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THE DESIGN OF WATCHES FROM MERANTI WOOD WASTE AND DOYO WEAVING

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ABSTRACT
Meranti wood (Shorea spp.) waste from the furniture production process in East Kalimantan Province, Indonesia can be managed into more valuable and marketable products, such as recycling into accessory products such as watches. The watches that are designed as fashion accessories can use a combination of other materials from natural fibers in the form of doyo weaving, which is hand-woven from the Dayak tribe in this area to add aesthetic value and the selling value of watch products. The problem of this research is how to design a watch product by utilizing meranti waste from furniture production and combining it with the use of doyo woven material on watches to add aesthetic value and product selling value. The purpose of this research is to design an aesthetic and unique watch by using a combination of meranti wood waste and doyo weaving to increase the selling value of watch products. In the process of designing this watch product using the Vinod Ghoel model method which includes problem formulation, literature review, data analysis, design analysis, development of design alternatives and the final design which includes technical drawings, 3D modeling, and prototypes. This design produces a watch product that contributes in the form of a product that utilizes meranti wood waste and displays local cultural characteristics in the use of doyo weaving materials so that this product has an aesthetic, unique and high selling value.

Keywords:
Watches, Meranti, Doyo Weaving.

INTRODUCTION

Watches made of wood have been very popular with consumers for a long time, but currently, wooden watches are made from only certain woods, such as maple wood. Watches made of wood that are offered by manufacturers today, have a design tendency to use wood as a whole. Where in all parts of the watch, such as the strap which is usually made of metal, has now been replaced with solid wood [1].The province of East Kalimantan in Indonesia has a large forest area with a permanent production forest of around 3.027.099 Ha in 2022 producing various types of wood raw materials [2].The local government regulation in the province of East Kalimantan states that it is necessary to manage raw materials in the form of forest products, namely wood so that they become finished products such as high-value furniture for sale outside the island of Kalimantan [3]. Meranti wood (Shorea spp.) processing, especially furniture waste, can be used as a watches product as an environmentally friendly fashion product is considered effective, besides because the meranti wood is considered strong and durable and supports the government regulation. The use of natural materials to make accessories and fashion products that do not damage the environment apart from meranti wood waste material is woven fabric. Woven cloth from the province of East Kalimantan, the handicraft product of the Dayak tribe in this province, is doyo weaving [4]. Doyo weaving is one of the crafts of the Dayak tribe which originates from the fiber of the leaves of the doyo plant in the province of East Kalimantan, Indonesia [5,6]. The doyo plant (Curliglia Latifolia) is a type of pandanus with strong fiber and grows wild in the interior of Kalimantan as the main ingredient for doyo weaving [7,8,9]. The use of doyo weaving for accessories on watch products is still not widely found. As a cultural heritage woven product, this woven product needs to be introduced not only for clothing but also for other products such as accessories such as watches. Good product development is a product that fits the ergonomics and comfort of the product adapted to the user [10]. By utilizing meranti wood waste from furniture production and using a combination of doyo weaving, the design of this watch product is very beneficial to introduce environmentally friendly natural resources in product development.

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OBJECTIVES

Global environmental problems are currently making consumers increasingly concerned about climate change and environmental issues, because some of the products that are produced and used by humans today are produced from materials and processes that can contribute to environmental damage. The problem in this research is how to design a watches product made from eco-products from meranti wood waste produced by furniture production by combining woven materials which can also introduce East Kalimantan regional woven which has cultural value, and eco-friendly. Most of the meranti wood waste waste from the furniture industry is just wasted and can only be used as firewood in this area. This is what underlies how to use meranti wood waste so that it can be processed into products, namely watches that still feature cultural and traditional elements in these products. The purpose of this study was to design a watch product using a combination of materials from meranti wood waste from furniture production and doyo weaving as a means to preserve and introduce local handicrafts from East Kalimantan to consumers.

METHODOLOGY

The design methodology used in this research is the design methodology developed by Vinod Goel. This method includes:

a) Formulation of the problem
The design of watches from meranti wood from furniture production waste with the addition of doyo weaving on the strap so that it has the value of the ethnic identity of the Dayak tribe in East Kalimantan, the sales target is wider, easy and comfortable to use.

b) Literature review
Literature study related to the production design of watches.

c) Design Analysis
Design analysis consists of several analyzes such as market analysis, ergonomics and anthropometric analysis, material analysis, shape/form analysis, and color analysis.

d) Design Development
This process makes several initial designs that will be selected and then developed into several development designs. Furthermore, this development design will be made as the final design.

e) Final Design
The final design includes presentation drawings and product prototype watches.

