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“Optimizing Innovation in Knowledge, Education and Design”

EXTENDED ABSTRACT



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Assalamualaikum warahmatullahi wabarakatuh,



First and foremost, I would like to express my gratitude to the organizing committee of i-Spike 2023 for their tremendous efforts in bringing this online competition a reality. I must extend my congratulations to the committee for successfully delivering on their promise to make i-Spike 2023 a meaningful event for academics worldwide.

The theme for this event, 'Optimizing Innovation in Knowledge, Education, and Design,' is both timely and highly relevant in today's world, especially at the tertiary level. Innovation plays a central role in our daily lives, offering new solutions for products, processes, and services. By adopting a strategic approach to 'Optimizing Innovation in Knowledge, Education, and Design,' we have the potential to enhance support for learners and educators, while also expanding opportunities for learner engagement, interactivity, and access to education.

I am awed by the magnitude and multitude of participants in this competition. I am also confident that all the innovations presented have provided valuable insights into the significance of innovative and advanced teaching materials in promoting sustainable development for the betterment of teaching and learning. Hopefully, this will mark the beginning of a long series of i-Spike events in the future.

It is also my hope that you find i-Spike 2023 to be an excellent platform for learning, sharing, and collaboration. Once again, I want to thank all the committee members of i-Spike 2023 for their hard work in making this event a reality. I would also like to extend my congratulations to all the winners, and I hope that each of you will successfully achieve your intended goals through your participation in this competition.

Professor Dr. Roshima Haji Said
RECTOR
UiTM KEDAH BRANCH



WELCOME MESSAGE (i-SPIKE 2023 CHAIR)



We are looking forward to welcoming you to the 3rd International Exhibition & Symposium on Productivity, Innovation, Knowledge, and Education 2023 (i-SPIKE 2023). Your presence here is a clear, crystal-clear testimony to the importance you place on the research and innovation arena. The theme of this year's Innovation is "*Optimizing Innovation in Knowledge, Education, & Design*". We believe that the presentations by the distinguished innovators will contribute immensely to a deeper understanding of the current issues in relation to the theme.

i-SPIKE 2023 offers a platform for nurturing the next generation of innovators and fostering cutting-edge innovations at the crossroads of collaboration, creativity, and enthusiasm. We enthusiastically welcome junior and young inventors from schools and universities, as well as local and foreign academicians and industry professionals, to showcase their innovative products and engage in knowledge sharing. All submissions have been rigorously evaluated by expert juries comprising professionals from both industry and academia.

On behalf of the conference organisers, I would like to extend our sincere thanks for your participation, and we hope you enjoy the event. A special note of appreciation goes out to all the committee members of i-SPIKE 2023; your dedication and hard work are greatly appreciated.

Dr. Junaida Ismail

Chair

3rd International Exhibition & Symposium Productivity, Innovation, Knowledge, and Education 2023 (i-SPIKE 2023)

FLUX 2.0: SUSTAINABLE FURNITURE PRODUCTION WITH REVOLUTIONARY MODULAR 3D PRINTED JOINERY SYSTEM

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ABSTRACT

FLUX 2.0 offers versatile modular shelving options, enabling furniture makers to create innovative and customized pieces that cater to different spaces and purposes. With the use of 3D printing technology and the Ergo-aesthetic framework as the design philosophy, FLUX 2.0 simplifies the complex wood joinery fabrication process, reducing the cost of production and transportation. The customizable and modular system allows for easy assembly and disassembly for storage and transportation, providing a sustainable and environmentally friendly production method. With the flexibility of FLUX 2.0, furniture makers can create unique and functional pieces that meet the demands of today's consumers, offering an innovative solution for the furniture industry.

Keywords: Sustainable Furniture, Furniture Joinery System, 3D Printing, Furniture Design.

