

Palm Shell Waste as an Accentuation of Candle Holder Handicraft Product

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Abstract—Utilization of production waste into materials for the manufacture of handicraft products has become an important issue at this time. This is done to reduce the amount of production waste so that it can be reused and not pollute the earth. These materials will have added value in terms of function and economy if managed properly to become new products. One of the production wastes is palm shell waste which is the residue from palm oil production. This study aims to utilize palm shell waste as an accent on handicraft products in the form of candle holders. The product design for candle holders in this study uses the design product development method from Vinod Goel. The result of this design is a candle holder by utilizing palm shell waste which is used as a candle holder and as an interior decoration.

Keywords— Palm shell, handicraft, candle holder.

I. INTRODUCTION

Handicraft products are a type of product made by artisans using manual manufacturing techniques for a long time [1]. Handicraft products can be used to meet functional human needs in daily activities. Handicraft products can attract buyers because they have uniqueness through aesthetic elements that are highlighted from other products. This product also has high cultural and artistic value because it displays the regional characteristics of the craftsman which can be seen from the color, motif, shape or material of the product. [2,3]. Handicraft products can be sold through sales outlets in tourist areas, exhibitions or online sales. The proceeds from the sale of handicraft products can improve the economy and welfare of the people who produce and sell these handicraft products [4,5].

One of the handicraft products that has been made for a long time is a candle holder. Candle holders are made from material that are around the craftsman's environment. The design of the current candle holder has evolved to keep up with the current times. Changes in the design of the current candle holder are forms, materials and functions that are tailored to user needs.

Candles are a source of light consisting of a wick covered with fuel in solid form [6]. In the past, candles were used as the main lighting in every human activity that required lighting. With advances in technology and since the discovery of lighting through lamps, candles are currently more widely used for other functions, for example for birthday celebrations, for worship, and as room fragrances.

Nowadays, candles have candle holders of various shapes and designs. These various forms add aesthetic value to the candle. This aesthetic value will be seen when the candle is

used which gives it a unique shape, and if the candle is not used then the candle holder and the candle can be displayed on the table or the area where the candle is placed in the room as a home decoration. Candles and their holders are needed when the lights suddenly go out. When the lights go out suddenly, the location of the candle and the candle holder will be difficult to find in the dark. One idea to solve this problem is to add phosphorus to the candle holder. Phosphorus is a substance that can emit light after being given light energy such as sunlight or light from a lamp [7, 8].

The phosphor substance will emit light shortly after the light goes out, so the candle holder will be easier to find in dark conditions. Phosphorus or phosphorescence is the ability of a substance to store energy and release that energy back in the form of light. Phosphorus is usually found in toys, watches, wall clocks or wallpapers on the walls. Phosphorus can be mixed with other materials such as resins to make a product.

Resin is a chemical substance that is rather viscous, tends to be transparent, does not dissolve in water, and will harden quickly and some are slow. Resin has been used since ancient times mostly as a varnish or adhesive coating, as a raw material for handicrafts [9].

Utilization of waste from unused materials or unused production waste materials to become materials for making new handicraft products has begun to be carried out at this time. These materials will have added value in terms of function and economy.

Currently, the utilization of waste or unused production residue has become an important issue. The community realizes the importance of protecting the environment by utilizing waste materials to reduce unused waste and prevent increasing global warming. One of the remaining materials from the production of palm oil in Indonesia is palm shell waste.

Indonesia has approximately 14.663,60 (Thousand Hectares) of oil palm plantations in 2021[10]. With a large number of oil palm plantations it also produces large palm oil production. The increase in palm oil production also contributes to the remaining palm oil waste, one of which is palm shell waste.

Until now, this palm shell waste has not been utilized optimally and its economic value is very low. Palm shells are waste generated from industrial processing of palm oil, which has not been utilized optimally in new product [11]. Oil palm shell waste is gray-black in color, irregular in shape, and has a

fairly high hardness. Palm shell waste has been widely studied for its utilization, such as for activated charcoal. As a material that is commonly found from the processing of palm oil, palm shells can also be used as handicrafts as accessories [12].

To reduce palm shell waste, this research aims to make handicraft products in the form of candle holders by utilizing palm shell waste as an accent in this product. Candle holders are also made using other raw materials such as resin and phosphorus. The combination of these materials will make the candle holder an aesthetic interior product.

II. METHOD

Candle holder product design in this study uses the design methodology developed by Vinod Goel [13]. In general, this method consists of several steps, namely:

- Preliminary Design
This initial stage is the process of collecting information and data, analyzing data based on the initial design concept which includes analysis of function, usage, market and product concepts in general, and ends with the preparation of a design program and initial sketches of candle holder products.
- Design Development
This stage alternative component and design drawings are made in sketches and 3D (three dimensions) of the candle holder product.
- Final Design and Prototype
This final step is carried out through making drawings, namely with a complete 3D presentation and technical drawings, then proceed with the prototype stage.

