iJRASET
International Journal For Research in Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 12 **Issue:** XII **Month of publication:** December 2024

DOI: https://doi.org/10.22214/ijraset.2024.65743

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International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 12 Issue XII Dec 2024- Available at www.ijraset.com

Designing a Sustainable Cafe Library Interior Using Textile Waste Materials and Innovative Resin Tiles

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Abstract: ***The increasing demand for sustainability in interior design has fueled the quest for new materials and creative solutions. This study looks into the use of textile waste in cafe library interior design, with an emphasis on comfy furniture, useful decor, and unusual partition pieces. This study's original contribution is the fabrication of ornamental tiles manufactured from textile waste and sustainable resin, a material combination that has not previously been used in interior design. The process entails conducting surveys from three perspectives: customers, cafe library proprietors, and interior designers, to assess the proposals' practical practicality and reception. This article provides a thorough framework for incorporating textile waste into the emerging narrative of eco-friendly interior design by combining creative design principles and sustainability aims.***

I. INTRODUCTION

A. Background

Interior design is a profession that combines aesthetics and functionality to create settings that meet the needs of humans. As concerns about climate change and resource depletion grow, sustainability has become an essential component of current design methods. Among the different industries that contribute to global trash, the textile sector is notable for its high levels of production and disposal, with millions of tons of garbage ending up in landfills each year. This waste consists of pre-consumer off-cuts, post-consumer discarded clothing, and industrial wastes, all of which hold untapped potential for recycling and upcycling in interior design. Cafe libraries, which combine the practical requirements of a library with the pleasant and friendly environment of a cafe, provide a great setting for investigating sustainable design. These spaces demand an interplay of comfort, aesthetics, and functionality, making them suitable for experimenting with eco-friendly materials like textile waste.

B. Problem Statement

Despite advances in sustainable design, the use of textile waste in furniture and ornamental tiles remains unexplored, especially when paired with eco-friendly resins. This study reveals a gap in the practical applications of such materials in interior spaces, with a specific emphasis on cafe libraries. The project's goal is to show that using these novel materials may address both environmental and aesthetic concerns in interior design.

C. Objectives

1) To utilize textile waste in furniture and decorative elements in cafe library interiors.
2) To create innovative resin-based decorative tiles using textile waste for partitions and other applications.
3) To assess the reception and feasibility of these designs through surveys.

D. Life Experience

My mother used to do some sewing in her spare time. There were numerous cutouts of cloths that she used to sew. She would either toss it away or use it as pillow filler. When I was looking for a topic to explore, this one sprang to mind: if this much waste came out of a few cloth stitching, imagine how much waste the entire Bhopal cut out waste would be. After that, I considered conducting research on textile waste and how I could use it in interior design and the creation of innovative resin ornamental tiles from textile waste.

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II. LITERATURE REVIEW

A. *Overview of Sustainable Practices in Interior Design*

The literature describes a change in interior design approaches toward sustainability, with a focus on waste material reuse. Smith (2020) investigated sustainable textile applications in furniture, demonstrating environmental benefits and aesthetic adaptability. Similarly, Johnson (2021) and Chen (2019) underlined the significance of circular design concepts and novel recycling solutions.

B. *Textile Waste in Design*

Several studies have been conducted to study the usage of recovered fabrics in interior applications. Patel (2022) demonstrated new furniture designs that incorporate textile waste, whereas Gomez (2023) highlighted its application in finishing aspects. However, these research do not include an emphasis on integrating textile waste with other sustainable materials, like as resin, for multifunctional applications such as partitioning.

C. *Research Gap*

While previous research emphasizes the value of textile waste, practical implementation frameworks are limited. There is also a scarcity of empirical evidence on the performance of novel materials developed from textile waste in real-world interior contexts. This study intends to close this gap by suggesting and evaluating novel material combinations.

III. METHODOLOGY

A. *Research Approach*

This study uses a mixed-method approach, integrating stakeholder surveys with material experiments. Stakeholder involvement, design development, sustainability assessment, and material procurement comprise the technique.

