

# Plywood Furniture Designs ( A Study on Shapes, Functions, Materials, Construction Techniques, and Production Processes)

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**Abstract** Furniture is a facility or means for various human activities in certain spaces. Furniture design was born because of the need of function. Furniture designs are made according to its use, its users, and the time when as well as the space where it is used. The designer will also consider the materials to be used, and how to assemble and produce furniture. This study examines the designs of plywood furniture in terms of functions, materials, construction techniques and production processes. In order to achieve the objectives of the research, the qualitative descriptive approach is applied. The steps taken are; 1) identifying various furniture products, 2) classifying and giving descriptions on each furniture product based on the analysis of shape, function, material, construction technique, aesthetics and production process. The findings of the field study show that the furniture designs used are designs that have been made before. The existing design is repeated, modified, developed, and tailored to fit the needs of consumers or buyers, and there are some designs that are made in particular because of its relation to the design of the interior.

**Keywords** designs, furniture, production process

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## 1. Introduction

Nowadays, the creation of works in the field of furniture continues to grow quite rapidly, in line with the progress in the architecture, interiors, and technology fields. Innovation is always developed continuously. New design, new process, new material, new method and new technique of production process have been developed to simplify and speed up the production process. Market orientation is also getting broader, not only the local markets but also the opportunities for export. But along with such developments, competition is also getting tighter.

Considering such situation, along with the urgency to face the free market policy of *Masyarakat Ekonomi Asean* (South East Asian Economic Community / MEA) which will be applied by the end of this year, efforts to anticipate the policy are necessary. One of the efforts which can be pursued is by improving the quality of our products in terms of design aspects through the approaches of shape, function, material, construction technique, and production process.

In the efforts to improve the quality of furniture products, it is expected that the created designs have value. The value meant in this case is not only the visual value as the ultimate goal, but also the values related to the product's shape, function, materials, construction techniques, aesthetics and production processes, and other factors such

as economic and social factors. Thus, the created furniture design can be accepted by the user community with their respective demands which is; in addition to having the value for use, the products must also have attractiveness and selling power that can be justified.

## 2. Research Objectives

This research aims to improve the quality of plywood furniture products through several approaches namely the shape, function, material, construction techniques, aesthetics, and production process, so that the created designs have eminent value. The eminence meant in this research is the various design innovations in term of new product creations, innovations in term of material, and innovation in term of production process technology.

## 3. Research Methodology

The method used in this research is a combined method of qualitative and quantitative methods. The quantitative method is used to obtain data related to various furniture products in terms of shape, function, materials, construction technique, aesthetics and production process. While qualitative method is used to obtain data related to product quality seen from the aesthetic aspect. The research stages

are linear or parallel processes with the combined methods in accordance with the need of the research. Data analysis was conducted in stages according to the process, starting from preparation, data collection, up to the analysis of the findings in the field study.

## 4. Theoretical Review

Essentially, the field of design covers very broad areas such as architecture, interior, urban design, engineering design, product design, textile, and furniture. Furniture as a product, as mentioned in the Encyclopaedia Americana XII, is divided into two groups. The first is the item that can be moved freely, which means that they are not attached to the elements of space. The second is item that is tied to the space (built-in), such as shelves, cabinets that are attached to the wall, seats that are built on the floor. (Thomas H. Ormslle, 1976:186).

In line with its development, especially in the field of architecture, interior, and technology, furniture has been through quite rapid development. Its development is much faster compared to the previous developments, in terms of design, material use, and production process. The concept of "form follows function," which was introduced by American architect Lois Sullivan (1856-1924), at the end of the 19th century, connects the aspects of function with the material, and economic aspects. (Lucie-Smith, 1994: 86).

This concept is a binding ideological milestone in the visualization of modern furniture design, characterized by various forms of simple, practical, and diverse functions. In addition, the use of modern technology and economic demands become decisive benchmarks, because a design is made with the purpose of adding maximum value. Basically, there are three terms for the identification for production process offurniture products, namely traditional, provincial, and contemporary / modern. (Y Tulie Sulahria and Ruby Diamond, 1977:74).

**Traditional**, the traditional style includes the design styles with typical characteristics of the artisan masters in the early generation up to the Neo Classic period. Traditional furniture is done by hand and it has smooth, meticulous and artistic characteristics with relatively long production process.