III. RESULT AND DISCUSSION

To design candle holder products using palm shell waste, it is necessary to carry out an analysis according to the steps in the method in this study. The results obtained from the analysis and discussion using the Goel method are as follows:

- Determine the target market
Analysis for determining the target market aims to adjust the product made with consideration of consumer needs and desires, priority scale, customer behavior and price. By determining where this product will be marketed, the facilities for candle holder products can be more focused on reaching the target market. The results of the market analysis, this candle holder product is made for unisex gender, adult age, and is aimed at buyers who have an interest in collecting unique interior products.
- Determine the need for the product
In this activity, what needs exist in candle holder products will later be analyzed through human activities as users who are adapted to the equipment or needs provided for candle holder products. The need in designing this candle holder product are:

1. The candle area

The requirements needed for this activity are an area for placing candles that match the size of the candles used, so that when installing candles it will be easier for the user and the candles will not fall after being installed.

2. Area to store spare candles and matches

The product attribute requirement of this activity is an area for a drawer used to store matches and candles. This drawer is needed to make it easier for users to find candles if they want to replace a new candle. This drawer can also function to store matches if you want to light a candle using a match.

3. A handle for opening and closing the drawer

The need for this attribute is a drawer handle that is easy to hold with a finger to make it easier for the user to open and close the drawer when storing and retrieving candles or matches.

- Ergonomics
Ergonomic analysis will discuss user comfort and safety when using candle holder products. The place where the candle area is installed must match the size of a human finger to make it easier to put on and remove the candle. The material used in designing this product is a material that is not harmful to the user. The design of the candle holder is also made by avoiding sharp corners so that users are safer when using it.
- Anthropometry
Anthropometric analysis is used to determine the size of the product that fits the user's body based on the user's anthropometric data table. This is important to do so that users will safe and comfortable when using a product that suits their needs and a comfortable size when using this product.
This product uses anthropometric data of Asian ethnic groups, with female gender having a size of 50 percentile. The length and width of the products used in candle holder products are adjusted to the width of the palms of the hands to make it easier for the user to move the candle holder.

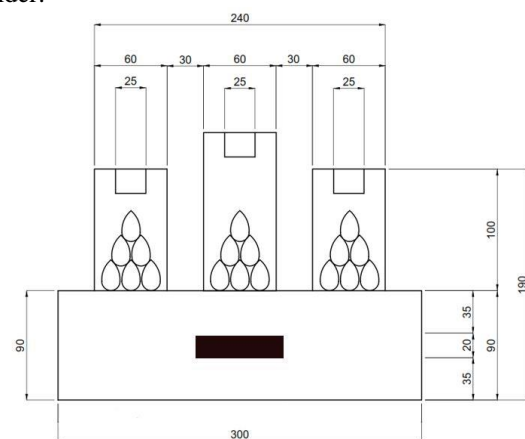


Fig. 1. Product size based on anthropometric data (mm)

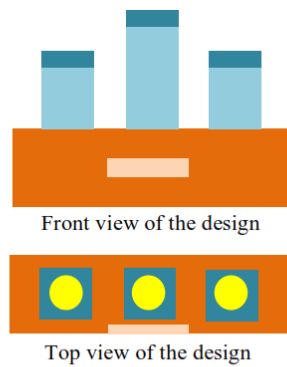
The length used in this product is 30 cm. The hole for placing the candle is made according to the diameter of the candle which is 2.5 cm in diameter. So that the candle does not fall easily when placed, the candle placement has a depth of 2.5 cm. Figure 1 is product size based on anthropometric data used in this study.

- Product Configuration

Configuration analysis is an analysis performed to organize the existing attribute configurations on the product. This configuration is designed through several alternative designs.

From several alternative design of candle holder that were made, one design was chosen which would be the basis for making the candle holder prototype as shown in figure 2.

Figure 2 is a candle holder design with the required attribute configurations. This designed candle holder only provides for three candles that are round in shape, which is a type of candle that has a circular holder adjusted to the size of the product.



Color Description:

- Pine wood
- Drawer handles
- Mixture of Resin and Phosphorus
- Resins
- Palm shells
- Candle area (heat resistant material)

Fig. 2. Front and top view of the design

The top layer on the candle holder is a combination of phosphorus and resin materials. This top layer is the area for placing the candles. The purpose of mixing this phosphorus and resin is when the light goes out suddenly a light will appear from the phosphorus to indicate the location of the candle when the electricity and lights went out suddenly. The layer below is a mixture of resin material and palm shell waste arranged in a row to form a triangle which is inserted into the resin.

Resin, phosphorus and palm shell waste stand on a box made of pine wood material. This pine wood is made to form a box as a holder for the candle holder and a place for the drawer area.

- Color product
Color product analysis is needed to get colors that match the concept chosen for the candle holder design, while neutral colors and bright colors are possible. The color chosen for this product is natural color.
- Results of Design and Prototype

This designed product allows candle holders to be easily found when the lights are out when the product is needed because it has a phosphorus substance in the product that will display light for a few moments.

