

Nature as a Creative Mentor: How Sri Lankan Fashion Designers Embrace Biomimicry

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Abstract – Channelling nature as a profound source of inspiration for integrating design solutions has been a longstanding practice dating back to the dawn of human survival. This innovative approach involves perceiving biological functions and visuals, and then merging them with design to create product solutions. In recent times, this process has taken on a new form with biomimicry gaining traction as a valuable tool for industrial enterprises. The purpose of this study is to explore the potential impact of biomimicry on the fashion industry and its future landscape in fashion design. To conduct this research, primary data was collected through purposive sampling and semi-structured interviews with local designers, while secondary data was obtained from renowned fashion trend forecasting platforms, social blogs, and scientific literature. These were then subjected to mixed method analysis. Through this exploratory research, we draw conclusions about the efficiency of biomimicry as a design practice and its potential as a tool for advanced innovative concepts in Sri Lankan context. The study also highlights the gaps between biological knowledge and the fashion industry, which have been hindering the widespread adoption of this practice. By investigating the opportunities and possibilities that biomimicry presents, this research aims to empower local fashion designers to incorporate biomimetic principles into their creative and commercial practices. Ultimately, the findings inform shaping a sustainable and innovative future for the field of fashion.

Keywords: Biomimicry, Future fashion, Fashion Designer, Sri Lanka

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Introduction

The fashion industry has experienced rapid growth and significant changes in the last decade, operating in a dynamic and highly competitive environment that increases the likelihood of uncertainty as a real phenomenon (Gazzola et al., 2020). One of the most notable developments during this period has been the increasing focus on sustainability. The concept of circularity is closely related to sustainability (Gazzola et al., 2020). Biomimicry offers a creative approach to sustainable designs, providing regenerative solutions to pressing environmental issues. Incorporating nature's design principles is becoming a crucial form of fashion expression in the near future (Biomimicry Institute, n.d.). The Sri Lankan apparel industry is highly sensitive to global changes and demands, necessitating rapid adaptation to the international fashion arena. This study specifically focuses on the perception of the burgeoning biomimicry concept among top-tier decision-makers in the fashion industry, the fashion designers (Gopura et al., 2019).

Research Aim & Objectives

Biomimicry is a rapidly growing technology and design principle that has found its way into various fields. It encompasses several practices, such as bio design, bio synthetics, and bio materials, all of which embrace the concept of mimicking nature's processes. As the fashion industry increasingly adopts circular practices, it also moves towards incorporating biomimicry principles. The purpose of this research is to investigate and explore the future of fashion design within the context of novel bio design and biomimicry processes among Sri Lankan designers. By focusing on the potential of biomimicry to impact the fashion industry, this study aims to shed light on the innovative approaches adopted by Sri Lankan apparel designers in incorporating biomimicry principles. Through a thorough examination of biomimicry practices and their potential implications, we seek to identify how these sustainable and nature-inspired methodologies could transform the future of fashion design. Ultimately, this research aims to provide valuable insights and recommendations for the integration of biomimicry practices in Sri Lanka's fashion industry, fostering a more sustainable and ecologically conscious approach to fashion design.

Literature Review

This chapter discusses literature acquired from scientific journals- publications & Trend Forecasting websites.

A. Biomimicry

Biomimicry is the practice of emulating natural processes, and it is not a new concept for humans. A classic example of biomimicry is the creation of the hook and loop fastener, also known as Velcro, in 1948, inspired by bur plants. Biomimicry holds significant value in product design because nature often offers the best solutions to our design challenges. In the upcoming years, biomimicry is expected to be a key method of invention in the fashion industry (*Fashion Trend Forecasting 2023-2025 | WGSN*, n.d.) The biomimicry design spiral serves as a guide for the design process, leading us through identification, translation, observation, abstraction, application, and evaluation stages before creating a design. The term "biomimicry" is a combination of "bio" and "mimicry." The word "mimicry" refers to animal behaviour, particularly their superior survival strategies, where they mimic the behaviour, appearance, colour, and

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other characteristics of other living things to blend in (Benyus, 2002). Table 1 below indicates terminology related to this area of investigation for the better understanding.

