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Biomaterial Sustainable Handbags from Waste Eggshell

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Abstract: This project explores further the process of creating eco-friendly bags out of unused eggshells. To gain a deeper understanding of the problem, the researchers reviewed existing information, collected and evaluated data, and employed various methodologies. This study not only adds to our understanding of how to make sustainable handbags from waste, but it also prepares the way for future research. It underlines the necessity of making people aware of the problems we discovered. Overall, the project demonstrates our commitment to understanding and improving how we produce handbags from eggshells, and we hope it inspires others to find innovative ways to repurpose this waste product.

Keywords **- Biomaterial, Eggshell waste, Fashion Industry, Handbags, Sustainability.**

1INTRODUCTION

The introduction of biomaterials produced from waste eggshells into the fashion industry provides an inspiring opportunity to solve both environmental problems and material source innovations. Traditionally, the fashion industry has been dependent largely on materials such as leather, which contribute to deforestation, pollution, and animal welfare concerns. Using waste eggshells as a biomaterial provides a sustainable solution. Eggshell waste is very common in the food business, with millions of tons thrown away each year. Instead of ending up in landfills and causing environmental damage, eggshells can be turned into successful fashion materials.

By introducing eggshell-derived biomaterials into garment manufacturing, companies may decrease their dependency on traditional, environmentally damaging materials. This effort also contributes to a circular economy by transforming garbage into valuable resources. Furthermore, eggshell biomaterials can provide designers with new textures and aesthetic options, resulting in the creation of innovative and environmentally responsible fashion products.

2 METHODOLOGIES

This methodology outlines the process of preparing eggshells and producing biomaterials for handbags.

Eggshell Collection: Partner with local businesses like fried rice vendors, bakeries, or catering services to collect eggshells. Establish a collection system with designated bins or pick-up points.

Cleaning and Drying: Thoroughly wash the collected eggshells to remove any organic material. Dry them completely under sunlight or in a well-ventilated oven at low temperatures.

Crushing and Grinding: Crush the dried eggshells into smaller fragments using a mortar and pestle or a grinder. Grind the fragments into a fine powder using a high-powered blender or a commercial grinder.

2.1 BIOMATERIAL PRODUCTION

Bloom the Gelatine: Sprinkle gelatine powder over cold water in a 1:10 ratio and let it sit for 5-10 minutes until translucent.

Heat and Dissolve: Place the bowl over simmering water, stir until the gelatine dissolves completely.

Add Eggshell Powder and Salt: Mix in the eggshell powder and salt thoroughly.

Incorporate Glycerin: Remove from heat and stir in glycerin in a 1:1 ratio with the gelatine.

Add Food Coloring: Add food coloring gradually until desired shade is achieved.

Molding and Setting: Pour the mixture into molds, ensuring no air bubbles. Place the mold in sunlight for 3-4 days until the biomaterial sets completely.

2.2 HANDBAGS MAKING

Once the biomaterial is prepared, we simply cut it into the desired shapes and attach it to the handbag. The handbags themselves are crafted from unused cloth, ensuring a sustainable approach. After affixing the biomaterial onto the handbags, we let them dry for two days. Following this, the handbags are ready for everyday use. This process emphasizes our commitment to utilizing waste materials effectively while creating practical and eco-friendly fashion items for daily use.

Fig:1 Theme board

Creating a theme board for your sustainable biomaterial handbags made from waste eggshells is a great way to visually communicate your design concept and inspire creativity.

Fig: 2 Explorative Sketches

Rough sketches are like brainstorming on paper. They're not worried about being perfect or detailed; instead, they're all about trying out new concepts and seeing what works.

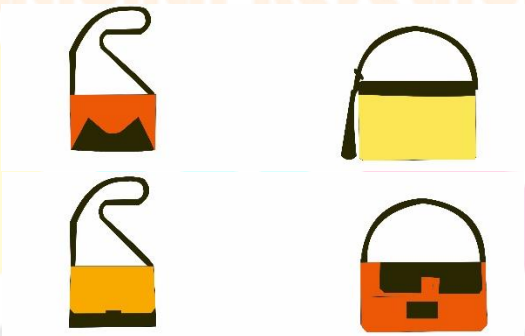

Fig: 3 Concept Sketches

Concept sketches are the first step in bringing ideas to life visually. They're rough, quick, and informal, aimed at capturing the essence of an idea rather than producing refined artwork.

Fig: 4 Concept Selection

Choosing the right concept is crucial in the design process as it determines the direction for further development. This step ensures that the final design is not only innovative but also practical, meeting the project's objectives effectively.