B. *Material Sourcing*

1) *Eco-Friendly Resin:* Plant-based resins are often made from sources like soy, corn, or other natural materials. For example, soy-based resins are derived from soybeans.
2) *Textile Waste:* This can include scraps from manufacturing processes, offcuts from clothing production, or any other textile remnants Design Development
3) *Furniture and Decor:* Using patchwork, weaving, and upholstery techniques, comfortable sitting arrangements and decorative pieces were created. The focus was on comfort, toughness, and aesthetics.
4) *Decorative Tiles:* Textile waste was used to build prototypes of resin-based tiles. The tiles were made to be both aesthetically pleasing and useful for partition walls.

Making eco-friendly resin tiles entails numerous phases, beginning with procuring plant-based resins derived from renewable resources such as soy and corn. Oils or starches are extracted, chemically modified into polymer resin, and textile waste is sorted and chopped. The eco-friendly resin is combined with 30-50% shredded textile waste and put into molds before curing for 24 to 72 hours. After demolding, the tiles are sanded and sealed if desired. The entire process takes between 3 and 5 days.
Eco-friendly resin costs between ₹1,500 to ₹3,500 per liter. Conventional resin typically costs between ₹1,000 and ₹2,500 per liter. While eco-friendly resin may be more expensive, it provides long-term benefits that traditional solutions do not.

C. *Concept Development*

1) Create design ideas for your chosen space (e.g., cafe, library, or farmhouse).
2) Make mood boards and sketches to illustrate how textile waste might be included into the design.
3) Concentrate on topics such as sustainability, comfort, and creativity.

D. *Design Planning*

1) Create precise floor layouts to maximize space usage.
2) Color palettes and materials were chosen depending on available textile waste.
3) Furniture and decor components made from textile waste that are both functional and aesthetically pleasing.

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E. Surveys and Data Collection

Stakeholder perspectives were gathered through structured surveys.

1) *Customers:* Questions focused on their experience of comfort, aesthetics, and awareness of sustainability in cafe libraries.
2) *Cafe Library Owners:* Explored their views on cost-effectiveness, maintenance, and customer appeal of sustainable interiors.
3) *Interior Designers:* Analyzed their perspectives on the practicality, creativity, and scalability of using textile waste in designs.

F. Tools and Techniques

1) *Design Tools:* AutoCAD, SketchUp, and Photoshop for layout plans, elevations, and 3D modeling.
2) *Material Testing:* Prototypes underwent testing for durability, safety, and user experience.

IV. RESULTS

A. Furniture and Decor

1) *Textile Waste Applications:* Utilized textile remnants to make patchwork sofas, upholstered chairs, and wall hangings. Customers praised these aspects for their comfort and visual appeal in surveys.
2) *Innovative Designs:* Quilting, embroidery, and weaving techniques created new textures and patterns to enhance the visual attractiveness of the area.

B. Decorative Tiles

1) *Resin-Based Tile Development:* Textile waste and resin were combined to create durable and lightweight partition tiles. Textile scraps were used to create bright patterns on the tiles, creating a unique appearance.
2) *Performance:* Prototypes were durable and wear-resistant, making them suited for high-traffic areas.

C. Feedback

1) *Customers:* Customers praised the unique utilization of waste materials for improved warmth and visual appeal, with 85% expressing satisfaction. The designs raised sustainability awareness among many individuals.
2) *Cafe Library Owners:* Emphasized the opportunity to attract eco-conscious customers. Challenges with initial investment costs.
3) *Interior Designers:* Interior designers were praised for their ingenuity and environmental impact. We identified areas for improvement in scalability and material sourcing.

V. DISCUSSION

A. Innovations in Material Use

This study established the viability of incorporating textile waste into practical and beautiful interior elements. The introduction of resin-based tiles is a key innovation that provides designers with a new material alternative.

B. Challenges and Limitations

1) *Material Availability:* Obtaining high-quality textile waste was difficult to get consistently
2) *Production Costs:* Resin and processing were more expensive than traditional materials, limiting their wider usage.
3) *Scalability:* Expanding the concept for larger locations or commercial applications involves additional research and development.

C. Sustainability Impact

1) *Environmental Benefits:* Reduced landfill trash and resource extraction. Promoted circular economy by reintroducing waste into the production cycle.
2) *Social Awareness:* Customers and stakeholders got a better understanding of sustainable practices, potentially impacting future consumer behavior.

VI. CONCLUSION

This study emphasizes how textile waste has unrealized potential in interior design, especially when it comes to building comfortable, useful, and visually appealing areas like cafe libraries. Innovative design and sustainability are combined in a new way with the introduction of beautiful tiles made of resin.

