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Biomimicry as a source for sustainable design innovation to support beach tourism in the field of industrial design

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Abstract:

Biomimicry is one of the sources through which the industrial designer can watch nature, learn from it and search through it for new ways to build products and access new sources of inspiration to design products that are highly efficient and more durable and consume less energy and raw materials with nature. In addition to finding environmental design solutions by inspiring environmental forms, processes, and systems to solve design problems and increase sustainability in the design of products and materials used by humans and the environment. Since the environmental aspects are important in the design of sustainable products to be able to overcome the climatic changes that occur in the world, this has led to an interest in teaching industrial designers how to adopt biomimicry as a source of innovative and sustainable design in the field of industrial design. A design methodology has been developed and applied to be biomimicry in part of the graduation projects at the Product Design Department of the Faculty of Applied Arts at Badr University in Cairo for the academic year 2021/2022, with the aim of arriving at innovative and sustainable design ideas for products that help raise and introduce environmental awareness and professional practice for students in the field of industrial design. It supports the beach tourism sector in the Arab Republic of Egypt.

Research Problem: Considering the climate change crisis that the world seeks to face, it was necessary for companies, societies, and organizations to find new ways to make old products more efficient, with less energy and reduce the number of non-renewable resources inputs by adopting the use of biomimicry as a framework and strategy for companies that enable them to design and develop new products that are more flexible, successful, efficient and competitive (Flint 2014). According to a report by the Fermanian Institute of Business and Economics, which tracks the NII business, patents, scholarly articles, and research grants have increased more than five-fold since 2000, and NBA is estimated to account for about $1.6 trillion of total global output for 2030. Therefore, biomimicry is considered the source of change through academic studies in industrial design education, which has recently grown in academic research either as a discipline or as a research topic, but still in the development stage (Avcı 2019). Therefore, designers and manufacturers today seek sustainable solutions to improve design and product processes, which will reduce their environmental impacts .

Objective: to develop a design methodology that helps industrial designer to design thinking by biomimicry to create sustainable design innovation. **Significance of Research:** Creating a new generation of industrial designers who care about environmental issues and include them in their designs. Supporting industrial designers with a design thinking methodology to draw biomimicry. Drawing the attention of companies and stakeholders to adopting environmental issues and participating in developing solutions for them. **Research Methodology :** The research follows the analytical experiment method. **Results:** Through the analysis of the theoretical framework in addition to the applications in the field of biomimicry, the research reached the following results:

- Develop a methodology for biomimicry design thinking, through which the industrial designer can adopt the design inspiration from nature in his products.
- Determining a set of tools and methods that the industrial designer can use in the process of designing biomimicry.
- Determining the biomimicry approaches, either through an approach (problem to biology) or (biology to application).
- Determining the levels of biomimicry in three elements: the organism, the behavior, and the environment.
- Determining the dimensions of biomimicry in form, material, construction, process, and function.
- Classifying the types of biomimicry to visual inspiration, conceptual inspiration, and computation inspiration.
- Emphasis on the importance of biomimicry and its role in achieving sustainability to face climate changes.
- Teaching students to adopt biomimicry methodology in their designs to achieve design sustainability.
- Adopting biomimicry in design is a qualitative change towards innovation and achieving sustainability through problem-based learning.

Keywords:

Biomimicry, Sustainable Design , Eco-design , Design Thinking

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