



ERGO-AESTHETIC CONCEPT DESIGN APPROACH AMONG BAMBOO FURNITURE MANUFACTURERS IN MALAYSIA

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ABSTRACT

In general, the concept of ergo-aesthetic discloses the equilibrium of human behavioural character with form, shape, and symbolism incorporated into furniture design. This harmony synthesis is achieved throughout responses of behaviour and senses inside the design process. Many new developments have been made in the industry, especially on understanding the advantages and potentials of bamboo characters; however, these developments are not specific to designing with an aesthetic value in bamboo furniture design. Thus, this study focuses on the ergo-aesthetic principles incorporated in the design process to achieve a better output of bamboo furniture design among bamboo manufacturers in Malaysia. As such, ergonomic and aesthetic are the fundamental components that need to be considered throughout the design process as the implementation of ergo-aesthetic principles into a bamboo furniture design process through behaviour and cultural perspectives may lead to the enhancement of the quality of bamboo furniture output.

Key words: Ergo-aesthetic, Bamboo, Bamboo Furniture Design

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1. INTRODUCTION

Bamboo Production Scenario

In major bamboo producing countries such as China, Japan and Taiwan, designers work with craftsmen not only in producing various products that change lifestyles, but also in promoting the use of new technologies that would help create sustainable products that are ecologically supported as a social design. Many companies have begun to increase the use of natural fibres in furniture manufacturing in order to become 'greener', in line with the global sustainability and ecological awareness trend [1]. However, the bamboo furniture industry in Malaysia which focuses on small-scale production (SMEs), is still using traditional methods to design furniture due to limited knowledge and use of modern technology, in addition to being dependent and does not fulfil the requirements set by importers based on the Original Equipment Manufacturer (OEM) [2].

Furniture Industry in Malaysia

Malaysia is ranked amongst the top 10 largest furniture exporters in the world. It exports around 80% of its production. In 2019, the total revenue of Malaysian furniture export contributed to nearly RM10 billion [3]. Under the National Timber Industry Policy, the furniture industry is targeted to generate RM12 billion in export revenue by 2020 [4].

Data from previous research showed that the development of SME furniture companies are influenced by several factors such as the lack of design talent, inadequate mastery of design role, lack of manpower and human skill development, low market stigma, usage of stagnant technology, and the lack of marketing skills. The studies have also established that design incapability affects business performance of furniture manufacturing companies or such SMEs. To remain competitive in the industry, there is a need for SME manufacturers to take drastic actions by enhancing the organisations' design capabilities [5].

Design

Design is defined as a course of action to develop an artefact or an artefact system. This is a method in which the concept of shaping a product is realised with the inclusion of aesthetic value, work and power solving user problems and the application of technology in the production process. It encompasses both the aesthetic and scientific aspects of artefact creation as well as creativity. These three elements are interconnected in the development of a product; therefore, design is a crucial area that bridges creativity and innovation [6].

Ergo-aesthetic

The term 'ergonomic' can specifically be defined as 'the theoretical and fundamental understanding of human behaviour and performance in purposeful interacting socio-technical systems, and the application of that understanding in order to design of interactions in the context of real settings' [7].

'Aesthetic', on the other hand, is 'exclusively related to form, entirely preoccupied with emotional empathy and completely committed to symbols and icons' [8]. In this research, the researcher studied the function of ergo-aesthetic design approach among bamboo furniture manufacturer.

In summary, this study emphasises the importance of discovering exceptional properties in human behaviour and senses to further enhance the adaptation of ergo-aesthetic principles in bamboo furniture design processes. Therefore, senses and behaviour can be acknowledged as the essential elements to establish an effective linkage in synthesising ergonomic and

aesthetic into the design process to help bamboo furniture manufacturers produce a variety of bamboo furniture designs.



Figure 1 Bamboo furniture design using the traditional method in Malaysia

2. METHODOLOGY

This study focuses on how ergo-aesthetic principles are integrated into a design process to achieve a better output of bamboo furniture designs among bamboo manufacturers in Malaysia. Ergonomics and aesthetics are fundamental components that need to be addressed throughout the design procedures, thus they became the focus in the extensive exploration of literature studies on bamboo industry in Malaysia. Several articles have been reviewed, and the researchers have also explored substantial previous studies on the management of bamboo industry and design in Malaysia.