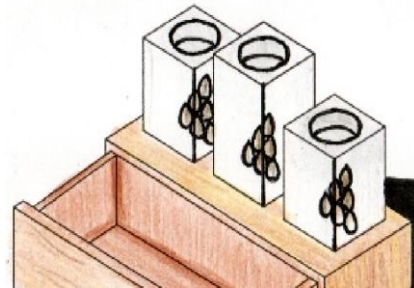


Fig. 3. Selected sketch for candle holder design

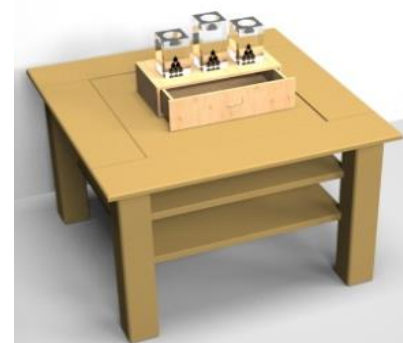


Fig. 4. Candle holder design results using 3D Software



Fig. 5. Prototype perspective view product candle holder

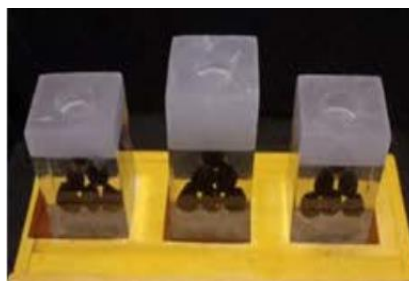


Fig. 6. Prototype top view product candle holder

The use of palm shell waste in the product as an accentuation will add aesthetic value to the candle holder product so that the product can also be used as a room decoration product. Figures 3, 4, 5 and 6 are the results of candle holder product designs from the start in the form of

sketches, candle holder designs using 3D software to the results of product prototypes made.

IV. CONCLUSION

Products designed using palm shell waste make it possible for candle holder products to be easily found when the lights are out when the lights are out because it has a phosphorous substance in the product which will display light for a few moments. Utilizing palm shell waste in the product as an accentuation will add aesthetic value to the candle holder product so that this product can also be used as a room decoration product.

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REFERENCES

- [1] Anh Thu, L., Fang, S., & Kessani, S. S. "Factors influencing Vietnam's handicraft export with the gravity model," *Journal of Economics and Development*, 21(2), 156-171. doi:10.1108/jed-08-2019-0021, 2019.
- [2] Chen, Z., Ren, X., & Zhang, Z. "Cultural heritage as rural economic development: Batik production amongst China's Miao population," *Journal of Rural Studies*, 81, 182-193. doi:10.1016/j.jrurstud.2020.10.024, 2021.
- [3] Cuaton, G. P. "A post-disaster study of a women-led handicraft industry in rural Philippines," *Journal of Enterprising Communities: People and Places in the Global Economy*, 13(4), 489-507. doi:10.1108/jec-10-2018-0074, 2019.
- [4] Hu, T., Xie, Q., Yuan, Q., Lv, J., & Xiong, Q. "Design of ethnic patterns based on shape grammar and artificial neural network," *Alexandria Engineering Journal*, 60(1), 1601-1625. doi:10.1016/j.aej.2020.11.013, 2021.
- [5] Thommandru, A., Espinoza-Maguiña, M., Ramirez-Asis, E., Ray, S., Naved, M., & Guzman-Avalos, M. "Role of tourism and hospitality business in economic development," *Materials Today: Proceedings*. doi:10.1016/j.matpr.2021.07.059, 2021.
- [6] Wisniak Jaime, "Candle: A Light Into The Past," *Indian Journal of Chemical Technology*, Vol. 7, July 2001
- [7] Bahar Moch Fachruddin, "Finishing Kayu Bercahaya Dalam Gelap Sebagai Media Edukasi Pelestarian Karang," *CORAK Jurnal Seni Kriya*, Vol. 10, No.1, Mei-Oktober 2021
- [8] Wira Bhaskoro and Kahdar Kahfiati, "Pengaplikasian Eksplorasi Pewarna Glow In The Dark Untuk Busana Pria," *Jurnal Tingkat Sarjana bidang Senirupa dan Desain*, 2013.
- [9] Puspaputra Paryana, "A Study of Resin as Master Jewellery Material, Surface Quality and Machining Time Improvement by Implementing Appropriate Cutting Strategy," in MATEC Web of Conferences, 2017.
- [10] <https://www.bps.go.id/indicator/54/131/1/plantation-area-by-province.html>
- [11] Kurniati Elly, "Pemanfaatan Cangkang Kelapa Sawit Sebagai Arang Aktif," *Jurnal Penelitian Ilmu Teknik*, Vol.8, No.2 Desember 2008 : 96-103
- [12] Quaye Harold Awuley, Agyeman Kafui Kwesi, Tachie-Mensah Joyce, "Application of Palm Kernel Shells in Costume Jewellery," *International Journal of Innovative Research & Development*, Vol 5, Issue 1, 2016.
- [13] Goel.Vinod. "Sketches Of Thought." *USA: Massachusetts Institute of Technology*.1995.