**Provincial**, the provincial-style furniture limits the excessive things, such as excessive application of ornaments, simplifying them by only presenting the outlines.

**Contemporary**, the contemporary or modern style is a form or design that is modified and adapted for the current needs. The production method uses machinery, so it can be mass produced. The two elements are typical features of modern furniture, while highlighting details on the construction which is functional, practical, and ergonomic.

## 5. Results and Discussion

In the area of Bekonang Sukoharjo, there are several small businesses engaged in furniture crafts. To run the

production process, many workers are employed from the surrounding areas which have quite the number of carpenters. The furniture business in Cangkol village was originally a family business, which then over time, it experienced management problems, so it split into several small businesses managed by each family members. One of them is the furniture company "Maharani" which became the object of study in this research.

The furniture is produced using plywood material as the main material. The production process is done either manually or semi-machine and other tools. The furniture products produced among others are beds, wardrobes, makeup tables, working desks, kitchen sets, chairs, and so on. Over time, the development of furniture products is increasing. Many orders come from individuals, government and private agencies, and special orders from hotels and agents in Central Java and East Java.

Considering the good prospect of furniture products, both for domestic market and export, The "Maharani" furniture company keeps trying to develop and improve its quality, in terms of design, material, and production and finishing system. The labour force of approximately twenty people is divided into specific areas of works such as material preparation, carpenters, assembly, finishing, supervision, administration and marketing.

In the production process, several stages of work are done as follows:

### 5.1. Design Process

The design process is the initial work before production activities begin. The designs made are designs taken from books, furniture and interior magazines, and design magazine which are then developed and modified according to consumers' preference. Indeed, the main objectives of the created designs refer to the tastes and needs of the market. But there are also some designs that are determined by consumers and custom designs tailored to their needs. There are also designs which are related to the design of the interior, i.e. furniture for houses, bedroom completed with wardrobe and dressing table, kitchen set, dining table and so forth or for hotel interiors, offices, and so forth.

### 5.2. Material

The materials used as the base material is teak wood shaped into small pieces of 4-5 cm thick and approximately 160 cm long. These small pieces serve as a framework for the board manufacture that will be coated with plywood or teakwood of 3mm in size. Then after becoming a panel (plywood) with a thickness of 4cm with a standard size (244 cm-length and 122cmwide), the plywood is used as the main material for furniture manufacture. In addition, other materials are used as outer coating such as veneer, *tacon* sheet, teak wood profile and other complementary materials like furniture hardware such as handles, hinges, keys, castors (wheels) and other ornaments made of brass, wood carvings and so forth.

### 5.3. Construction Technique

What is meant by construction technique is the adjustment of forms between two or several parts or components of furniture. The adjustment is to unite the various components into a well fitted structure. Construction is part of the design process that is done after the materials are selected and manufactured by using joints. There are several construction techniques applied by "Maharani" Furniture Company. The joints are often made from two or more construction forms. The choice of construction techniques is based on the consideration regarding the type of material used and most importantly the function of the furniture.

The preferred construction technique is a joint system with dowels (pegs) and screws, bolts, and screw nails. Another technique to support the strength of the connection is by using the adhesive material (glue). The glue also serves as binding agent especially on coating materials such as teakwood coatings, *tacon* sheets and veneers as well as for certain parts, including the installation of carved ornaments and cast profiles which are reinforced with nails.

The implementation of the selected construction technique is based on the consideration regarding the nature of the material and the aim to ease the production process and to facilitate the installation of components so that the construction process can be done simultaneously in large quantities.

#### 5.4. Aesthetics

Aesthetics, in the sense of beauty, is basically a number of certain basic qualities in particular items, namely unity, harmony, symmetry, balance and contrast. (The Liang Gei, 1983: 35). Further, it is stated that the beauty in the narrower sense only concerns on the beauty of objects that are perceived visually, namely the beauty of shapes and colours.

Added by Agus Sachari, a product designer will involve aesthetics in making decisions on the type of figures as well as other visual elements. For that, a detailed understanding on the purpose and the planning concept is necessary. It is also supported by IDF (Japan Design Foundation) which describes that the study of aesthetic approach on certain product's designs includes shape, colours, details, size and allure.

