performance, and circularity. Findings indicate that upcycled seating can match conventional furniture in usability and aesthetics while significantly reducing environmental impact. Challenges such as material variability, supply logistics, and consumer perception are discussed, and strategies for scaling circular furniture production are proposed.

Keywords: Circular economy, upcycling, sustainable furniture, modular design, material reuse, design for disassembly

1. INTRODUCTION

The global furniture sector continues to operate predominantly on linear 'take make dispose' production models, which contribute to environmental degradation through deforestation, resource depletion, and landfill accumulation (Gamal, 2022). Circular economy strategies provide an alternative approach, emphasising closed material loops, repairable design, and sustainable consumption patterns (Pei et al., 2024).

This research aims to explore practical applications of circular economy principles by designing a seater constructed from upcycled materials sourced from post-consumer and post-industrial waste. The study objectives include: (1) developing a framework for material sourcing and selection, (2) designing a modular and repairable seater, and (3) evaluating its environmental, functional, and aesthetic performance.

deforestation, resource depletion, and landfill accumulation (Gamal, 2022). Circular economy strategies provide an alternative approach, emphasising closed material loops, repairable design, and sustainable consumption patterns (Pei et al., 2024).

This research aims to explore practical applications of circular economy principles by designing a seater constructed from upcycled materials sourced from post-consumer and post-industrial waste. The study objectives include: (1) developing a framework for material sourcing and selection, (2) designing a modular and repairable seater, and (3) evaluating its environmental, functional, and aesthetic performance.

2. LITERATURE REVEVIEW

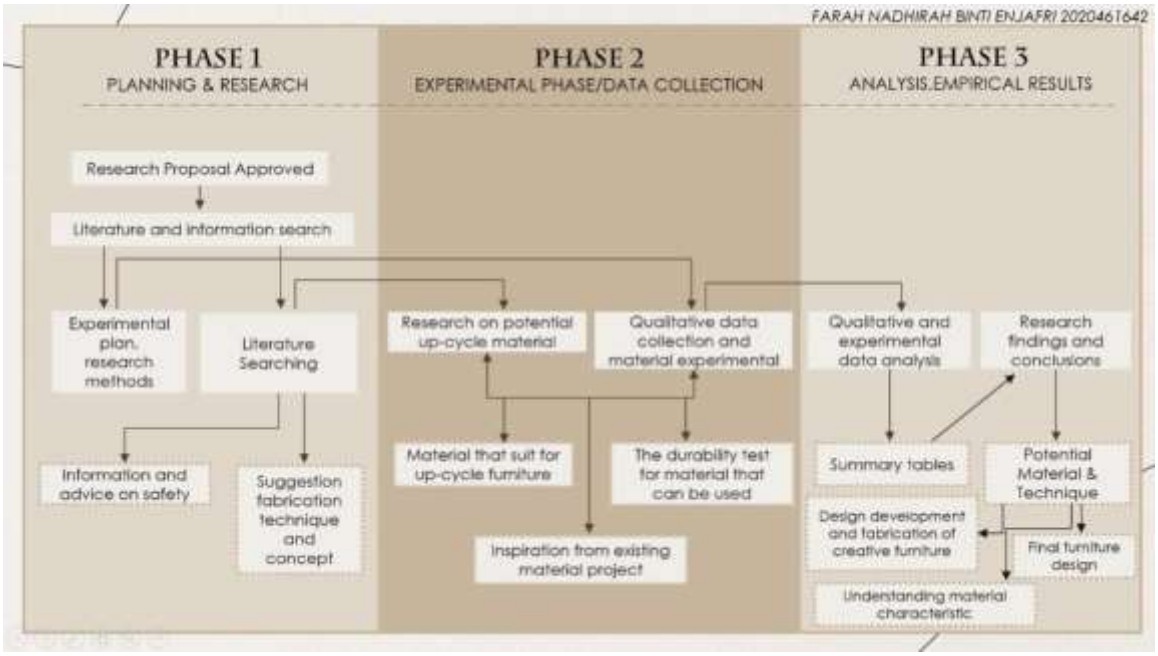
The circular economy has become a pivotal concept in sustainable furniture design. It emphasises prolonging product life and reducing waste generation by employing reusing, repairing, remanufacturing, and recycling (Gamal, 2022; Pei et al., 2024).