Data collection included reviewing the design management practices of bamboo furniture manufacturers which were extracted from journals and books related to past studies conducted by various researchers as well as reports on issues related to bamboo. In addition, data were also collected through interview sessions conducted with the Malaysian Timber Industry Board (MTIB), the anchor and a major player in the bamboo industry in Malaysia.

The researchers then linked the data on bamboo management practices in Malaysia with the ergo-aesthetic theory to build a design concept model approach for bamboo manufacturers so that they are able to produce notable designs for bamboo furniture.

3. PROBLEMS RELATED TO BAMBOO FURNITURE

Malaysia has an abundance of bamboo species that predominantly grow in logged land and riverbanks. Nevertheless, despite the surplus of these raw materials, the bamboo industry in Malaysia still functions at a small industrial scale. This is one of the main problems faced by bamboo manufacturers.

The bamboo furniture industry design activities in Malaysia are still experiencing slow growth. Although there are 74 bamboo-based industries in Malaysia, most of them are considered as a modest small-scale industry. More than 85% of the bamboo industry in Peninsular Malaysia fall under the micro-industry category where basic machinery is used [9]. This micro-industry is heavily dependent on tools such as saws, knives, machetes, chisels, sanders and hammers. However, SMEs that have received funding from various government agencies could afford to have machines such as cross-section cutting machine, planning machine and hand drills.

Another problem that affects the development of the bamboo furniture industry is bamboo supply which depends on existing forests. According to National Forest Inventory 4 (NFI4), most bamboo supplies in Peninsular Malaysia depend on forest bamboos which are recorded to be about 329,000 hectares [10]. At present, there is no known bamboo plantation in Malaysia.

In addition to these problems, the design of bamboo-based products is rather limited, and the usage of commercially produced bamboo-based products in Malaysia is less varied. The designs of bamboo products are customarily provided by handicraft departments, and no changes are seen in future market [11].

In addition, the industry lacks practitioners or experts in bamboo-based products. The new generation, especially, lacks expertise in choosing bamboo species according to their quality and suitability.[12]. Figure 2 illustrates the problems faced by Malaysia Bamboo Furniture industry in the ecosystem that involves different agencies.