TABLE I
BIOMIMICRY TERMINOLOGY

No.	TERMINOLOGY TABLE	
	TERM	DEFINITION
1	BIONICS	IN 1960, U.S. AIR FORCE MAJ. DR. JACK E. STEELE MADE THE BIONICS PROPOSAL, AND BIONOMISTS AGREED THAT THE FIELD APPLIES BIOLOGICAL THEORY AND PROCEDURES TO ENGINEERING AND TECHNOLOGY. IT IS A SCIENCE THAT IS BASED ON OR EMULATES COEXISTENCE. SYSTEMS WHOSE TRAITS HAVE BEEN EXHIBITED THROUGH IMITATION AND ARE REFERRED TO AS "BIO-MIMICRY"(CHEN & PENG, N.D.)
2	BIOMIMETICS	BIOS IS GREEK FOR "UNIT OF LIFE," AND MIMESIS IS TO IMITATE, REPLICATE, OR MIMIC. THE TERM "BIONICS," SOMETIMES KNOWN AS "BIOMIMETICS," IS FREQUENTLY USED IN SCIENCE AND ENGINEERING. (SCHMITT, 1969)
3	BIO MIMICRY	THE PROBLEMS THAT MANKIND FACED ARE RESOLVED BY THE BIOLOGICAL SYSTEMS THAT ARE STIMULATED BY BIOLOGICAL SHAPE, COLOR, AND STRUCTURE FOUND IN NATURE. THE STUDY OF PARTICULAR SPECIES THAT MIMIC HUMANS IN TERMS OF BEHAVIOR, FORM, COLOR, OR OTHER CHARACTERISTICS MAKES HUMAN SURVIVAL MORE LIKELY.(BENTLEY, 1999)
4	BIO DESIGN	BIO DESIGN IS THE APPLICATION OF ORGANIC FORM OR STRUCTURE TO INANIMATE ITEMS.(NOBLET, N.D.)

B. Biomimicry in Practice

In the realm of fashion design, innovation, inspiration, and originality are of utmost importance. When the principles of biomimicry are applied to fashion, it becomes possible to emulate nature in the creation of novel and avant-garde designs. The fashion industry is widely recognized as one of the most environmentally harmful industries globally. However, through the integration of biomimicry and fashion, new materials and garments can be developed that benefit the environment without sacrificing the appearance of those who wear them. This intersection of science and design, creativity and engineering, sustainability and innovation allows for more comfortable clothing and a cleaner environment.

As the public and consumers demand it and are in control of the purchasing decision, global brands are increasingly turning to nature-inspired fashion. This is especially true in the age of social media, where public opinion can make or break you in a matter of seconds (Fractal Fusion Fashion, 2021). The utilisation of biomimicry in fashion is an emerging trend. When applied to the fashion industry, biomimicry extends beyond the visual design of garments. Whether it is the use of Brewed Protein materials to create unique textures, NikwaX fabric that emulates

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animal fur, orange fibre fabrics that mimic yarn, or fabrics composed of specially designed fibres that replicate animal fur, the goal of biomimicry in fashion is to connect the materials to the natural world by employing biological processes in the creation of the materials, fabrics, apparels (*Welcome to Nikwax | Outdoor Innovation*, n.d.)

Mammals have a unique ability to repel water droplets from their skin due to the arrangement of their fur. The dense, water-repellent fur coating along their skin pushes water away from their bodies, particularly in areas where the fur is less dense (*Durable, Waterproof Fabric Inspired by Mammal Fur – Innovation – AskNature*, n.d.) Nikwax, a leading company in cleaning and waterproofing solutions, offers products that help you extend the life of your waterproof apparel, shoes, and equipment. The best part is that Nikwax is water-based, free from hazardous solvents, and does not contain long-lasting PFCs, making it safe for home use (*Welcome to Nikwax | Outdoor Innovation*, n.d.). Pinecones have a fascinating design that ensures seeds are released only under ideal germination conditions. The tightly closed pinecone structure protects the seeds during less favourable circumstances. However, the cone's bract scales bend when exposed to the right temperature and humidity levels. These bract scales contain two types of cellulose that differ in swelling behaviour, causing the bending. The cone's aperture allows for seed dispersal and potential germination. This concept of opening and closing inspired Schoeller Textil AG, a Swiss manufacturer of technical textiles, in creating their c change fabric. This fabric, widely used in high-end sports apparel, consists of two textile layers and a polymer membrane. The unique molecular structure of the polymer membrane opens when the body is warm, allowing heat and moisture to escape. Conversely, it contracts as the body cools, enhancing the fabric's insulation and trapping heat against the skin. The adaptive nature of this fabric ensures an ideal body climate, as claimed by the manufacturer (Wood, 2019).

