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Exploration of Nature Patterns for a Brand Identity Across a Bio-Design Taxonomic System

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Abstract

Currently, bio-design is gaining more attention and extent at the core of the global design. Within this, the common concept of bio-design is refers to the integration of living organisms as a vital element of improving the functions of the product. By taking Pahang National Park as a research setting, the research inquiry whether pattern from nature can proposing as a new foundation in the context of place branding. The aim is to clarify that using specific pattern from nature will be helping in place branding through a bio-design concept. As a qualitative study, the pattern uncovered from the local fish, plants, and flora in Taman Negara Pahang was go through a three steps of bio-design analysis framework. The set of prospective patterns further was transferred into fabric and being used for a place branding promotion.

Keywords: Bio-Design, Nature Pattern, Place Branding

Introduction

Global warming, plastic pollution, and the weakening of various resources are effects human life. Unsustainable practices moreover are one of the factors contributing to this downward spiral. Towards this, the concept and process of any product development is involved with the act of a design, manufacturing, and selling through the stages of development which combines design, merchandising, and marketing functions with production to introducing products in the market (Mattson and Dorensen, 2020; Crutsinger et al., 2006). Similarly, according to broad literature, within the product development process, the aesthetic design elements that are decided in this phase, such as the material, can be categorized as major contributors to the sustainability of the final product (Curwen et al., 2012).

In relation to product development process, a new design paradigm namely a bio-design or bio-inspired design was established in 2012 which focus on incorporates living organism into design process. This moreover presents a new frontier in terms of design with nature in the

case of bio-inspired design and simply is a field that brings the natural sciences to the design industry. In particular, a bio-design known as a combination of the inter-disciplinary interests in the fields of the life-sciences and art/design in order to explore the future of life at all levels and how we might become a more sustainable society through methods of biological crafts. Indeed, a Bio-design embodies an emerging design movement which incorporates the use of living materials such as bacteria, fungi and flora. This further explains of crafting methods on how to create a product by using living materials.

As for bio-design aim is to use natural resources in order to create new design solutions and technologies, thus, it shown here a bio-design essentially crosses traditional art-design-science boundaries in order to change accepted values of life at all levels. By taking Pahang National Park as a research setting, the research aim is to study whether pattern from nature can offering as a new foundation as an aura for a place branding by following a bio-design system.

Literature Review

A Bio-design Taxonomic System

Nature as culture is not a new concept and has been expressed at every level of the design process, including as a form and aesthetic determinant. Nature also has inspired artists, architects and engineers throughout the centuries. Shapes, patterns, structures, construction principles and techniques from nature have been utilized in many ways and forms. Towards this paradigm, several approaches through bio-design that inspired by nature have been identified by various authors (Faludi, 2005; Zari, 2018; Kepler & Stokholm, 2004). The successful of bio-design applications which have passed the conceptual or production stage are mostly in the field of materials development or product design. Therefore, , a bio-design is more often used either to produce novel ideas or to increase the sustainability of an existing design.

There is also a growing body of research which identifies obstacles to the implementation of bio-design as a viable design methodology in the field of architecture and interiors (Faludi, 2005; Zari, 2018). Bio-design can begin with a well-defined problem, where solutions can be reached through the analysis of a natural system. Subsequently, the fundamental principles of natural systems are abstracted and eventually translated into a new design form. However, there is a clear lack of methodological approach for built environments in the field of bio-design, resulting in a limited number of field applications.

The literature review on a Bio-design employments are expresses that bio-design performed as solutions particularly on structural colour materials and it was very hard to acknowledged as design methodology (Shang et al., 2016). In which, a meaning of bio-design in design process is noticed in nature that was the source of their inspiration (Wen et al., 2014; Alison Hawthorne Deming, 2016; Kyoo-Chul et al., 2013). For this reason, a particular design methodology need to be created as a search engine of biological strategies to transform the process of bio-design into a systematic and comprehensive design process. In particular, a bio-design system facilitate researcher to find relevant biological solutions that persuading design problems. Where by, as the bio-design is involved inter-disciplinary interests between art-design-science, this research used a bio-design as a methodology to support the mapping

between biological mechanisms and design problems. Within these understanding, the taxonomy system of current bio-design appliances presents as Table 1 below:

Table 1

The taxonomic system of current bio-design appliances

Bio-design taxonomic System	Descriptions Activities
Design Analogy	Strategies
Design Ideation	Development steps
Design Algorithms	A Biological Patterns

Understanding a Brand Proposition

Brand is referring to a symbol, mark, logo, image or name that be use to distinguish the specific product from others. Further a combination of one or more of those elements can be utilized to create a brand identity. Therefore, with a legal protection given to a brand name is called a trademark.

