

Multilayer Product Value Model as Design Intervention Approach Strategy: Innovation Concept Development Analysis of Bamboo Soundproof Cubicle

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ABSTRACT

Today's society lives with limited space. Generally, people have houses with a small building area (limited space), high productivity, and multifunctional space. Through this limited space, the development of a product requires innovations for saving space that can be accepted by people from various circles and function properly. That can be produced at the small-industry level. Products that are needed by the community, especially new products that will continue to be needed due to the COVID-19 pandemic. This study analyzes the design concept of a portable soundproofing panel product produced with the Society 5.0 industrial concept approach that is sustainable for small industries (SDGs). Essential aspects of the design need to be adapted to market need in the online era and affordable for the general public, like portable soundproofing panel products for people working on online activities that save space. They have adapted to the production skills of the artisans, including the availability of tools and talent from selected materials. The research method uses descriptive analytics by examining design strategies that small industries in the furniture sector can apply. The implementation of collaboration must pay attention to the best potential of the collaborators. The results of this research are in the form of design strategies through design principles that can be applied to small industries with a layered design (MPV Model) as a design intervention approach. This MPV model relives the crafter skills in line with the design principles to develop a product diffusion concept.

Keywords: Society 5.0, Soundproof Portable Panel, Small Industry, Design Intervention, Innovation.

INTRODUCTION

Society 5.0 is referred to as the Super Smart Society (Ferreira & Serpa, 2018; Harayama, 2017); this community has diverse needs that must be met and has high quality due to technological innovation at every level of society (Harayama, 2017). Modern society in recent years has many product needs, but on the other hand, they have limitations. These limitations include limited physical space, high productivity, and varied and fast-paced activities. In the last two years, the Covid-19 pandemic, which did all work online at home, increased technological innovations, especially those related to online needs. However, on the other hand, the problem of these limitations is increasingly visible in the scope of residences and offices. The Education, Industry and Business sectors working online using online platforms can present voice problems in a limited space. In this case, portable soundproofing panel products are essential for people working online, so productivity does not decrease through concentration on online activities. At this time, a product design does not only pursue the provision of design needs but also needs to consider the impacts arising from the process of realizing the product design. Generally, small industries do not have many machines and do not use advanced technologies (Bharadwaj et al., 2018).

However, small industries have a higher level of sustainability than large industries. "Building global innovation ecosystems by connecting industries, academic institutions and other related stakeholders" (Zengin, Yunus et al., 2021, p.4). The MPV model built the connection between small industries and academic institutions/designers as a design intervention approach. This strategy is for developing a sustainable product diffusion concept from the preliminary design. Therefore, this study chose to collaborate with small bamboo handicraft industries (Sendari, Yogyakarta) in testing design strategies to realize collaboration between academics/designers and the industry in developing the product diffusion concept that supports SDGs in Society 5.0 (SDG 12-Responsible Consumption and Production).

LITERATURE REVIEW

Product Innovation in Small Industries

A small industry is an industry that has the entire production process on a small scale. The production process includes manufacturing to servicing (Small Scale Industries: Definition, Characteristics, Objectives, Examples, n.d.). Small industries have an essential role in this modern economy regarding flexibility and innovation ability, even though they have limited resources (Venugopal, 2015). Flexibility here can be seen in the products that are easy to adapt to the specific needs of consumers (Ellitan, 2018). Problems and limitations in small industries related to product design (Bharadwaj et al., 2018; Ellitan, 2018) include: (1.) Limited ability of workers, (2.) The resulting products have characters and crafts that do not last long, (3.) Does not have a fixed production price due to rising material prices and availability, (4.) Lack of Quality Control, and (5.) Machine malfunction. Although there are limitations, small industries have the opportunity to advance their business. Small industries are considered capable of innovating related to the modern lifestyle needed by buyers for the convenience of their lives.

Product Design for Industrial Sector

In creating a product that can be produced in the industrial sector, the designer requires several stages of activities to be carried out. The stages of the product development process include the recognition stage, product mock-ups, product prototypes, promising product prototypes, optimum product prototypes, final product prototypes, product specifications, marketing strategy, and financial analysis (Product Design and Process Development, n.d.). Design Methods used in product design can be seen in the following diagram.