As such Bio mimicry has widespread applications in the global scale and are used to improve the quality of product while searching for sustainable solutions.

Methodology

The following figure 1 represents the research design used to achieve the research objectives of the sequence.

A. Data Collection

Questionnaire-The purpose of this questionnaire survey is to identify the necessity of comprehending the scope of primary data resources, as well as the characteristics of the resource personas. This survey has been incorporated into the process to refine and narrow down the data scope effectively. The survey aims to gather essential information, starting with confidential and metadata details like the participant's name, and progressing to fundamental data points such as company affiliation, experience level, age, and product expertise.

Interviews- The interviews were strategically organised to align with the mindset, academic backgrounds, and interests of the resource persons for the research. Conducting interviews allowed for a wealth of information to be gathered, as opposed to

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using a written/printed questionnaire, given the diverse range of perspectives that designers might have regarding idea themes and research questions. The data derived from these interviews holds significant value.

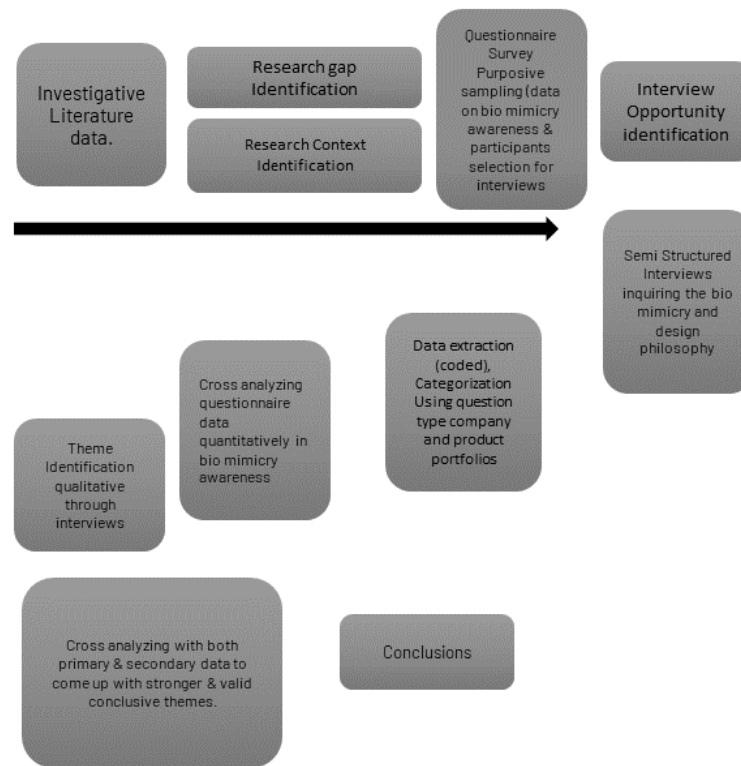


Figure 1- Research Methodology

B. Participants

Export Apparel Designers - One of the most significant economic sectors in Sri Lanka is the garment export industry, which has undergone rapid expansion over the past four decades. The value of this sector escalated to \$5.42 billion in 2021, with exports growing by 22.93 percent on a yearly basis. The rationale behind selecting this category of designers lies in its potential to capture the attention of the majority of the audience and its widespread perception. This particular cluster plays a pivotal role in shaping fashion as a business enterprise. As a result, drawing conclusions based on their perception becomes crucial, ultimately contributing to effective outcomes that will benefit the country's fashion industry. This research aims to establish a connection between these factors and their positive impact on the domestic fashion sector.

Retail Apparel Designers - Local retail fashion designers in the apparel industry possess various design skills and product offerings. The decision to strategically include these designers was made to enhance the diversity of design perspectives in the field of biomimicry.