Branding bring art and science together to differentiate each brand and build a strong customer experience. Towards brand, there are three different categories of brand that included:

1. ***Brand Insights:*** A combination of analytical and creative process that converting data reveal from customer and market opportunities.
2. ***Brand Strategy:*** Strategies that be develop separately with defined missions, visions and values.
3. ***Brand Experience:*** Increase brand value and reinforce loyalty through experiential assets and blending together between visual communication and design principles.

Research Method

A qualitative research approach is applied into analyses of pattern from nature that can offering as a new foundation that further can be used as a brand experience for a place branding. Based on the taxonomy system of current bio-design appliances that includes Design Analogy, Design Ideation and Design Algorithms, this research was segregated into 3 stages: (1) Reviewing the literature, Forming strategies and locating the study, (2) Collecting, Analysing and Synthesizing information, and (3) Reporting Evidences.

In particular, the first stage (Design Analogy) a numbers of literature that related to bio-design taxonomy and bio-design performed in the design process was collected and reviewed using a systematic contextual document review. The outcomes further help for the development of a specific strategies based on the chosen location for the study. Following that, the second stage is more on Design Ideation that involved more on the collection of primary data for the research study. The collection of primary data which are a living materials from nature existed in Pahang National Park such as animal, fungi, flora and fauna will be further analyse and synthesize. The final stage is Design Algorithms which about establishing of the research findings.

Analysis

Design Analogy

Data collection was carried-out by document analysis and significant information was extracted from multiple sources accordingly in its corresponding column in the classification table. For the quality analysis, the focus was on the categories of accuracy, and similarity elements of the bio-design system. As Table 2 shows, our analysis revealed three main description categories to present the findings and cross-case analysis in this section. Table 2 show the differences and similarity of steps within two different design analogy from Arts, Engineering and Science.

Table 2
The similarity of steps within two different design analogy from Arts and Science.

CATEGORIES	FIELD	STEPS FOLLOWED
Bio-Inspired Engineering Design Process	Engineering	Identification Extraction Framing Application
Bio-Design Creative Design Thinking Process	Arts	Identification Invention Development Application
Bio-Design Science Process	Science	Identification Extraction Invention Application

One similar characteristic activity in bio-design is identification which involved the search activity for biological information. From the outcomes, as biological solutions that can rarely be used in the technical domain directly, bio-inspired design entails a step of abstraction to enable analogical transfer. Here it shown that designers need knowledge in both the biological and the technical domain to master this.

Design Ideation

For the Design Ideation stages, analysis conducted through Qualitative Colour Pattern Analysis (QCPA) procedures. A Qualitative Colour Pattern Analysis (QCPA) is a method to assessing how patterns and colours revealed from animals, insects and plants(flora and fauna) appear against their natural background as viewed by ecologically relevant species. It combines calibrated digital photography (Stevens et al., 2007), visual modelling and colour pattern analysis into an analytical framework.