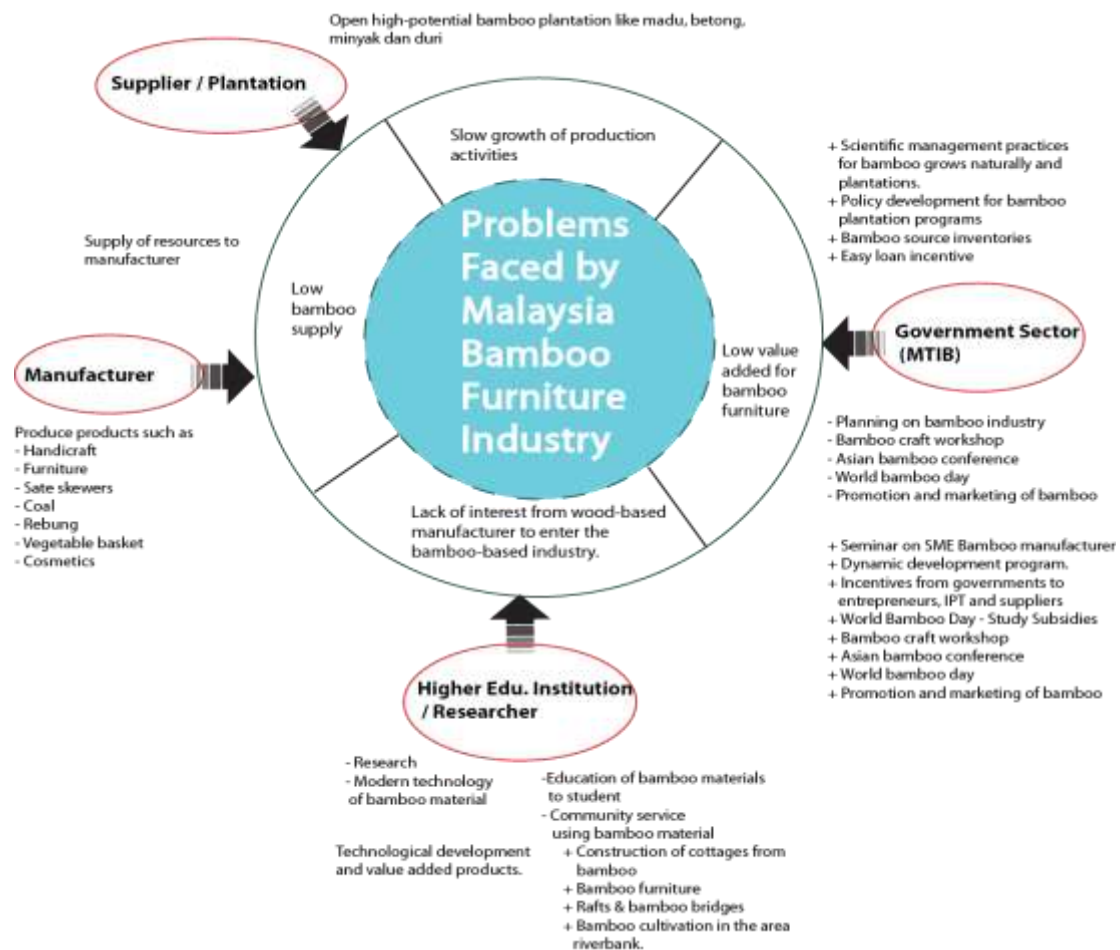


Figure 2 Problems Faced by Malaysia Bamboo Furniture Industry

4. ORGANISATIONAL ERGONOMICS

Subdivisions of ergonomics and human factors (organisational, physical and cognitive) are more recent in comparison to the overarching ergonomic system that normally focuses on the background. Organisational ergonomics takes the opportunity to fully improve work environment directly from quality administration to cooperation. This includes supervising all associations to create a better workstation [13].

The environment and machinery in a physical workplace play a major role as these variables lead to organisational ergonomics, resilience, subjective well-being and objective well-being. Workplace environment also plays a vital role in motivating employees to perform their assigned work well [14].

Modernisation has created various tools and techniques in a workplace to expand profitability and productivity [15]. This includes good conditions, regular maintenance, appropriate tools, proper workspace, protective equipment, appropriate specifications, user-friendly machine and safety measures to create greater comfort and safety which eventually lead to the wellbeing of the employees.

Therefore, organisational ergonomics is a discipline that allows a bamboo manufacturer to study the physical, cognitive and organisational characteristics of human interactions and bamboo product designs (Figure 3). In view of this, ergonomics is a primary factor that leads to an increase in productivity and quality of products [16].

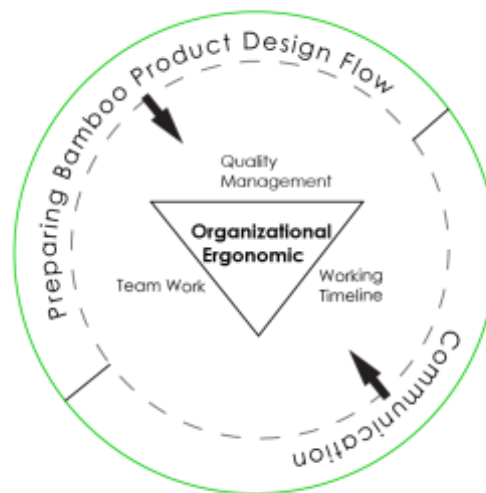


Figure 3 Conceptual Organizational Ergonomics for Bamboo Manufacturers in Malaysia

Figure 3 illustrates the conceptual organisation of bamboo manufacturers in Malaysia to improve design management. First and foremost, to obtain a good application of this organisation ergonomics, a bamboo manufacturer must ensure communication trickles down from the top management to the production lines using a three-element step: quality management of the company, teamwork between every department and a working timeline for every bamboo project. This will allow a bamboo manufacturer to properly determine and evaluate problems with a bamboo product faced by the company as well as other bamboo-related issues in Malaysia.

