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Innovative Elements and Principles of Sofa Upholstery Fabrication through Recycled Fabric Exploration

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Abstract
The demand for sustainable and eco-friendly design practices has been increasing in recent years, and the furniture industry is no exception. Upholstery sofas are popular furniture made with synthetic or natural fabrics, which can have a significant environmental impact. As a result, there is a need for innovative and sustainable solutions for the production of upholstery sofas. This thesis explores using recycled fabrics as an alternative material for upholstery sofa fabrication. This research aims to identify innovative design elements and principles for using recycled fabrics in upholstery sofa manufacturing, as well as evaluate their practicality and feasibility.

Keywords: Upholstery, Recycle, Waste, Material

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1.0 Introduction

The word 'innovative' comes from the Latin - 'Innovare', which means new. Innovative here refers to old methods or ways that have been updated. According to Arlan (2022), innovation means renewing or changing something already existing. Innovative is associated with innovation, which refers to the process implemented to create an innovation about something or an idea, then evaluated through improvements to new products. The adjective for innovation is innovative which is a process of combining to reach the level of maturity of a knowledge or idea, and then obtain a new assessment of a product or process (Arlan, 2022).

Among the important things in the design structure is the element of design. Elements are objects that will be arranged and applied in a design project as part of a composition. It can be isolated and characterized as a part or component in any visual design (Portillo, 2021). The elements include line, shape, form, texture, space, value, and colour.

It is not complete if it has elements without the principle of design. The principle of design is a combination of elements to create a composition. The principle of design is also a guideline for arranging elements so that the design results are organized, harmonious, and orderly. It applies to the composition's overall structure and each of its components (Portillo, 2021). Good production design emphasizes the principles of unity, harmony, repetition, rhythm, balance, emphasis, movement, and contrast.

Upholstery attaches padding, cushions, and fabric or leather covers to the furniture frame. Although the components in the chair may not be visible, they significantly impact its comfort and ergonomics (Ibrahim, 2020). Quality upholstery can achieve a comfortable sitting posture and a healthy and reasonable one.

Recycling is a procedure that involves the reuse of waste material, also known as solid waste, to create new items that can be recycled (Setro, 2016). Materials such as glass, paper, metal, plastic, textiles and electronic components can all be recycled. Fabric recycling is the process of reusing old clothes or textiles (Cowley, 2019). This recycling process will indirectly add a draw to the fabric, thus reducing the pollution produced by fabric and textiles.

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The project aims to investigate innovative concepts and design principles to produce upholstered sofas from recycled fabrics. The focus is on promoting environmentally friendly and sustainable practices in the furniture industry. This project uses quantitative study methods to discover the technical and aesthetic properties of different types of recycled fabrics and determine if they could be used to make sofas. Several essential results came out of the project. It develops new design elements and principles that improve the performance and long-term viability of upholstered chairs made from recycled fabrics. The study also talks about the pros and cons of using recycled fabrics and gives suggestions for how manufacturers and designers can use the material in their products. Also, the project focuses on the financial feasibility of using recycled fabrics in the furniture business, showing how it could save money and help the environment.

This study is critical because it adds to the growing body of knowledge about how to design furniture in a way that is good for the environment. These results can help designers, manufacturers, and policymakers decide how to make upholstered chairs in a way that is good for the environment. Stakeholders can reduce their environmental impact using recommended design principles and recycled fabrics. This will help them meet the growing demand from consumers for more environmentally friendly furniture.

Overall, this project helps us learn more about innovative concepts and design principles that can be used to make seats upholstered with better-recycled fabrics. It talks about how important sustainability is in the furniture business and gives practical tips for making designs that are good for the environment. This encourages a more responsible and environmentally conscious way of making furniture.

The furniture business significantly affects the environment because traditional furniture-making methods often use resources that do not grow back and make much waste. Upholstered seats and popular furniture pieces are often made with synthetic or natural fabrics that add to carbon emissions, water pollution, and the depletion of resources. We need to find safe ways to make sofas that have less of an impact on the environment as soon as possible.

This research is because there is a growing need for sustainable design procedures, and the furniture business must deal with environmental issues. By focusing on using recycled fabrics in sofa upholstery, this study hopes to find new ways to make things more environmentally friendly and less dependent on non-renewable resources.

Using recycled fabrics not only lessens the damage that making fabrics does to the earth but also helps keep trash out of landfills. Using these materials is in line with the concepts of a circular economy because it makes it possible to reuse textiles and reduces the need for new resources. Even though there may be benefits, much study has yet to be done on the technical properties and usefulness of using recycled fabrics to make upholstery sofas.