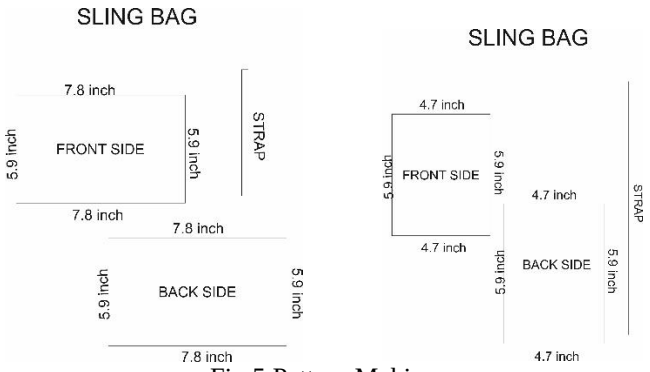

Fig:5 Pattern Making

2.3 TESTING PROCESS OF BIOMATERIAL

In this project, I conducted three different tests to assess the biomaterial's properties. Firstly, I measured the GSM (grams per square meter) of the biomaterial to understand its weight and density, which is crucial for determining its suitability for use in handbags.
GSM, or grams per square meter, serves as a fundamental metric for evaluating fabric weight and density in the context of fashion materials, including biomaterials derived from sustainable sources like waste eggshells. The GSM measurement provides valuable insights into the overall quality, durability, and suitability of the material for various applications within the fashion industry. For biomaterials specifically, such as those derived from waste eggshells, the GSM can vary significantly based on factors such as the processing techniques used, the composition of the biomaterial, and its intended application. For example, biomaterials intended for handbag production may require a certain GSM to ensure sufficient strength and durability, while biomaterials for clothing may have different GSM requirements to achieve desired drapes and comfort.
Secondly, I tested the tearing strength of the biomaterial to evaluate its durability and resistance to tearing, ensuring it can withstand daily wear and tear.
Testing the strength of biomaterials is indeed crucial to guarantee their suitability for diverse applications, particularly in fashion items such as handbags. Various methods and equipment are employed to assess the mechanical properties of biomaterials, ensuring they conform to necessary standards for durability and performance. One common method for testing the strength of biomaterials is tensile testing, which measures the material's resistance to being pulled apart or stretched. In this test, a sample of the biomaterial is subjected to controlled tension until it reaches its breaking point. The force required to break the sample is recorded, providing valuable data on its tensile strength, elongation, and other mechanical properties.
Lastly, I performed colorfastness testing to assess how well the biomaterial retains its color over time, especially since I added food coloring to it. These tests were essential in ensuring the biomaterial meets the necessary standards for quality and performance in handbag production.
Color fastness testing is indeed a vital aspect of assessing biomaterials, especially for products like handbags that undergo wear and exposure to diverse environmental conditions. This testing ensures that the colors of the biomaterial remain stable and do not fade or bleed excessively when subjected to various factors such as light exposure, washing, rubbing, perspiration, and other external influences. During color fastness testing, samples of the biomaterial are exposed to simulated conditions that mimic real-world use and environmental exposure. These conditions may include exposure to light sources such as xenon lamps to assess lightfastness, immersion in water or washing solutions to evaluate washing fastness and rubbing against standardized materials to measure rub fastness.

3 ETHONOGRAPHY STUDY

In my ethnographic study, I conducted two surveys targeting consumers to gain insights into their awareness, preferences, and design preferences for biomaterial handbags.
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. Additionally, some participants were already aware of biomaterials, indicating a growing interest in sustainable fashion alternatives.
The second survey focused on design selection, where consumers were asked to provide input on various design aspects and features, they preferred in biomaterial handbags. I sent consumers a set of handbag designs to gather their preferences, aiming 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.

By conducting these surveys, I gained valuable insights into consumer preferences and design preferences for biomaterial handbags, allowing me to tailor the final product to meet the needs and desires of the target market effectively.

4 CONCLUSIONS

The design and development of sustainable biomaterial handbags using waste eggshells represent a prime example of the potential for innovative, eco-friendly solutions in the fashion industry. By repurposing a readily available waste product, this initiative not only addresses environmental concerns but also introduces new avenues for creative and sustainable design.

In a world where environmental sustainability is becoming increasingly important, such initiatives hold significant promise. They showcase the possibilities of transforming waste materials into valuable resources, thereby reducing the industry's reliance on traditional, environmentally harmful materials like leather and synthetic polymers.

As the fashion industry continues to evolve towards greater sustainability, innovations like biomaterial handbags made from waste eggshells will play a crucial role in shaping a more responsible and environmentally friendly future. By embracing these eco-friendly alternatives, fashion brands can demonstrate their commitment to sustainability while offering consumers stylish and conscientious choices.

Ultimately, initiatives like these highlight the importance of collaboration between industry, researchers, and consumers to drive positive change and pave the way for a more sustainable fashion ecosystem.

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REFERENCES

[1] Ghanem, N. B., et al. (2019). Eggshell-derived hydroxyapatite for bone tissue engineering applications. Journal of Materials Science: Materials in Medicine, 30(1), 12.
[2] Li, Y., et al. (2019). Eggshell-based adsorbents for heavy metal removal: A review. Environmental Science and Pollution Research, 26(22), 22292-22312.
[3] Barhoum, A., et al. (2019). Eggshell membrane: A potential renewable resource for water purification membranes. Journal of Materials Chemistry A, 7(15), 9252-9261.
[4] Arias-Uribe, L. A., et al. (2018). Eggshell waste valorization: Potential applications for bio composite materials. Bulletin of the National Research Center (Egypt), 42(1), 1-12.
[5] Liu, D., et al. (2017). Eggshell membrane-derived bio