INTRODUCTION

The furniture industry in Malaysia faces several challenges related to traditional wood joinery fabrication methods, including high material waste, high labor intensity for organic shapes design, and difficulties in handling and storage for transportation. These challenges lead to significant costs in the production and transportation of furniture items, contributing to the estimated 130,000 tons of furniture waste generated annually in Malaysia. In addition, with the current demand for online platforms due to the pandemic, there is a need for furniture manufacturers to offer cost-effective and sustainable solutions that can be easily shipped and assembled.

To address these challenges, there is a need for innovative approaches that simplify complex wood joinery and offer customizable, easy-to-assemble, and eco-friendly furniture solutions. The proposed research aims to develop FLUX 2.0, a modular 3D printed furniture joinery system that satisfies the demands of the post-pandemic online platform and reduces the cost of furniture fabrication and handling in Malaysia. By utilizing 3D printing technology and the Ergo-aesthetic framework as the design philosophy, FLUX 2.0 offers versatile modular shelving options that cater to different spaces and purposes, simplifying the complex wood joinery fabrication process, reducing the cost of production and transportation, and reducing material usage by 60-90% compared to traditional methods. The research will investigate the potential of FLUX 2.0 in reducing material waste, enhancing profitability, and meeting the growing demand for eco-friendly furniture in Malaysia.

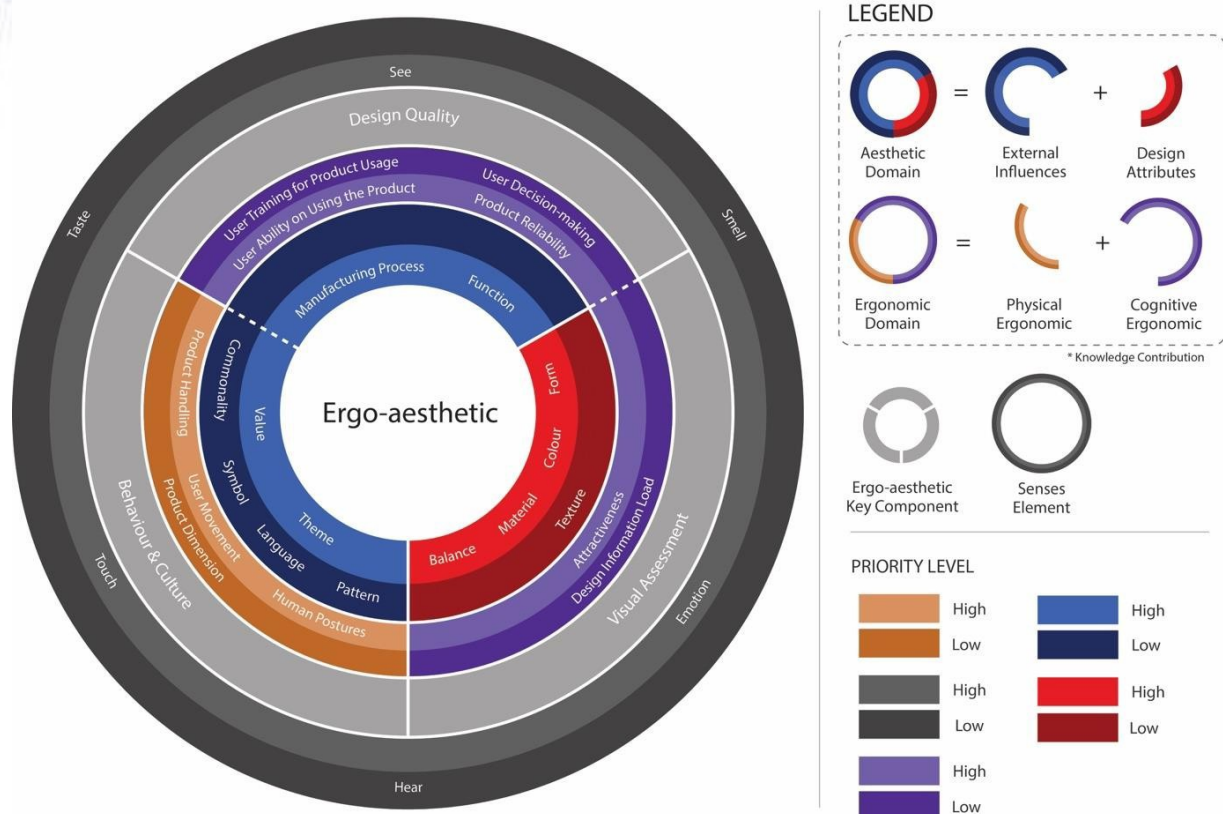


Figure 1. Ergo-aesthetic framework.

