Sustainable Biomaterial Handbags from Waste Eggshell

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Abstract— This project presents a comprehensive analysis of Design and development of sustainable biomaterial handbags with a focus on eggshell waste.
To achieve objectives, they conducted an extensive literature review, gathered and analyzed relevant data using Research Methods/charts, and applied various statistical techniques.
This research not only contributes to the existing body of knowledge on Design and development of sustainable biomaterial handbags using waste eggshell but also serves as a foundation for future studies in this area. Additionally, our project highlights the importance of "public awareness" to address the issues identified in our study.
This project signifies my collective effort to delve deep into the complexities of Design and development of sustainable biomaterial handbags using a waste eggshell and offers meaningful contributions to the academic and practical understanding of this field. We hope that our findings will inspire further exploration and initiatives aimed at wasting eggshells effectively.

Keywords—Biomaterial, Eggshell waste, Handbags, Sustainability.

I. INTRODUCTION

The aim of sustainability in the fashion industry has encouraged new approaches to material design and product development. One such experimental responsibility is the development of sustainable biomaterial handbags from waste eggshells.
This effort discusses serious environmental concerns while also demonstrating the opportunities for innovative reuse of leftovers from other businesses. Fashion designers and manufacturers may help to create a more circular and eco-friendly economy by upcycling leftover eggshells into high-quality fashion goods. Standard handbag materials like leather and synthetic polymers leave an essential environmental footprint, contributing to pollution, deforestation, and greenhouse gas emissions. Concurrently, the food sector generates millions of tons of eggshell waste each year, the majority of which is discarded in landfills, contributing to further environmental damage. Addressing these concerns demands creative techniques that transform waste materials into valuable goods.

II. METHODOLOGY

1.TRANSFORMING EGGSHELL WASTE

Eggshells, primarily composed of calcium carbonate, offer a unique opportunity for material innovation. When processed, eggshells can be transformed into a durable and eco-friendly biomaterial.

The process involves several stages:
Collection and Cleaning: Eggshells are collected from food processing facilities. They are then thoroughly cleaned to remove any organic residues, ensuring they are safe and ready for further processing.
Grinding and Processing: The cleaned eggshells are ground into a fine powder. This powder is then combined with bio-based polymers and other natural additives to create a composite material. This composite can be molded and formed into sheets or specific components required for handbag production.

Material Formation: The composite material undergoes various treatments to enhance its properties, such as flexibility, durability, and aesthetic appeal. This may include treatments to ensure the material can be dyed, textured, and finished to meet design specifications.

2 HANDBAG DESIGN AND FABRICATION

Handbag Design: Develop a design for the handbag considering factors like size, shape, functionality, and aesthetics. Consider incorporating additional sustainable materials like organic cotton or recycled fabric and unused waste fabric for the lining and straps.

Biomaterial Shaping and Assembly: Cut or Mold the eggshell biomaterial sheets into desired shapes for the handbag's body, base, and other components. Use

stitching, riveting, or bio-adhesives to assemble the biomaterial parts together.

Finishing and Branding: Add finishing touches like straps, handles, clasps, and inner linings made from sustainable materials. Consider branding the handbag with a logo or label highlighting its eco-friendly features made from waste eggshells.

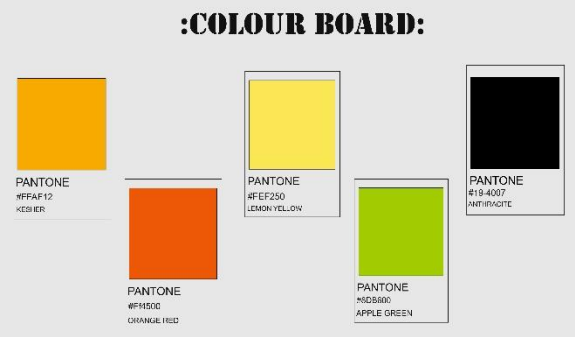

Fig:1 Color Board

For the color board, majorly using a food color for making biomaterials. It's essential for establishing the visual direction of a project and ensuring that all design elements are harmonized.

Fig:2 Explorative Sketches

Explorative sketches can help you create and organize a wide range of ideas rapidly. They don't have trouble with small details or perfection, instead focusing on exploring new ideas and possibilities.

Fig:3 Concept Sketch

Concept sketches are an essential part of the design process, serving as the initial step in translating ideas from thoughts into visual representations. These sketches are typically rough, quick, and informal, focused more on conveying ideas than on creating polished artwork.

Fig:4 Concept Selection

The concept selection process is playing the main role in the design process for further work. This process ensures that the final design is both innovative and feasible, meeting the project's requirements and goals.