RESULTS AND DISCUSSION

Analysis and discussion are needed in carrying out the this design product development. The analysis and discussion are:

1. Market Analysis
   Market analysis is carried out to find suitability between products made with consumer needs, product policies, priority scale, price, and product distribution. The product design for watches made of meranti wood and doyo weaving is determined for geographical segmentation in the province of East Kalimantan in particular and Indonesia in general. the target market is for teenagers with a unisex gender.
2. Ergonomics and Anthropometry Analysis
   Ergonomics and Anthropometric analysis is needed because each product needs to prioritize comfort in using the product. Ergonomics analysis is used to design watches that have the comfort and safety needed to carry out activities with watch products, namely by using non-hazardous materials to avoid sharp corners on each side that are in direct contact with humans. Anthropometric analysis is used to measure the dimensions according to the user in order to have the comfort of the watch user. With convenience in a product, the product can already be produced, if a product is not comfortable to use, then the product fails and cannot be produced. The anthropometry used is the body size of the Asian nation, using the hand size dimensions of the 50 percentile male gender.
3. System Analysis
   Analysis of the system used in these products includes the strap connection system with the watch body. The connection system that is applied to this watch product made of meranti wood and doyo weaving. The system analysis that has been carried out is an analysis of the system on the spring bar joint, the

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quick release pin spring bar and product clamps from watches.

4. Materials Analysis
   Material requirements for watches made of meranti wood waste from furnitue and doyo weaving must be able to withstand loads, withstand hot weather or be safe. Therefore, materials are needed that comply with the criteria that have been mentioned as the frame and body.
   a) Body Materials
      For construction materials for the watch case body, materials are needed that have more value in terms of strength, durability and weight. For this reason, meranti wood was chosen, because it has good resistance, strength and also has a lighter weight according to the needs of watch products.
   b) Upper Strap Material
      For the upper strap material, material is needed that has more value in terms of aesthetics and practicality. Doyo weaving is used because it has this thing that is adjusted to the needs.
   c) Bottom strap material
      For the bottom strap material, a material that has more value is needed in terms of strength, practicality, weight, and waterproof. The material used is sheepskin, because it has superior strength and durability qualities than synthetic materials.
   d) Watch Dial Material
      For watch dial materials, you need a material that has more value than a thinner shape and doesn't break easily.
   e) Wood Adhesive Material
      The selected wood adhesive material that will be applied to the watch product is resin. This was chosen because it has several good criteria including the strength of the resin which when hit by impact does not break easily, but only cracks. Then the price is quite economical.
   f) Finishing Materials
      The finishing material chosen for use in this wood waste watch product is lacquer paint. At the finishing stage using varnish paint by brushing. In addition to having many color choices, using this method is also more economical than spraying, the process can be done more thoroughly than spraying small parts of the color, it also has a very good level of resistance and durability.
5. Form/Shape Analysis
   The design style that is suitable to be applied to this watch product is the electric design style. The electic style was chosen because the style is personal and reflects the past. This style is unstructured, but in its application it still emphasizes the harmony of each interior element.
6. Color Analysis
   The color composition used in the design of this watch is a composition of light brown and dark brown. The composition of dark brown and light brown colors combines colors that have different chroma (intensity) and different values (dark light).
7. Alternative Design
   The design of this watch product is carried out by making several alternative designs resulting from the analysis. Figure 1 is an example of several design alternatives.

Fig. 1. Product design alternatives

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8. Design Specifications
From the results of the analysis, the final specifications are obtained from the basis for making watch products. The following are details of the design specifications that have been obtained:
   a) Users
   Users of these watches are men and women
   b) Dimensions
      - Diameter of the watch body: 42 mm
      - Watch glass diameter: 30 mm
      - Watch thickness: 12 mm
      - Watch strap length: 200 mm
   c) Components
      - The watch body is made from waste meranti wood.
      - The dial / clock time holder is made of HPL.
      - Watch bezel made of meranti wood.
      - Hour hand.
      - Crown / watch timer.
      - The back cover of the watch uses screws.
      - Watch movement.
      - Strap made of synthetic leather and doyo weaving.
      - Lock the strap using a pin buckle
   d) Configuration
   The configuration that will be applied to the product is in accordance with the analysis.
   e) System
      - The strap connection system with the watch body is using a spring bar.
      - The watch strap lock system uses a pin buckle.
      - The watch back cover system / back case uses a screw on back system.
      - The connection system for bonding the watch glass is using waterproof glue
      - The watch body printing system uses a CNC router machine.
      - Product finishing system using varnish
   f) Materials
      - Meranti wood as a watch case and dial material
      - Lycal resin as a wood adhesive material
      - Synthetic leather and doyo weaving as a watch strap material.
      - Finishing wood using varnish
   g) Shape
   The style applied is the eclectic style.
   h) Color
   The colors used in the waste wood watch products are on the body of the watch using light brown and dark brown colors.
9. Final Design
Final design is the final result of selecting design alternatives that are selected and then developed into the final design as shown in Figure 2.

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Fig. 2. Final design

10. 3D Modelling
    3D modeling is an application that uses 3D modeling software to show the final design results so that they look more detailed with better animations so you can see the details of the watch product as seen in one of the 3D modeling views in Figure 3.

Fig. 3. 3D Modeling

11. Prototype
    Figure 4 is the final result of designing a watch product using a combination of meranti wood waste and doyo weaving in the form of a prototype that can be used by consumers

Fig. 4. Prototype product

CONCLUSION

In the process of designing this watch product using the Vinod Ghoel model method which includes problem formulation, literature review, data analysis, design analysis, development of design alternatives and the final design which includes technical drawings, 3D modeling, and prototypes. This design produces a watch product that contributes in the form of a product that utilizes meranti wood waste and displays local cultural characteristics in the use of doyo weaving materials so that this product has an aesthetic, unique and high selling value.

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