This study aims to fill this knowledge gap by looking into the new ideas and design principles that go into making upholstered sofas out of recycled fabrics. This study looks at the technical and aesthetic properties of different types of recycled fabrics, evaluates how well they work, and identifies their challenges and benefits. The goal is to give furniture manufacturers, designers, and others in the furniture industry helpful information and practical recommendations.

The reason for this study is how important it is to use sustainable design practices, how recycled fabrics could be used as an alternative material, and how important it is to reduce the environmental impact of making upholstery sofas as soon as possible. By looking at new elements and design principles, this study hopes to assist in reaching the larger goal of producing the furniture industry eco-friendlier and more sustainable.

1.1 Problem Statement

People must always wear garments to encase and conceal their bodies adequately. A minimum of four distinct articles of clothing are required daily for a person. Every single day, a brand-new outfit will be donned. This signifies that a person possesses diverse apparel that can be updated and replenished frequently. Each year, individuals from all over the globe, including Malaysia, use over 80 billion unique articles of clothing. According to a 2017 report by the Ellen MacArthur Foundation, the fabric used for apparel accounts for more than sixty per cent of the total amount used worldwide, and an estimated eighteen million tonnes of clothing are in landfills. Approximately 15 percent of the population recycles their used garments at present. Less than one per cent of the materials used in the fashion industry are recycled to create new garments when the industry has reached the end of its life cycle. If current trends persist, the quantity of waste generated by the fashion industry in 2030 could reach 148 million tonnes (Fisher, 2020). If this trend persists, by the year 2050, landfills will be congested with more than 150 million tonnes of waste from the fashion industry.

It is conceivable that a large number of people are oblivious that the fashion industry contributes to the pollution of the entire planet. According to Fisher, 2020, the fashion industry is the third most polluting industry in the world and is responsible for roughly 8 percent of global greenhouse gas emissions. According to research conducted by Gupta and Kaur Saini in 2020, three-fifths of all garments are destined for landfills or incinerators, a practice that contributes significantly to pollution production. In 2018, 195,300 metric tonnes (t) of discarded clothing were deposited in Malaysian landfills. The percentage of refuse textiles disposed of in landfills has increased from 2.8% in 2012 to 6.3% at present, according to additional data provided by SWCorp Malaysia (New Straits Time, 2021). More than 50 tonnes of refuse fabric were effectively collected in Melaka as part of an initiative by the Melaka Solid Refuse Management and Public Cleaning Corporation (SWCorp) to collect the most items of recycled fabric in a single day (Meor Ahmad, 2022). This was realized as part of Melaka Solid Waste Management and Public Cleaning Corporation (SWCorp).

Fig. 1 Melaka Solid Waste Management and Public Cleaning Corporation (SWCorp).

1.2 Research Objectives

To identify the variety of fabrics used to construct upholstery materials; To experiment with appropriate methods for sofa upholstery;To manufacture ecologically friendly, long-lasting sofas.

1.3 Research Aim

This study aims to determine the process and effectiveness of using fabrics and materials from fashion and textile waste to make upholstery sofa furniture.

1.4 Research Question

1.4.1 How do recycled fabrics' durability, elasticity, color fastness and texture compare to conventional fabrics?
1.4.2 How can innovative design elements and principles improve the performance, aesthetic appeal and sustainability of upholstered sofas made with recycled fabrics?
1.4.3 What are the practical considerations and possibilities of using recycled fabrics in the manufacture of upholstered sofas, including availability, quality, cost and consumer acceptance and perception?

1.5 Research Scope/Limitation

This study focuses on producing upholstered sofas and using recycled fabrics in the context of technical and design considerations as well as feasibility and practicability.
1.5.1 Generalizability
The findings of this study may be unique to the context of upholstery sofa fabrication and may not be directly applicable to other furniture or industries.
1.5.2 Size and representativeness of the sample
The research may have limitations in terms of the sample size and representativeness of the participants, which may impact the generalizability of the results.
1.5.3 Time and resource constraints
The study may need to be expanded regarding the time available for data collection and analysis and the resources available for conducting exhaustive experiments or surveys.
1.5.4 design and aesthetics
Although the research addresses design elements and principles, the study may need to exhaustively address the complete range of design and aesthetic considerations in upholstery sofa fabrication.

It is essential to acknowledge these limitations to ensure a clear comprehension of the scope and boundaries of the research and to interpret the findings within these constraints.

1.6 Research Significance

The significance of this study resides in its potential to enhance the understanding and application of sustainable design practices within the furniture industry. This research provides valuable insights and recommendations by examining the technical properties of recycled fabrics, identifying innovative design elements, and assessing the practicality and feasibility of their utilization in the production of upholstered sofas. This study aims to address the pressing demand for sustainable solutions within the furniture industry by advocating the adoption of recycled materials and implementing environmentally conscious practices. The integration of recycled fabrics in the manufacturing process of upholstered sofas enables manufacturers to mitigate their ecological footprint, promote the preservation of resources, and cater to the escalating consumer demand for eco-conscious products. Moreover, this study contributes to the knowledge of sustainable design principles, fostering additional advancements and ingenuity within the industry. The results of this study possess

the capacity to facilitate beneficial transformations, promote sustainability within the furniture sector, and cultivate a heightened environmental awareness in the production of upholstered sofas.