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A. Future Directions

1) More research to maximize the cost-effectiveness of tiles made of resin.

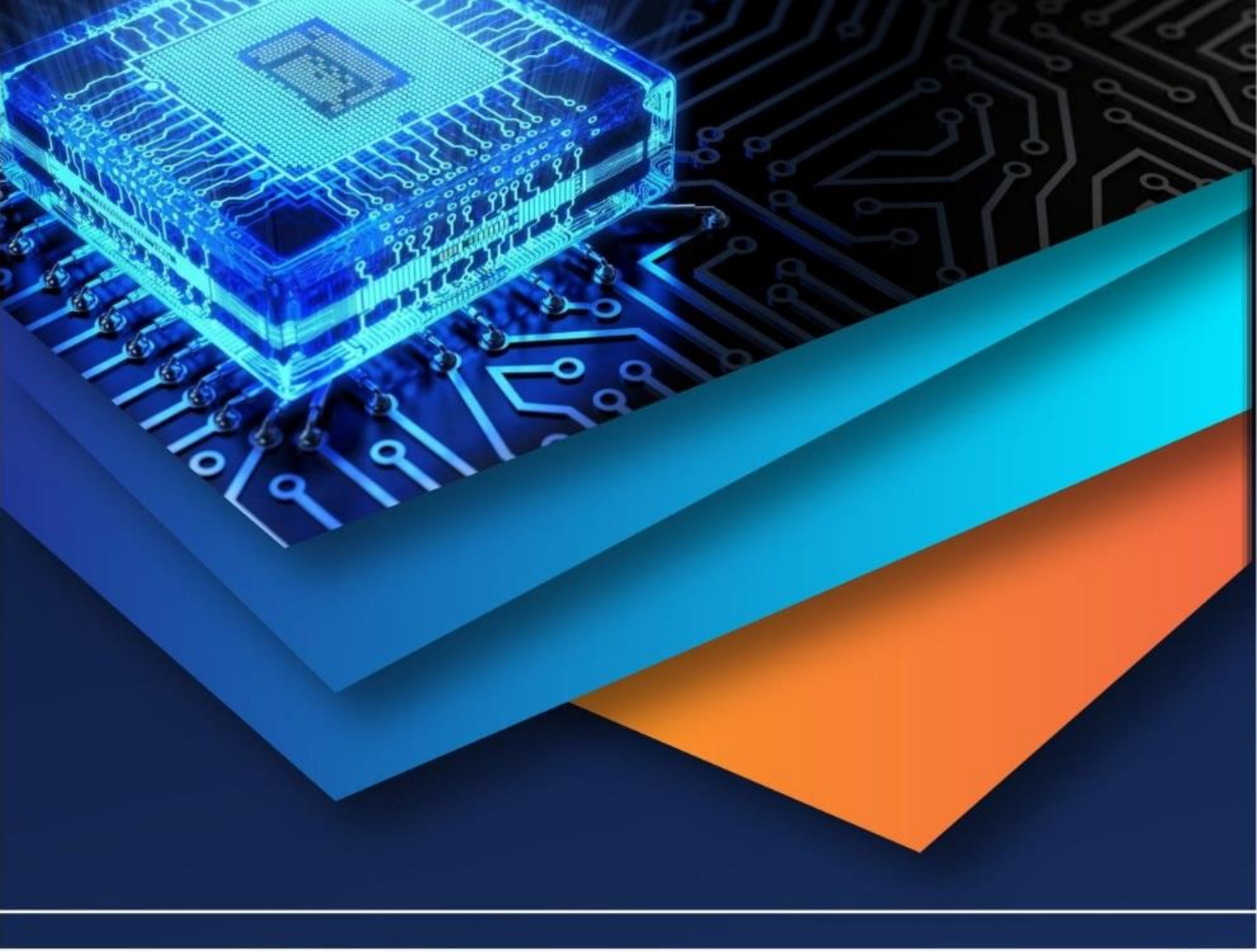
2) Examining other eco-friendly materials for bigger projects.

3) Creating thorough guidelines that designers can use to use textile waste into their work.

In order to bring design innovation and environmental responsibility together, this study offers a path for future initiatives by presenting real-world applications and involving stakeholders.

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