Making of nusantara decorative motif creations necklace based on hdpe on type plastic waste

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Abstract. The problem of HDPE plastic waste from thick inorganic household waste that is difficult to destroy can damage the environment, the need for the utilization of HDPE plastic waste into products that are beneficial to humans. The purpose of this study was to determine the results of ornamental motif necklaces in the archipelago in accordance with the provisions of the aesthetic theory derived from HDPE plastic waste material that produces good quality so that it can attract consumers as users. The method used is a qualitative method based on the collection of literature data and information from the opinions of experts in their field of accessories to provide input or to the archipelago creation creations based on product theory and aesthetics. The results obtained are necklace products that have design elements derived from decorative motifs of the archipelago (Kawung and Tumpal) made from HDPE plastic waste that have benefits in fashion. The conclusion from the analysis based on theory and accessory expert opinion on the archipelago ornamental motif necklace especially kawung motif made from HDPE plastic waste can produce necklace creations that have good aesthetics and quality so that they can attract attention. consumers as users.

1. Introduction
Plastic waste has become a serious problem in the Jakarta area, but the amount of plastic waste continues to increase from used plastic at home, market activities, and other public facilities. Most plastic waste is produced from household and general waste generated from types of soap, fragrances, food, beverages such as mineral plastic bottles, shampoo, cooking oil, and others. Waste will continue to be produced and will never stop as long as humans remain. It can be imagined that the amount of waste generated by the inhabitants of this earth will increase. Waste itself is one of the consequences of human activity and the volume is directly proportional to the population. If not handled effectively and efficiently, the existence of waste in nature will certainly turn around destroying the surrounding life. Nature does have a big hand in automatic waste processing, especially in organic waste. However, nature's hard work in breaking down waste naturally is very unbalanced compared to the millions of tons of volume of waste produced each day [1].

The problem of waste is crucial. In fact, waste can be said to be a cultural problem because its impact is affected on various sides of life, especially such as big cities like Jakarta, Semarang, Surabaya, Bandung, Palembang, and Medan. The biggest source of waste is derived from settlements, the composition in the form of 75% consists of organic waste and the rest is inorganic waste. Organic waste has been widely used as material for composting, briquettes and biogas, but inorganic waste is still very minimal in its management. Inorganic waste is very difficult to be degraded or even
completely degraded by nature, therefore a very large landfill is needed to balance this type of waste production. Inorganic waste that is most often found in the community is plastic waste. In 2008 the production of plastic waste for packaging reached 925,000 tons and around 80% of it has the potential to become hazardous waste for the environment (Kompas, 2009) [2].

Illegal recycling of plastic bottle packaging is so widespread that people destroy it first and then discard it so that it is not illegally recycled. Types of plastic bottles based on their use vary, if registered from the code contained in a plastic bottle. Likewise, when viewed from its shape, such as used plastic bottles, shampoo, deodorant clothing, liquid soap, and others. With a thick texture, glossiness, beautiful curves and colors are usually only reused for other things, for example, for detergent containers used for oil or used for detergent again. If properly processed, a plastic bottle with a thick texture or type of waste. HDPE plastic bottles can be used as attractive craft products. Much research has been produced from mineral plastic bottle waste, one of Indonesia's designers, Lenny Agustin, also processes mineral plastic bottle waste into necklace accessories made from pieces of mineral mineral waste bottles, then assembled, and then painted plastic bottles with permanent colors [3]. Based on recycled plastic bottle waste products made by several recycled craftsmen, craftsmen only process mineral plastic bottle waste. The craftsmen have not made a new breakthrough treating waste from plastic bottles, instead of mineral plastic bottles. Therefore, we researchers want to make a new breakthrough in processing plastic waste bottles with thick, sparkling and thick plastic bottles into necklace products for show or fashion where the necklace accessory is a visual supporter of costume in a performance or fashion art, and when viewed from In terms of research time, making necklace accessories is more efficient than making costumes, but its function as aesthetics in the performing arts or fashion is no less important than costumes and can arouse the interest of consumers or the public by wanting to use it and find out how to treat waste by recycling. So by recycling waste can run 4 principles, namely independent (managed by the community itself), productive (producing something of value), comprehensive (all waste can be overcome), and environmentally friendly (waste management does not pollute the environment) [4].