2.0 Literature Review

The literature review section thoroughly examines and evaluates prior research and scholarly literature pertaining to the subject matter of "Innovative Elements And Design Principles Of Upholstery Sofa Fabrication Through The Exploration Of Recycled Fabrics." The present section undertakes a critical analysis and synthesis of pertinent literature to establish the theoretical and conceptual foundation for the study.

2.1 The Historical Development of Upholstery in Malaysia

The furniture industry in Malaysia has been overgrown since its beginning in the mid-1980s (Ratnasingam, 2017), following the country's progress in textile production. At that time, the government encouraged Malaysian businesses to invest in this lucrative industry and reap the benefits. In those days, there were only a few upholstery designers, and small manufacturers could design suitable furniture or reproduce old designs, mostly made with traditional materials such as rattan or bamboo. Nowadays, however, every house needs upholstery, and nearly all of them are manufactured by mechanized companies with sophisticated machinery. Upholstery has become an essential part of the interior decoration industry in Malaysia, which has gained a significant amount of reputation overseas. Well-known brands like Rattan Art, Casateak and KOME Furniture originated in Malaysia. Upholstery is mainly manufactured utilizing upholstery fabric, although it is also commonly produced through leather, timber, metals, and fabric. However, this industry is growing fast and gaining significance in the textile industry because many people buy upholstery materials from Malaysia (Farhana et al., 2022). So many people are buying them because they are made using the traditional methods of production, which produce more value-added products. Because of this, upholstery has become a profitable business for furniture manufacturers and retailers. In addition, the emerging upholstery business in Malaysia has been very successful because it offers a wide range of designs and products to Malaysian customers.

2.2 FABSCRAP Disposal Management

A video on YouTube that has been uploaded to the Now. This Earth account informs about the company FABSCRAP. FABSCRAP is a company that offers services or manufacturing materials for brands and businesses that want changes to their designs. Among the big brands that use FABSCRAP services are Marc Jacobs, Yoma Textiles, LT Apparel Group, and many other well-known companies. FABSCRAP has managed to collect over 5,000 pounds of unwanted fabric and yarn. FABSCRAP reuses 60% of the materials it collects and resells the fabric at thrift store prices. 40% of the textiles collected by FABSCRAP are shredded and used as insulation, carpet padding, or to fill mattresses. 3% of the material collected by FABSCRAP is disposed of in a landfill. In an interview with Lucy Biggers, Jessica Schreiber in FABSCRAP Helps Fashion Brands Recycle Textile Waste | One Small Step (Ashoka, 2021) stated that 60% of fossil fuels are found in textile fibres. According to the United Nations, the clothing industry accounts for 10% of greenhouse gas production. FABSCRAP will also donate clothes that are still in good condition. Clothes torn or in poor condition will be repaired and sold for $5 per pound.

2.3 The Thousand Patchwork Bag Project

In the Harian Metro digital newspaper on January 29th, 2018, in the writing of Fazurawati Che Lah (2018), regarding the organization of the Upcycling Project at the Faculty of Chemical Engineering (FKK) of the MARA University of Technology (UiTM) Shah Alam, in the management of fabric waste by producing 1,000 multi-purpose bags that made of patchwork. According to Fazurawati Che Lah (2018), the textile decomposition process will naturally release harmful methane, a greenhouse gas and a significant contributor to global warming. Dyes and chemicals in textiles and other permeable clothing or footwear components enter the soil to pollute soil and water drainage (Fazurawati Che Lah, 2018). The project aims to reduce fabric waste, thus reducing the carbon footprint (Dr Noor Fitrah, 2018). According to the Waste Management journal entitled Assessment of Carbon Footprint Emissions and Environment Environmental Concerns Waste Treatment and Disposal Techniquessia Case Study, approximately eight per cent of solid waste in this country is produced from fabric-based waste. The analogy of making this bag is 1,000 bags produced using 112 meters of fabric, equivalent to 28 pairs of adult bras and 56 pieces of batik cloth (Fazurawati Che Lah, 2018). Cost savings can also be made in producing this bag compared to using new fabric (Dr Noor Fitrah, 2018). The produced products were given as souvenirs to the 800 guests present at the Chancellor's Grand Hall (DATC) in conjunction with the UiTM Innovation Month Summit 2017.

