Chapter 21

Paper Pulp Plastic Bag

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Introduction

In today's world, the concept of sustainability has become increasingly vital as we confront pressing environmental challenges and seek ways to ensure a prosperous future for generations to come (Enel Group, 2023). At its core, sustainability in design represents a proactive approach that considers the entire lifecycle of products (Interaction Design Foundation, 2023). This general perspective aims to minimise environmental impact, conserve resources, and promote ethical practices throughout production and consumption processes (Acaroglu, 2020).

Designing for sustainability is an adaptable approach in product development, aiming not only to meet immediate consumer demands (Acaroglu, 2020) but also to ensure that every stage of a product's lifecycle contributes positively to the environment and society (Enel Group, 2023). This approach, guided by sustainable design principles (Enel Group, 2023), strives to reduce waste using recyclable and reusable materials, promoting products that can be reused, repaired, or safely disposed of in a biodegradable manner (Acaroglu, 2020). By adopting these principles, designers not only avoid the environmental impacts of their creations but also foster a circular economy (den Hollander et al., 2017) where resources are used efficiently and waste is minimised.

This sets the stage for exploring how sustainable design principles not only address current environmental challenges but also pave the way for innovative solutions that benefit both present and future generations.

Sustainable strategies in design

According to Acaroglu (2020), "80% of the ecological impacts of a product is locked in at the design phase". This creates awareness of how important designers are in embedding the impacts of their products. Using sustainable design principles from the initial concept to disposal allows designers to create more sustainable consumption patterns. The design stage is most important for finding opportunities and unique ways to obtain sustainable goods and services in the economy (Acaroglu, 2020).

Consumption is a major driver of unsustainable consumer goods (and the way they are designed) (Acaroglu, 2020). A product will exist in the way it was meant (or designed) to be, "allowing the creator to produce a product which fits into a system..." (Acaroglu, 2020). This system includes planned obsolescence as a way to prompt consumption, which in turn drives the economy to produce more goods, which makes more money.

Case Study: Project Overview

To create awareness about sustainability and its importance in design, I was tasked with a sustainable waste solution project. This project involves designing with the entire product life cycle in mind, from creation to disposal or reuse. For this case study, I am using my own sustainable waste solution product, The Organic Bag (Figure 1).

Figure 1: Organic Bag, 2024, Photo provided by Author

For this project, I researched and developed various sustainable materials by experimenting with different ingredients and organic waste. This approach was guided by the Circular Design Framework, which emphasises sustainability and the elimination of waste throughout a product's life cycle. Based on the research and development of a new sustainable material, I was challenged to design a low-tech, context-aware product and prototype it. The production cycle of the product should adhere to the Circular Design Framework as well as the three pillars of sustainability.

To ensure that valuable information was obtained from my research, I experimented with a wide variety of ingredients. These tests explored different ways to create biodegradable materials using organic waste and ingredients commonly found in household kitchens. After the final experiment, I chose a few and refined a bio-plastic-based paper pulp, which I then used to design a product according to the properties of the paper plastic.

The material refinement stage was significant in the design process, as it determines the outcome of the final product outcome. The material refinement involved experimenting with different types of paper-based waste, such as egg cartons, printer paper, corrugated cardboard, and card, to test their properties. After refining the material's production process, I created a recipe card with ingredients and instructions to allow others to recreate and use it (Figure 2). The next phase was to develop and prototype the actual product. I sketched many ideas but ultimately decided to create a disposable grocery bag, a mock-up collaboration with Woolworths.

The outcome was more successful than initially anticipated. I made large sheets of the paper pulp plastic, cut and assembled the bag with all necessary elements. The bag is disposable and strong enough to hold a moderate amount of groceries.

Figure 2: Paper Pulp Plastic recipe card, 2024, Photo provided by Author

Process: Outline

The advantage of using this material and process is that all cut-offs, waste, and scraps dissolve in water. This process minimises waste and is easily scalable for large production. It mimics nature, where waste from one product or industry, such as the paper industry, can become the core material for a new design. This approach conserves resources and reuses existing waste, reducing plastic pollution and single-use plastic waste.

Attitude towards Sustainability

Initially, I held misconceptions about sustainability and my role as an Industrial Designer in circular product design. I believed it aimed solely to eliminate plastic and substitute all materials with "eco-friendly" alternatives, which did not initially motivate me. However, through research and challenges in designing for sustainability, I realised the importance of sustainability in creating products and services. Now, I focus on creating products with minimal waste and maximum resource efficiency, prioritising durability, reuse, and recyclability.

I now understand that sustainability does not mean eliminating plastic entirely but designing plastic products to last. If a product breaks, it should be easily repairable rather than replaced, reducing waste. When it is finally time to discard the product, it should be performed safely and responsibly. As a developing Industrial Designer, sustainability is now a core principle in my design process. When a product is developed, I aim to ensure that its life cycle is carefully planned and well managed.

Conclusion

Sustainable design is necessary because it helps address global issues such as pollution, climate change, and biodiversity loss (Enel Group, 2023). When designers build sustainability in their work, they become important influences in protecting the environment and preserving natural resources for future generations (Enel Group, 2023). Using the three pillars of

sustainability, this design ensures fairness by giving everyone in society equal access to opportunities and resources, promoting unity and justice (Enel Group, 2023). Economically, sustainable design enhances long-term stability (Enel Group, 2023) and efficiency by reducing reliance on limited resources. This approach not only strengthens businesses but also promotes balanced economic growth that benefits communities and nature and reduces risks linked to environmental harm (Enel Group, 2023).

Overall, sustainable design means committing to innovation and responsibility. It aligns economic success with environmental health and social well-being. By consistently applying sustainable principles in design, designers can lead the way toward a better future where products are not just useful but also contribute positively to our planet and society.

Refences

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