Upcycling refers to transforming waste materials into higher-value products without significantly deteriorating material quality (Ahmad et al., 2020). Reclaimed wood, textile offcuts, and metal frames are commonly used in upcycled furniture production (Sari et al., 2024). Modular design and design for disassembly (DfD) allow easy repair and replacement of components, enhancing product circularity and longevity.

Despite these advantages, barriers such as inconsistent material quality, fragmented supply chains, and consumer perceptions of reused products limit adoption (Pei et al., 2024; Upcycling Supply Chain, 2025). The literature indicates a need for practical prototypes to validate circular furniture design strategies.

Journal of Creative Arts, Vol. 2, No. 2 (Special Theme 1), 2025
e-ISSN: 3030-6086
Page: 87-96

3. METHODOGY



Research Plan

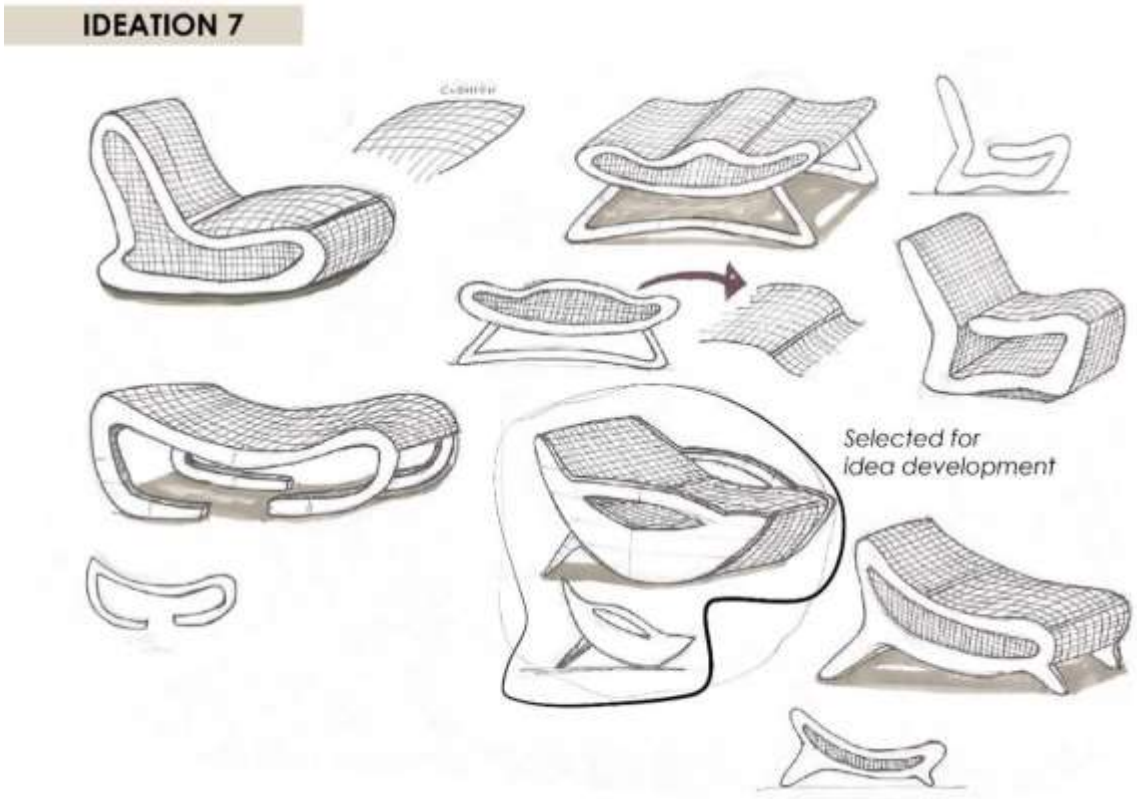
This study employed a design-based research (DBR) approach to develop and evaluate an upcycled seater prototype. Materials were sourced from post-consumer waste (discarded chairs, plastic scraps, textile remnants) and post-industrial waste (wood, bicycle tire tubes and metal offcuts).