3.0 Methodology

The researcher will explain how a problem is studied and why specific methods or techniques are used in this methodology section. This methodology aims to help understand the application of the method in more detail by explaining the research process. In this research, the researcher decided to collect data using a quantitative research approach. Data will be obtained using both primary and secondary sources. An online questionnaire will be used to obtain primary data. While secondary data will be collected through reading materials such as working papers and journals to supplement the information obtained, primary data will be collected through questionnaires.

3.1 Kuala Lumpur, Malaysia

This data collection process has been carried out around Kuala Lumpur and Selangor since the researcher is also a resident of the area. Researchers have carried out this data collection process in several places around the capital. The first location to collect this data is at MyTown Mall, Pudu. The researcher came to the location on May 31st, 2023. The researcher chose that location because that week was a school holiday week, and coincidentally, many new movies were to be shown. Therefore, the researcher took the opportunity to gather data and views from the public.

Fig. 2 Around MyTown Mall, Pudu.

The second location the researcher focuses on to carry out the data collection process is around the Sultan Abdul Samad Mosque area. The researcher came to the location on June 3rd, 2023. The researcher came to the location because it was the Hajj season. Many family members gathered to send their family members to carry out the last pillar of Islam. The last location that the researcher visited was at the Faculty of Art & Design at Universiti Teknologi MARA, Shah Alam. The researcher has asked some students to answer the questions that the researcher has prepared. The selection of respondents is random.

3.2 Research Design

This study's quantitative methodology will incorporate survey questionnaires into the research design. These questionnaires will be distributed to upholstered sofa manufacturers, furniture designers, and members of the broader public. The survey will collect quantitative data regarding the use of recycled fabrics, preferences for technical features, and perceptions regarding the practicability and viability of utilizing these materials.

3.3 Research Flowchart

The research process involves a series of interrelated phases necessary for conducting a study, including from its beginning to the finish line. This study aims to address several key components: (a) identifying problems, (b) establishing the relationship between these problems, (c) conducting a comprehensive review of the existing literature, (d) gathering relevant information, (e) analyzing the collected data, and (f) developing a product design.

3.4 Research Framework

The research is rooted in the principles of sustainable design practices and using recycled fabrics to produce upholstered sofas. The subject includes fundamental principles such as the protection of resources, the implementation of circular economy practices, the reduction of environmental harm, and the fulfillment of social obligations.

The theoretical framework incorporates theories and concepts about sustainable design, materials science, product development, and consumer behavior. The earlier concepts refer to theories related to sustainable product design, material selection criteria, eco-design principles, life cycle assessment, and consumer perceptions and preferences regarding environmentally friendly products.

3.5 Research Procedure

By following this research methodology, one can systematically gather and analyze data in order to tackle the research objectives, gain a deeper understanding of the innovative aspects and design principles involved in the production of upholstery sofas using recycled fabrics, and make a valuable contribution to the existing body of knowledge on sustainable design practices within the furniture sector.

3.6 Purposive Sampling

A purposive sampling technique will be employed to select participants who have expertise and experience in upholstery sofa fabrication. The sample will include a diverse range of manufacturers and designers from different regions or sectors of the furniture industry.

3.7 Primary Data Collection

According to Husein Umar (2013), primary data is information obtained from the first source, either from individuals as a result of interviews or survey questionnaires conducted by researchers. In this study, researchers will use a qualitative method by interviewing several workers from furniture factories related to the manufacturing process and materials used in the production of furniture. The researcher also intends to interview several users or owners of sofas who own sofas of various types of materials.

The researcher will ask furniture factory workers involved with sofa furniture manufacturing about the steps in the process. The researcher will select 3 to 5 furniture factory workers to be interviewed. I will also ask furniture owners who own furniture in the house. They will also be asked to provide suggestions and views through their experience with their sofa furniture. This is the primary data collection that the researcher will do.

3.8 Methods of Analysis

Once the data and information have been collected from the interviews, the researcher will analyze the information obtained. The primary data obtained will be recorded, and essential information will be recorded during the interview period. Then, the information will be converted into writing and analyzed in writing.

4.0 Conclusion & Recommendations

This research provides valuable insight into the technical nature and viability of using recycled fabrics in the production of sofas with upholstered seats. Using questionnaires and trial-and-error methods to capture quantitative data, researchers have identified key design elements and principles that can improve the performance and sustainability of recycled fabrics used in furniture manufacturing. The economic viability of incorporating these materials into the furniture industry has also been demonstrated. This research contributes to a greater understanding of sustainable materials and design practices in the furniture industry and provides manufacturers and designers with recommendations for incorporating recycled fabrics into their products.

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Paper Contribution to Related Field of Study

This paper is conducted to overcome the problem of pollution caused by the release of greenhouse gases by using clothes. Elements and Principal Design will be applied to the patchwork arrangement and sewn together. The result of grafting the fabric will be used as upholstery for manufacturing sofas.

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