

Sustainable practices in furniture design: Biomimicry

Furniture design has always been an important part of our life, we need furniture for sitting, sleeping, eating, working and storage. Population growth requires furniture to be optimised. As our needs and life circumstances change, so does our furniture. In the past, people used natural elements in furniture design with primitive forms. With the support of technology, furniture design today promises unconventional possibilities. Furniture designers can now develop ideas based on the anatomy and function of what nature has to offer. The science of applying nature to solve human problems is known as Biomimicry.

Nature has the answers to all design problems. Biomimicry helps designers reduce production costs, especially on materials, while optimising the effectiveness of the furniture to achieve the desired functions. In nature, nothing is single-purpose. For example, the ocean is home to many creatures, it regulates the earth's system and absorbs carbon dioxide. Imagine furniture structures that can accomplish multiple functions just like the ocean.

Sustainability is also a rising concern — furniture pieces made from recycled materials will become popular in the coming years. Looking to nature for inspiration can implement sustainability in furniture as biomimicry is like natural systems, it is self-solving and self-reinforcing. Integrating biomimicry into furniture design practice can make our built environment “fit in” again and contribute to the ecosystem we live in by analogising the functions of nature.



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The Covid-19 pandemic made an impact on the home environment — when lockdowns required people to stay home, they wanted versatile furniture. In Kuala Lumpur, the dining chair is used as an office chair, which is not ergonomic. The new work-from-home revolution will continue to shape what furniture will be like in the future as workers struggle to return to their office. Considering that many will continue to work from home, office furniture will likely have to be more ergonomic and practical.

Interior architecture has already adopted the concept of biomimicry — furniture samples inspired by flora, fauna and skeleton structures are not new. My research on Transformation-Biomimicry Theoretical Framework (T-BTF) in Chair Design Process based on Malaysian Identity offers a sustainable solution for furniture designers to create a healthier and more sustainable planet, that will have a positive impact on the future of our bodies and environment. Biomimicry furniture can be constructed to perform the same functions a natural ecosystem does. With the application of transformation principles by Vikramjit Singh (Innovations in Design Through Transformation: A Fundamental Study of Transformation Principles. Journal of Mechanical Design, 2009) such as expand/collapse, expose/cover, and fuse/divide, furniture has the potential to be truly portable and highly flexible.

Transformation-Biomimicry Theoretical Framework (T-BTF) uses Rafflesia (plant structural, analogue form) in the design process. The

Rafflesia Chair, developed using T-BTF, serves a variety of functions with its multiple storage in both the armrest and the backrest of the chair. The Transformation principle of fuse/divide was rendered into the coffee table that comes with the Rafflesia Chair, and it can be stored under the Rafflesia Chair when it is not in use. The blooming form of the Rafflesia is translated into the design of the Rafflesia Chair to bring out a sense of Malaysian identity.

T-BTF has proven its potential in accelerating the furniture design process based on a workshop conducted at Sunway University. A group of interior design students managed to design a piece of furniture by using T-BTF as a framework with a more well-thought-out design facilitating the transformation of the Rafflesia's structure in an hour. The outcome were new design solutions that portray the Malaysian identity most vividly, and the efficiency of the furniture was improved too.

Furniture designs based on T-BTF perform better functions between states, which might seem impossible for a single primary-function product. Manufacturing costs and sale prices are reduced, compared with those of single primary-function products. T-BTF cuts down complexity and deployment time for many designers, it facilitates new design solutions for products that serve a wide variety of functions. This type of furniture is compact, space-saving and multifunctional.

Now that's a promising future for the furniture industry. **E**