The design of accessories product design requires creativity and concept accuracy in designing necklace accessories for the performing arts or fashion, so it requires creativity that can arouse the desire of consumers or the public to use necklace products and find out waste treatment by recycling about how to make necklaces using the material of plastic bottle waste materials hard textured / HDPE, and the use of processing processes with simple techniques. Necklace accessories are based on inspiration, product theory, and esthetic. Based on the source of inspiration of the researchers in creative design in the manufacture of necklace accessories products made from hard textured plastic waste using traditional Nusantara motif design concepts in the form of Kawung and Tumpal motifs so that the necklace accessories have more appeal because it has special ethnic characteristics of the archipelago, then to Product theory is based on product quality, comfort, product durability, and based on aesthetic theory including design elements and design principles. The design elements used are based on shape, size, and color. Then with the principle of design based on proportion, balance, harmony, rhythm, transition, the center of attention.

The purpose of this study is intended for the community as consumers to find out the design process, the processing and the results of research objects in the creation of archipelago ornamental motifs that can be used as fashion with inorganic household HDPE waste material, then attract consumers as users.

1.1. Identification of problems.
How do you process hard plastic / HDPE bottles in making necklace accessories created by traditional Nusantara motifs as a support in performing arts and fashion so that they are attractive?

1.2. Restricting the problem.
1. How can the hard-pressed plastic bottle waste material be designed into an archipelago-patterned creative necklace accessory for performance and fashion art?
2. How to process the waste of hard-textured plastic bottles to be used as accessories for the creation of an interesting Nusantara motif based on product and aesthetic theories?

1.3. Research purposes
1. Explain that the waste of hard-textured plastic bottles can be reused as an accessory product in the archipelago's traditional patterned creations for performance art and fashion.
2. To find out how to process hard-textured plastic waste bottles to form a necklace product that matches the product and aesthetic requirements then can be used as an accessory for the performing arts and fashion.

2. Plastic waste and theory
2.1. The following types of plastic (plastic bottles) based on the code:
   a. PET (polyethylene terephtalate) is a polyester resin that is durable, strong, lightweight and easy to type when hot.
   b. HDPE (High Density Polyethylene) is a tough, strong and stiff resin. Derived from petroleum.
   c. PVC (Polyvinyl Chloride) is a tough and hard resin that is not affected by other chemicals.
   d. LDPE (Low Density Polyethylene) is a plastic that is easily formed when hot, which is made from petroleum.
   e. PP (Polypropylene) is a polymer plastic that is easily formed when it's hot.
   f. Polystyrene is a polymer plastic that is easily formed when heated.
   g. Others, most often products with code 7 are made from a mixture of 2 or more types of plastic (code 1 to code 6).

2.2. Product Theory and Product Aesthetics
2.2.1. Product Theory
According Pulat (1992) offers a product design concept to support efficiency and safety in the use of product design. The concept is design for reliability, comfort, length of time of use, ease of use, and efficiency in use [5].

According to Henry Dreyfuss important goals in the development of new products are: Use of products that must be safe, pleasing product appearance, facilitate maintenance and repair. Product Durability, low costs in maintenance and production, research relationships in accordance with the philosophical through product quality.

2.2.2. Product Aesthetics
Aesthetic forms, consisting of intricate shape qualities, such as size, proportion, texture, color. The overall aesthetic quality or complete harmony (completeness) is called Unity. Unity has the following characteristics: Balance, contrast, harmony, accent, emphasis, proportion, simplicity, repetition, domination, rhythm, motion [6].

According to Katsoff, aesthetics is a branch of philosophy that deals with structural constraints and feelings of beauty, especially in art.

According to Hartoko in Kartika's work, aesthetics are the ability to see through sensing, perception, feeling, observation and scenery [7].

Figure 1. Kawung decorative motifs
Kawung in Sundanese means anen or fro. Because of that the kawung ornamental variety has a shape resembling a palm fruit that is cut transversely so that it looks four palm seeds. This ornamental variety has existed since the days of our ancestors, with evidence of this decoration used on Javanese Hindu temple statues. Decorative Variety kawung has the meaning of harmony in life in the world and the hereafter.

Figure 2. Tumpal decorative motif

Tumpal is an archipelago traditional ornamental variety which has the basic form of isosceles triangle. In further developments, this decorative variety has a variety of variations. Tumpal has been found in the decoration of temples in Indonesia. In addition to the temple decoration is also used to make wood carvings, and so on. The type of ornamental tumpal is also called untu walang which symbolizes fertility [8].

3. Research Methodology
3.1 Operational Objectives
Based on operational objectives, this study aims to obtain a general description of the design and manufacture of accessories for creative necklaces with decorative motifs of the archipelago using material from thick-textured plastic waste bottles.