FLUX INVENTIVENESS

To make FLUX 2.0 a competitive product in the market, several strategies will be used. First, the product's unique features and benefits will be highlighted through targeted marketing and advertising campaigns. This will help create awareness and generate interest among furniture makers and enthusiasts who are looking for efficient and innovative solutions in furniture fabrication and assembly. Secondly, partnerships and collaborations with furniture manufacturers and retailers will be pursued to showcase FLUX 2.0 in action and demonstrate its potential. This will help build credibility and establish the product as a reliable and effective solution for furniture fabrication and assembly. FLUX 2.0 aims to participate in major international trade exhibitions, including the Malaysian International Furniture Fair, with the

support and sponsorship of key industry players such as the Malaysian Timber Industry Board (MTIB). These collaborations will enable FLUX 2.0 to showcase its innovative design and unique features to a global audience, establish new partnerships, and solidify its position as a leading player in the furniture joinery market. Finally, ongoing research and development will be conducted to improve and enhance the product's design, functionality, and performance. This will help ensure that FLUX 2.0 remains relevant, competitive, and innovative in the rapidly evolving furniture industry.

There are several similar products in the market that offer modular and customizable furniture solutions. One such product is the IKEA KALLAX shelving unit, which allows users to create their own configurations using different shelf inserts and sizes. Another example is the USM Haller modular furniture system, which offers a range of customizable shelving and storage options. The market for modular furniture is growing, with a report by Allied Market Research estimating that the global modular furniture market was valued at \$22.8 billion in 2019 and is expected to reach \$50.6 billion by 2027, growing at a Compound Annual Growth Rate (CAGR) of 10.5% from 2020 to 2027 (Allied Market Research, 2020).

FLUX 2.0, as noted by Lim et al. (2021), offers an innovative solution for furniture makers, allowing them to create unique and customized pieces that cater to different spaces and purposes. By simplifying the complex wood joinery fabrication process and reducing the cost of production and transportation, FLUX 2.0 can contribute to wealth creation for furniture manufacturers. This, in turn, can benefit consumers by providing them with high-quality, functional, and affordable furniture pieces. The customizable and modular design of FLUX 2.0 can also enhance the quality of life for consumers by providing them with furniture that meets their specific needs and preferences. The Ergo-aesthetic framework, as mentioned in the statement, allows for the creation of functional and comfortable furniture pieces that are designed with the human body in mind. Additionally, the easy assembly and disassembly of FLUX 2.0 for storage and transportation provides a sustainable and environmentally friendly production method that can reduce waste and promote a circular economy. Furthermore, as discussed by Lobo and Dias (2021), the use of 3D printing technology in furniture production can create new industries and opportunities for innovation and sustainability. The adoption of FLUX 2.0 by furniture manufacturers can help to consolidate and further develop these new industries, which can potentially lead to economic growth and job creation. Overall, FLUX 2.0 offers a promising solution for furniture manufacturing that can contribute to wealth creation, enhance quality of life for consumers, and create new industries for innovation and sustainability.

CONCLUSION

In conclusion, the modular 3D printed joinery system for sustainable furniture production is an innovative solution that offers a unique and creative way to merge art, culture, and sustainable development. This solution is designed to reduce the environmental impact of furniture production while meeting the post-pandemic demand for online platforms. By utilizing 3D printing technology, this solution enables the production of customizable furniture pieces that reflect the local cultural and artistic traditions of Malaysia. The modular design also allows for easy assembly and disassembly, making it more efficient to store and transport the furniture.

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