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Results & Discussion

Figure 1 below shows the findings of the study together with five key themes - innovation, knowledge, efficiency, resource leverage, aesthetic that biomimicry can add into the industry.

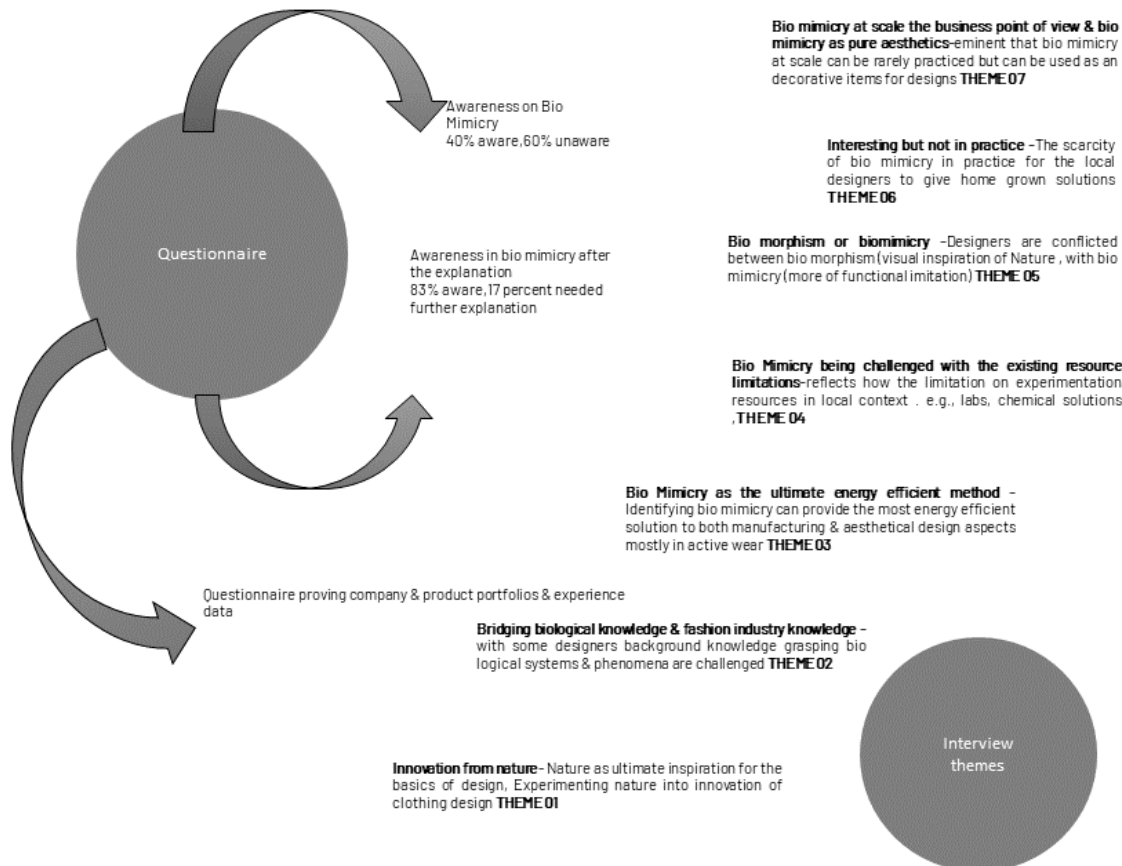


Figure 2- Designers' perception of Bio mimicy- Analysis

Conclusion

This research establishes correlations between the themes and methods used to analyse the perception of Sri Lankan fashion designers toward biomimicry in fashion design. The key findings, derived from questionnaires, interviews, and literature, reveal that biomimicry is not widely known in the Sri Lankan design field, although some practices are being carried out. While designers show interest in the concept, they face challenges in its execution. However, there is a positive aspect to biomimicry as they pursue it under five themes informed by the study. To promote the adoption of biomimicry, engaging in discussions with experts about experimentation and enhancing knowledge in biology, design, and technical aspects is essential. Although the terminology is novel, the practice is embraced among designers. Providing the necessary knowledge and freedom to experiment to export apparel designers may have an impact on innovation and novel revenue generation for the economy.

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