The aesthetics discussed this study refers to the IDF (Japan Design Foundation) as mentioned above, including the shape, colour, detail and size, as follows:

**Shape**, as a whole, is the totality of the product's figures. It must be able to express the product's role of function, as well as the unity of the parts in it. In terms of shape, the shape of the created product should be in accordance with its function, such as in decorative cupboard (multi-function cupboard). In addition to its function as a place for decorative objects display, it also serves as a partition that is integrated with the interior function. The same also applies in wardrobes that also serve as a dressing mirror, other types of buffet, kitchen set, and so forth. In general, the shapes of the created furniture products are in accordance with the principles of design, both in function and shape.

**Colour**, the colours should be able present the harmonious impression between the parts and the product's

characteristics. Colour can also help emphasize particular impressions. The created furniture products mostly use natural colours, which display the original colour of the material, particularly wood material. Natural colours protruding the wood pattern and texture bring distinctive beauty with either doff (opaque) or gloss (shiny) finishing. The uniqueness of the natural fibre pattern then becomes a part of the aesthetic value as a whole and also a distinctive feature of "Maharani" furniture products.

**Detail**, the details of the produced furniture products reflect the accuracy, neatness, and precision in the completion process. The neat overall look presents a beautiful impression which is also supported with the harmonious colour of natural fibre pattern and wood texture. This impression is apparent on the overall appearance.

**Size**, size is related to the sense of comfort and security in the product's use. In this case, proportion can play a role in delivering values that can help achieve the goal. The determination of the size applied on the furniture products is based on two interests. First, the size related to the need to ease activities. It means that the size of various furniture products is adapted to the benchmark size of human body motion and this size is used as the standard size applied. Second, the size is based on special consideration, for example the size of the furniture which is adapted to the interior planning such as decorative wardrobe in the living room that also serves as a partition, and also built-in furniture that is attached to the wall. Thus, the size of furniture produced is based on the consideration of comfort and safety needs, with the basic benchmarks of the human body and its motion range, as well as the space requirements related to interior planning.

**Production process**, the production process is the work activities in the furniture manufacture, ranging from work drawings, material preparation, component manufacture, assembly and finishing, as follows:

The first, the consumers order in forms of regular orders or special orders related to interior designs and some stocks for distributors or agents who have become regular business partners. The next step of the work is making a drawing sketch design which is then developed into a design drawing in form of perspective pictures of the furniture, accompanied with the size description, material, type of construction and ornaments, and other complementary parts such as handles, hinges and so on.

The second, after the initial works such as design drawing with perspective picture and description as well as its explanation have been done; the designs are then submitted to the production section. The production section then prepares the materials to be used, either basic materials, main materials, or supporting materials. Then the next steps are preparing the required equipments such as the production machinery, organizing, coordinating and planning the next production steps. In addition to those responsibilities, the production section's duty also includes supervision and quality control.

The third, the assembly is the installation of various elements or components and their supporting elements, such as handles, keys and decorative elements such as wood

carvings, profile trims and accessories made of brass and so forth. This process is done repeatedly, in order to check for deficiencies or errors in terms of structure, shape and construction, so that the final product is in accordance with the demands of quality.

The next process is finishing. The finishing process is done through several stages which are separate field of works that are specifically done by a skilled craftsman or experts in each field of finishing.

Then, after the production process is completed, the various types of furniture products are ready to be distributed either to the customers or to agents who have become regular business partners. In certain conditions, furniture with special designs is delivered in parts according to particular interior works. This is usually done on special orders for home interiors, offices, hotels and so forth.

## 6. Conclusions

From the above discussion, several important points of conclusions can be derived from the findings of the field study as follows:

1. The produced furniture designs are designs which have been made before. The previous designs are then repeated, modified, and developed in accordance with the consumers' and market's needs. In general, the furniture designs of various types, models, and styles have a sense of similarity. It means that there is not much innovation in the furniture design variation.
2. The design implementation related to the use of materials, construction techniques, and aesthetics has met the requirement of planning and application process in general.
3. The production processes, from sketching, drawing design, work picture, material preparation, to component assembly and installation, as well as finishing, have been conducted in accordance with the work stages of production process and the production management procedure.

Thus, the furniture products produced by "Maharani" Furniture Company have met the production standard in terms of shape, functions, material, construction techniques, and aesthetics. The requirements in designs planning and the principles of designs have been well implemented. However, innovations in terms of designs, material, finishing, and production technology need to be developed for the sake of market expansion, especially for the export opportunity.

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