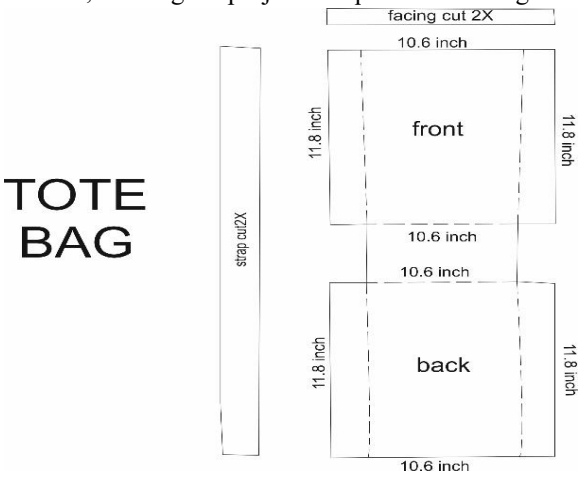

Fig:5 Pattern for tote bag

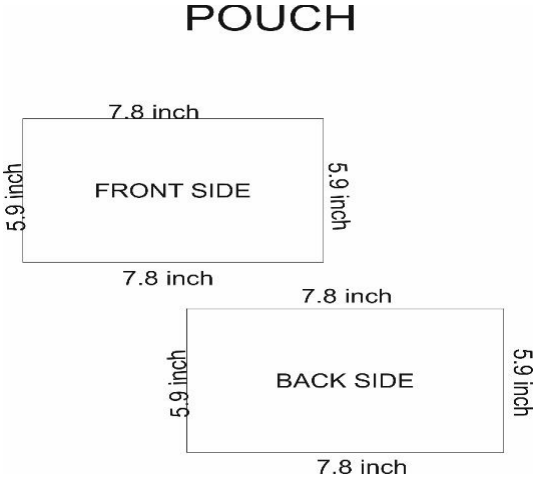

Fig: Pattern for pouch

TESTING PROCESS OF BIOMATERIAL

GSM OF BIOMATERIAL

GSM (grams per square meter) is a standard measurement of fabric weight and density, which is crucial in assessing the suitability of a material for different applications. When it comes to biomaterials used in fashion, including those derived from waste eggshells or other sustainable sources, the GSM can vary widely depending on the processing and intended use of the material.

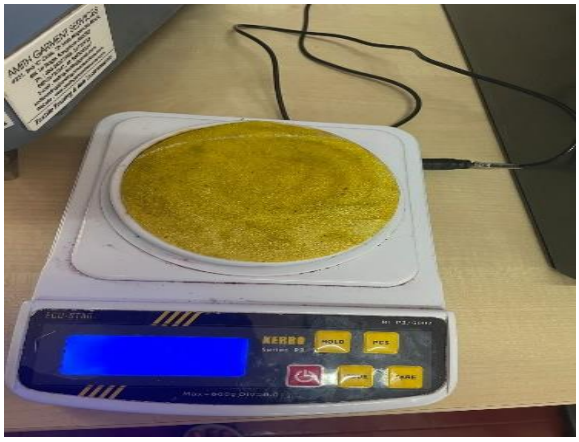

Fig:7 GSM

TEARING STRENGTH TESTER

Testing the strength of biomaterials is a critical step in ensuring their suitability for various applications, including fashion items like handbags. Several methods and equipment are used to measure the mechanical properties of biomaterials, ensuring they meet the required standards for durability and performance.

Fig:8 Tearing Strength Tester

COLOR FASTNESS TESTING

Color fastness testing is a crucial aspect of evaluating biomaterials, particularly for products like handbags that are subject to wear and exposure to various environmental conditions. This testing ensures that the colors of the biomaterial do not fade or bleed excessively when exposed to light, washing, rubbing, perspiration, and other factors.

Fig:9 Color Fastness Tester

III. ETHONOGRAPHY STUDY

In an ethnographic study, I conducted two separate surveys targeting consumers. The first survey aimed to understand consumer awareness and preferences regarding biomaterial handbags. It included questions about gender, age group, familiarity with biomaterials, and preferences for types of handbags. The findings revealed that most respondents preferred tote bags and pouches, with a majority being women who use handbags daily. Some participants were already aware of biomaterials.

The second survey focused on design selection, gathering consumer input on various design aspects and features they preferred in biomaterial handbags.

In the design selection phase of my ethnographic study, I sent consumers a set of handbag designs to gather their preferences. The survey aimed to identify which designs were most appealing and suitable for biomaterial handbags. Based on their feedback, I was able to determine the preferred designs among the options provided. This approach helped to ensure that the final product aligns with consumer tastes and preferences, informed by direct input from the target audience.

IV. CONCLUSION

The design and development of sustainable biomaterial handbags using waste eggshells exemplify the potential for innovative, eco-friendly solutions in the fashion industry. By repurposing a readily available waste product, this initiative not only mitigates environmental harm but also introduces new opportunities for creative and sustainable design. As the fashion industry continues to evolve towards greater sustainability, such innovations will play a crucial role in shaping a more responsible and environmentally friendly future.

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