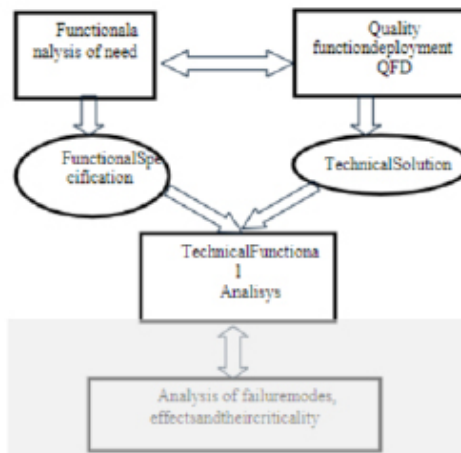


Image 1. Design Methods (Source: Ghimisi)

Bamboo as a Natural Material

Bamboo is a natural, recyclable, and renewable resource. Not only in India, but *bamboo* is also widely used in Nigeria because of its abundant availability, affordability, strength, flexibility, and environmental friendliness (Muizz O. Sanni-Anibire et al., 2022). “Bamboo seems to be a good solution, because it can grow in areas which are non-productive at this moment (e.g. eroded slopes), it is a fast growing material (it has a high yield), and its root structure stays intact after harvesting, generating new shoots” (Vogtländer et al., 2010, p.1263). However, the design with bamboo needs to be designed properly so that the distribution system for long distances does not eliminate its sustainability in supporting the SDGs system (SDG 12).

MPV Model as Design Intervention Approach

The intended use of the Design Intervention is “to generate innovative products in a structured way with a team of designers, focussing on maximum customer perceived value. The method has four levels: project strategic level, concept development level, design implementation level and product diffusion level.” (Ana Mestre & Joost Vogtlander, 2013, p.101). The MPV Model are used to develop product diffusion concept analysis. Image 2 describes the plot of the design intervention approach.

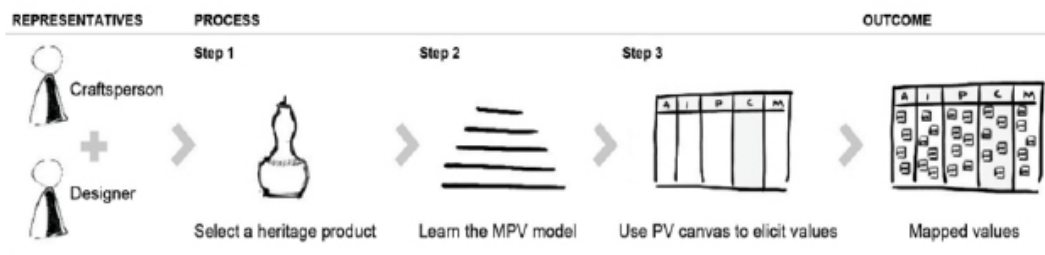


Image 2. Operationalization of Design Intervention (Source: Suib, Engelen, & Crul, 2020)

The design intervention approach was chosen because it is appropriate for collaborating craftspeople with designers (academics). The process begins with selecting a heritage product, namely *bamboo*, which is then developed with an MPV model to obtain an outcome map.

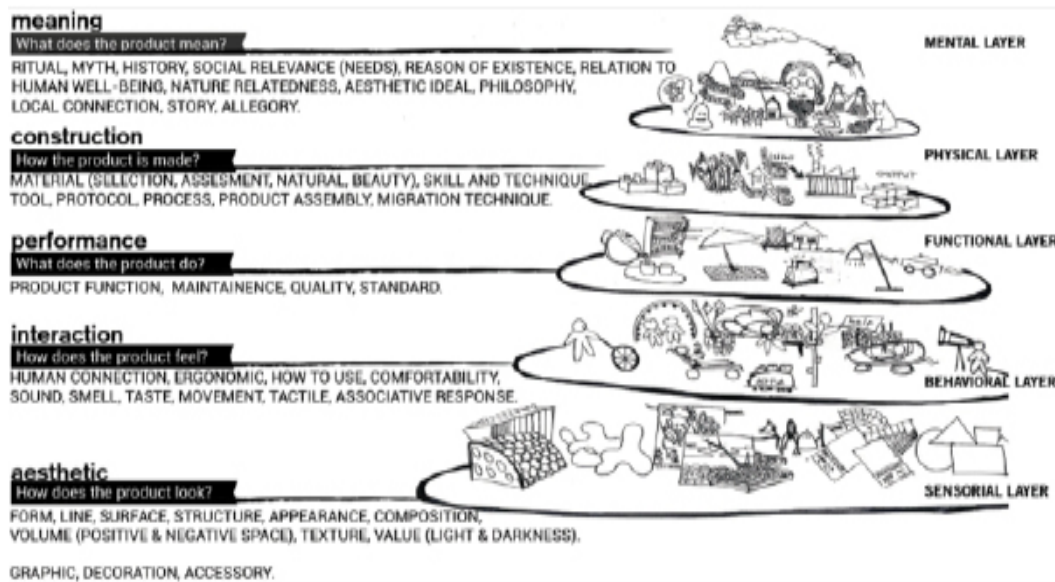


Image 3. The Multilayer Product Value Model (Source: Suib, Engelen, & Crul, 2020)

This MPV model considers five elements divided into two-focus: small industries and academics/designers. These elements help the designers/academics get the product diffusion concept based on the design needs and the *bamboo* small industries' production skills. The soundproof portable concept comes from a physical layer that is supported by several elements, not only derived from academics/designers: including aesthetics, interaction, and performance, but also from small industries: construction and meaning.