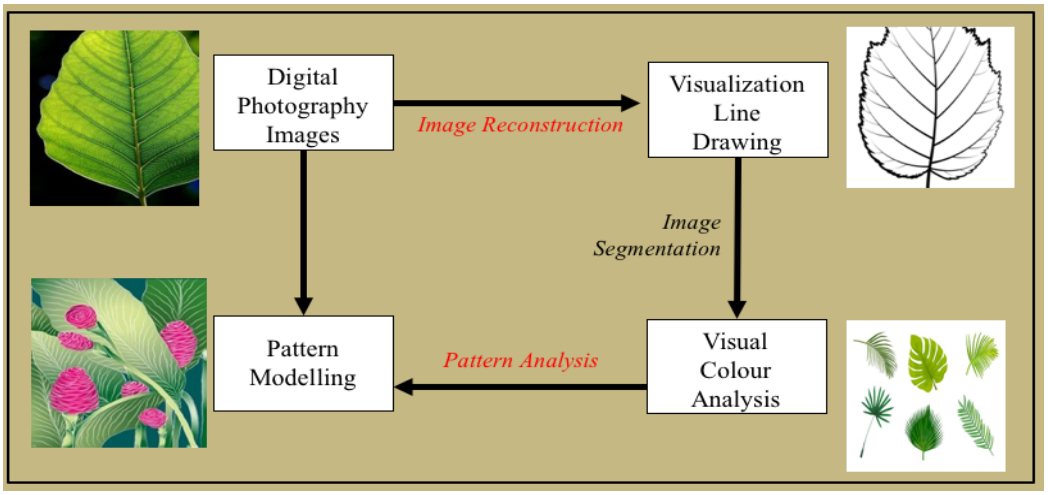
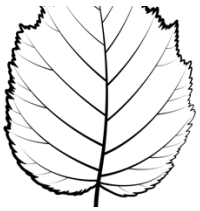
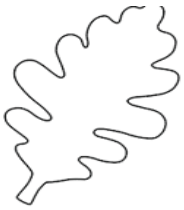


Figure 1 Qualitative Colour Pattern Analysis Framework

As the research is based on Pahang's National Park, the sample were focusing only on the plants that were divided into four group: Ferns, Fungi, Leaves and Fauna. The photograph images firstly were group according to the types and further was analysed based on line drawing. The sample of plants as per shown in Table 3.

Table 3
The types of plants in nature and in line drawing

Types	Ferns	Fungi	Leaves	Fauna
In Nature				
In line Drawing				

As per established in the literature, most of the plant involved in this study exposed the radial pattern, in which a similar curve and it is a common pattern in nature. Therefore, in some leaves, a radial geometry pattern was existed and it's also the most perfect classic proportion in nature.

Design Algorithms

After completed with the patterns analysis, the process of designing a new design involved in proposing a new potential pattern for the Pahang National Park's identity. The parametric design of the potential image brand for Pahang National Park includes three aspects: parametric form, parametric colour, and parametric pattern. The combination of the blending colour and the inline drawing pattern transformation can present the looks of rainforest in Pahang National Park. The mixture of the three colours is defined as the colour scheme of the

National Park of Pahang. Final Design results in Table 4 and Figure 2 selected out by the designers, which were selected in the first round.

Table 4
The types of plants in nature and in line drawing

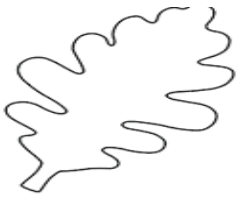
PARAMETRIC FORM	PARAMETRIC COLOUR	PARAMETRIC PATTERN	FINAL
			
			

Figure 2 The potential pattern and colour for National Park Pahang
This pattern design further was printed into textile fabric for the commercialization.

Conclusion

The three categories that emerged during our Design Analogy analysis reveal that bio - design communicate an original pattern from a living organism has the potential benefits of bio fabrication and the potential design of materials also can created using bio fabrication.

Accordingly, the outcomes of this research also explained a merging of aesthetics and science where finding on the science logic behind natural patterns has been a key step for the designers in proposing their new design work. Similarly, scientists also has required to have a parametric aesthetic thinking on the generative system of design process. In which, designers are not only required to constantly update their knowledge on design but also need to respect the logical science in environment.

Moreover, this study also covered that natural patterns that offered an unlimited source of design and can be effectively applied to form image brand. The findings from the study also contributing to the Sustainable Development Goals (SDG) in environmental benefits, climate action and increased economic stability via forest products. Importantly, giving special attention to how plant in the forestry can provide a therapy through pattern, this study not only shared the findings from two perspectives but also helps in generating sustainable economic growth and society.
In term of theoretical contribution, the research findings enhance the existing concept of bio-design where is the new taxonomy system of current bio-design appliances that includes the characteristics of the Design Analogy, Design Ideation and Design Algorithms helping for the new product development strategies.

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