Journal of Creative Arts, Vol. 2, No. 2 (Special Theme 1), 2025
e-ISSN: 3030-6086
Page: 87-96

Experiment with materials

Journal of Creative Arts, Vol. 2, No. 2 (Special Theme 1), 2025
e-ISSN: 3030-6086
Page: 87-96

A simple and sleek design approach was applied to ensure repairability and disassembly. The seater frame used reclaimed wood, bicycle tire tubes, steel supports from discarded furniture, and textile offcuts for upholstery. Mechanical joinery, such as screws and bolts, was utilized instead of adhesives to facilitate easy component removal and recycling.



Design development process

Prototype in progress

Evaluation criteria included: proportion of upcycled materials used, material diversion rate, structural durability, user comfort and aesthetic appeal, and circularity metrics, including component recovery potential and repair frequency.

4. RESULTS

The prototype demonstrated that approximately 85% of the materials were sourced from post-consumer or post-industrial waste. Material diversion from landfill was significant, particularly for wood and metal components. Embodied carbon was reduced by an estimated 45–50% compared with a conventional seater using virgin materials (Pei et al., 2024).

Final Seater Design

The seater provided adequate structural stability and comfort for users, confirming its functional viability. Circularity metrics revealed high repairability, with 90% of components detachable and replaceable using basic tools.

5. DISCUSSION

Findings indicate that upcycled materials can produce functional, aestheticallyacceptable furniture while reducing environmental impact, supporting previous research on modular and circular furniture design (Gamal, 2022; Sari et al., 2024).Challenges include inconsistent material quality, supply chain limitations, and consumer scepticism towards reused materials (Upcycling Supply Chain, 2025). Solutions involve establishing standardised supply networks, educating consumers, and integrating DfD strategies to extend product lifespan

6. CONCLUSION AND RECOMMENDATIONS

This study confirms that upcycled materials can be effectively used to create a durable, functional, and visually appealing seater, demonstrating the practical application of circular economy principles in furniture design. Recommendations for future work include: (1) scaling production throughpartnerships with recycling sectors, (2) developing take-back and repair programmes, (3) incorporating circular design education, and (4) investigating long-term durability and economic viability.

ACKNOWLEDGEMENT

In this research topic, the researcher would like to thank Universiti Teknologi MARA for encouraging the researcher to publish this writing, and at the same time, thank ChatGPT for helping the researcher so much in searching for the required data and, at the same time, assisting the researcher in improve our writing skills.

REFERENCES

Ahmad, F., Ahmad, A., Saharudin, H., & Khairi, H. (2020). A conceptual framework of designer responses in designing furniture from upcycled plastic materials. Environment Behaviour Proceedings Journal.

Gamal, D. F. (2022). Concept of circular economy in eco-friendly furniture design. Journal of Design Sciences and Applied Arts, 3(1), 80–89.

Pei, X., Italia, M., & Melazzini, M. (2024). Enhancing circular economy practices in the furniture industry. Sustainability, 16(15), 6544.

Sari, D. P., et al. (2024). Modular multifunctional product design from furniture waste. Management Systems in Production Engineering, 32(3), 303–316.

Susanty, A., Tjahjono, B., & Sulistyani, R. (2020). Circular economy practices in the traditional wooden furniture industry. Production Planning & Control.

Upcycling Supply Chain. (2025). A conceptual framework for the upcycling supply chain in the wood sector. Sustainability, 17(3), 1006.