METHODOLOGY

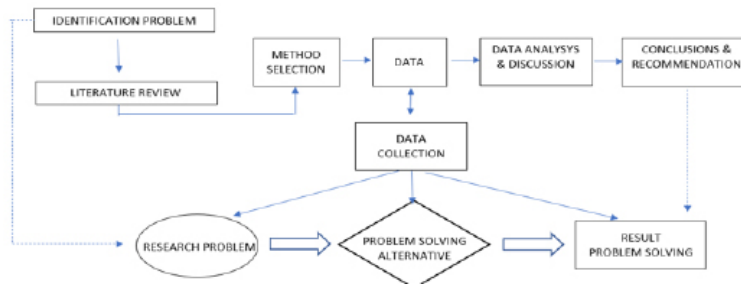


Image 4. Research Flow Chart (Source: Author, 2022)

The research was carried out using a descriptive analysis method oriented to problem-solving, focusing on developing a sustainable product diffusion concept from the preliminary design so that small industries can produce it. It begins with identifying problems related to the needs during the pandemic that is found in society and then proceeds with a literature study to gather theoretical foundations, after which the method in data processing is selected. The data is collected based on the research problem guarantee from problem identification, and then several alternative problem-solving are formulated to produce problem-solving. The data is processed and analyzed with an intervention design approach and MPV model to obtain conclusions for the final design.

RESULT & DISCUSSION

The findings in this study are the challenges in realizing Bamboo Soundproof Construction. Technical Functional Analysis in Bamboo Soundproof Construction Space Saving includes local crafts from bamboo artisans in Sendari, Yogyakarta. They are usually making bamboo furniture and construction in big sizes. A soundproof Bamboo cubicle is a kind of furniture that they can make. The preliminary design is figured in image 5.



Image 5. Design Concept of Soundproof Portable (Author, 2021)

The curved shape will be realized even though there is almost no bamboo material that bamboo furniture artisans in Sendari usually process. The challenge for crafters (small-scale industries) is the limited tools to process Materials and a mindset that is already fixed on the skills that are usually done. In the process of the MPV model done by Suib, Engelen, and Crul (2020) collaborated with artisans on the live session, but in this research, there is no live session. This study uses the MPV Layer (product value canvas) by including the consideration of the small industries' potential skills in the design process (outcome).

Table 1. Product Values based on MPV Layers (Author, 2022)

Aesthetic	Interaction	Performance	Construction	Meaning
Academics/Designers			Small Industries	
<i>style-composition & physical aspect</i>	<i>user interaction</i>	<i>product features</i>	<i>design aspect, material, & production process</i>	<i>local practice</i>
Natural Curved Shape	Folded Portable	Space Saving Soundproof	Bamboo <i>bilah</i> Bamboo <i>iratan</i> Knockdown	Craft Technique Hands Tools

MPV model as a design intervention approach contributes to decision-making for the final design (image 6).



Image 6. Final Design Concept of Bamboo Soundproof Construction (Author, 2022)

The final design was decided to use a laminate of bamboo *iratan* and bamboo *bilah*. The material is connected to sound-absorbing material, and the construction is knockdown and can be folded to obtain space savings when not in use. It is hoped that the design can support Society 5.0 (SDGs) and solve the small space problem.

CONCLUSION

The design intervention is used to bring new design ideas to small industries. Then the design need is assimilated (product diffusion concept) to be produced by following the artisan’s skill. The need that has arisen as a result of online activities during the COVID-19 pandemic and will continue to be is online meetings. This activity is a potential factor for developing portable soundproofing products for artisans in small-scale industries. The small industries selected in the collaboration are bamboo furniture artisans, where bamboo and craftsman skills are the primary considerations in developing the product. The challenge for small industries in realizing the design concept is getting out of the routine they usually do. Design concepts that are different from the products they usually work with are often an obstacle for the small industry to develop. Therefore, this design intervention approach is needed, especially the designer’s role in intervening in the design concept so that it is adjusted to the craftsman’s ability. The findings when implementing MPV Layer as a design intervention model are that designers need to continue to have the ability to translate the potential skills of the crafter into product values to obtain outcomes. Further research should practice the embodiment.

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