5. ERGO-AESTHETIC BEHAVIOUR

In the context of ergonomics and aesthetics of product development, senses play a significant role to ensure these properties are properly determined. As reiterated by many, [17-20] culture is an influential component which affects visual communication of a person towards an aesthetic characteristic. Specifically, the various forms, emotional symbols and icons constitute a significant linkage between aesthetics and emotion. Senses may be interpreted as the attributes of sight, taste, touch, smell, hearing and feeling. Aesthetics has been discovered to be essentially connected to emotion, one of the attributes of senses. In this study, emotion

is visualised through the input of senses i.e. see, taste, touch, smell and hear (see the relationship inside Figure 4). Therefore, it can be deduced that a market-worthy product is a product that incorporates all these distinct senses with an assumption that by satisfying these senses, the bias between ergonomics and aesthetics will be rectified.

Next, behaviour refers to the way we react towards the sensory receptors. A few scholars have highlighted the association between ergonomics and aesthetics and behaviour [17-19]. In this study, it should be noted that deviations in ergonomics and aesthetics are inevitable as human behaviour and culture experience constant changes. Nevertheless, the application of ergonomics and aesthetics through behavioural evaluation inside a design process can significantly improve visual appearance and comfort level of the created item.

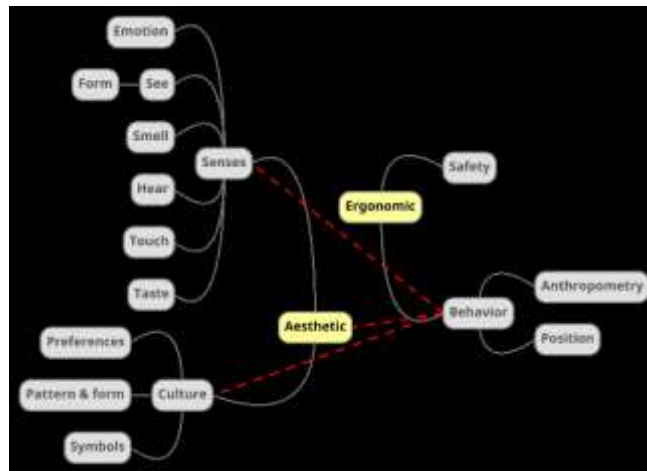


Figure 4 Conceptual Linkages Involving Aesthetics, Ergonomics, Behaviour and Senses [17-20]

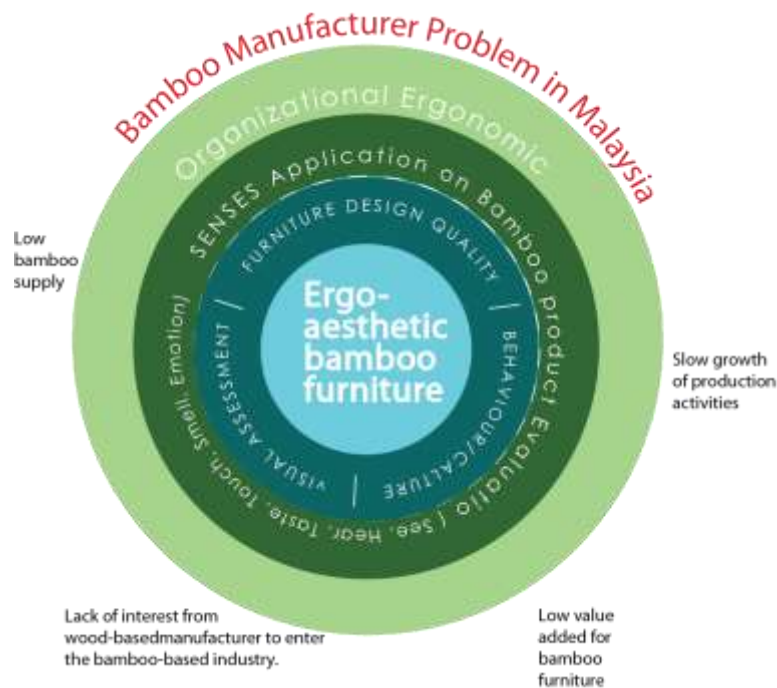


Figure 5 Conceptual Linkages Among Bamboo Environment in Malaysia, Organisational Ergonomics and Aesthetics, Ergonomics, Behaviour and Senses [17-20]

Figure 5 illustrates the essence of ergo-aesthetics of senses and behaviour where bamboo furniture design quality and visual assessment function as the core of the design approach for bamboo furniture manufacturers. First and foremost, to obtain a good application of the ergo-

aesthetic approach, bamboo furniture manufacturers should be well-versed with the knowledge of how senses contribute to their design. For example, in the bamboo industry environment in Malaysia, bamboo manufacturers must be aware of the main problem in their environment to help them design quality items. Sensory evaluation will eventually help manufacturers select a suitable shape for their product and the best material to ensure product strength and enhance visual appeal or apply a correct anthropometric measurement for the product. On top of this, behaviour and culture are equally important in identifying proper sensory attribute level to be applied to the product. For instance, behaviour and culture can determine the kind of sitting position that should be used for a chair design. This choice will affect the anthropometric data, colour usage, product shape and type of material to be used.

The ergo-aesthetic framework minimises the design and production of unwanted products caused by disparities between behaviour and culture and the interaction towards an item. Therefore, manufacturers must take into consideration the elements of senses, behaviour and culture in furniture design. They must consider the quality criteria and visual assessment criteria to ensure the stages in product development follow the highest standard which would eliminate undesirable bamboo furniture quality and features.

6. DISCUSSION AND RECOMMENDATIONS

To ensure that the ergo-aesthetic approach can be applied effectively by bamboo furniture manufacturers in Malaysia, bamboo manufacturers should thoroughly consider these important suggestions in order to improve furniture design, manufacturing and business structures:

- Socio-demographic factors are influential as they will affect the purchasing behaviour of users [21]. For instance, the older generation is more price-sensitive and less interested in bamboo furniture while customers with a higher mean income show a preference towards bamboo furniture. Likewise, customers with a higher education level and awareness have higher preference for bamboo furniture while at the same time demand for a shorter delivery period. Therefore, it is essential to have a solid grasp on the marketability of a certain product before designing it.
- Eco-briefing concept that emphasises on material processing, electrical and power usage should be adopted to enhance the efficiency and ecological awareness among bamboo furniture manufacturers [22]. When bamboo furniture manufacturers are aware of their environment i.e. regarding the demand, challenges, retailers and consumers, they can turn these problems into challenges and thus, create better designs for bamboo furniture.
- Knowledge Management Structure (KMS) is the key model to stimulate product innovation rate [23]. The three main components are knowledge management on bamboo culture, human resource and alliance within KMS.
- It is important to place sole focus on one type of furniture design as the main design and provide stimulations and supports in its evaluation since it helps to indicate the performance of the company [24]. By focusing on a single bamboo furniture type design and ensuring on-going encouragements, supports in each design stage, furniture design manufacturers are assured of growth for their business.
- The design and work environment should be upgraded and maintained to boost worker satisfaction [25]. It is of utmost importance to have an appropriate storage facility, fitting appearance of furniture, a feasible office layout as well as personalised authority and individual privacy.

- Create a centre for bamboo furniture or bamboo product manufacturers with a Shared Service Facility (SSF) concept [26]. The centre will ensure that the industry will continue to flourish and attract many players in the industry, especially those in wood furniture to join this industry thus, further stimulating the industry to produce furniture with high commercial value.
- Immediate business environment plays a vital role in ensuring the success of the bamboo furniture industry [27]. Bamboo manufacturers must plan their supply chain. The suppliers, procurement, retailers and distributors should be acknowledged as significant contributors to the desired business eco-system, and there should not be any barriers between material suppliers and bamboo manufacturers.

7. CONCLUSION

In conclusion, ergo-aesthetic is a New Product Development Process (NPD) concept where bamboo furniture manufacturer can equalise and emphasise from one sense to another, taking into consideration the behavioural and cultural boundaries present. When senses experience towards bamboo furniture is optimised, it will be followed by an increase in user willingness to accept the bamboo furniture. In this study, ergo-aesthetic is closely related to the understanding of human behaviour and cultural differences to stimulate and satisfy the human senses which are sight, hearing, taste, smell, touch and emotions. Essentially, this study highlights the significance of ergo-aesthetic as an NPD to obtain the perfect balance between bamboo furniture appearance and comfort level for a bamboo manufacturer. In the process of achieving the desired bamboo furniture in Malaysia, a thorough understanding of the local culture and behaviours may assist in the adaptation of ergo-aesthetic principles into the design process. The ergo-aesthetic theory will restore the balance between system and visual appeal of the bamboo furniture through behavioural linkages. In connection with this study, this approach will also help the bamboo industrial player in Malaysia to reduce unwanted products in the market by identifying and comprehending cultural and behavioural demands.

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