3.2 Research Place and Time
3.2.1. Research location
This research was conducted in Jakarta.

3.2.2. Research Time
Study time is estimated to be 8 months.

3.3 Description of Research Settings
1. The initial step in the process of making an archipelago motif necklace from HDPE plastic bottle material taken by researchers is collected and chooses a plastic bottle that can be used as a supply of necklaces stacked with household waste. Furthermore, the used plastic bottles are cleaned after being cleaned in scissors and separated from the plastic bottle caps and then taken in accordance with the source of inspiration, namely the archipelago decorative motifs of the Tumpal motif and the Kawung motif in combination into 3 types of models.
2. The next step is to conduct interviews with several experts in their fields then through data from the accessories experts before conducting an analysis based on product theory and aesthetics.
3. The author divides the necklace accessories products are divided into three types of design models by the authors based on the concept of Kawung and tumpal motifs.
4. Data from experts is then analyzed using products and aesthetics based on or input from some of the informants.
5. The author draws conclusions based on the best results after analyzing the product based on product theory and aesthetics and if needed deficiencies in each type of model it can be corrected for further improvement. Experts working in the field of accessories and design, among others: expert users of accessories and design, designers who understand about accessories, owners of the accessories industry and owners of making accessories courses.
3.4. Research Methods
This research uses a descriptive method using qualitative methods, according to Dantes. This research method uses research that discusses theories or phenomena according to what exists and is done to obtain information about the current situation [9].

3.5. Research Focus
In this research, the researcher took the focus of research on "Processing plastic bottles with HDDP in making Accessories for the creation of necklaces with Nusantara motifs taking the Kawung and Tumpal motifs".

3.6. Research Stage Procedure
In this study the field was approved and asked to collect data and documents needed in this study. Suryesna (2013) revealed the research in this study: discussing problems, research objectives, finding data, compiling designs, selecting materials through the product manufacturing process, interviewing interviewees, analyzing, concluding.

4. The Concept and Process of Making Necklace
4.1. The Concept of Making a Necklace
1. Making this design concept will look for alternatives to making works that will be created and look for the best based on theoretical analysis.
2. The alternative design of this form is certainly in accordance with the philosophical themes raised in the making of works based on aesthetic and philosophical values, namely the design of necklace creations with archipelago Kawung motifs and the motif of tumpal with the meanings that exist in archipelago decorative motifs, the archipelago motif is a distinct attraction.
3. The results of theoretical analysis based on the assessment of sources can determine the deficiencies that exist in the product so that it can be refined at a later stage so as to produce an ideal work of art.
4. Design development results sketches are divided into 3 model types and then get selected sketches based on input and assessment of sources analyzed based on aesthetic and product theories.
5. The best product conclusions, among other things in terms of artistic, product functions, ergonomics and manufacturing processes that are simple but can produce products that are of use value.

4.2. The process of making an archipelago motif necklace

Figure 4. Tumpal motif (type 1 and 2)

Figure 5. Kawung motif (type 3)
Table 1. The process of making an archipelago motif necklace

| Design Concept | Material Selection | The process of making a necklace |
|----------------|--------------------|----------------------------------|
| Design Necklace tumpal motif and kawung motif | The selection of items that will be used is thick plastic waste (used shampoo bottles) that has been washed clean, other manufacturing tools such as cutters, scissors, glue, acrylic paint, necklace strings and hooks. | 1. Cut the material manually with scissors into sheets by removing the top and bottom bottles. |
| | | 2. Pattern making with a pencil and a ruler. |
| | | 3. Cutting follows the existing pattern. |
| | | 4. Sanding to be smooth so that it is comfortable when used. |
| | | 5. Sticking stickers on type 1 and painting with acrylic paint on types 2 and 3 and cut other materials such as the necklace strap. |

5. Inspirative sources/ Inspirative Concepts.

5.1. The design concept of Necklace Types 1 and 2 Icons Necklace

Tumpal motif (Theory of Semiotics) refers to the theory of pierce marks in pictures that can be classified as icons, indexes, symbols [10].

a. Icons

This necklace design icon consists of 5 pieces of the same pattern and is shaped like a triangle opposite the shape of a parallelogram. For the dominant color in the pattern is yellow and detailed For type 1 has more colors that are used more modern and contemporary by using stickers, whereas for type 2 only 2 dualistic colors (eastern aesthetics) are more philosophical.

b. Index

This tumpal motif necklace product contains several 5 pieces of geometric shaped parallelogram inside which are arranged, namely: Parallelogram as the main form of necklace decoration.

c. Symbols

The meaning contained in the decoration of a tumpal, also called untu walang, is a symbol that symbolizes fertility, which is characterized by a dualistic element symbolizing male and female elements in two sharp opposite angles.

5.2. Design concept necklace Type 3 Icon Kawung motif (Semiotics Theory)

a. Icon

The iconic arrangement of 3 circular shapes is a kawung motive using eastern philosophical aesthetics namely pattern 3, which is in accordance with the theories and concepts created from the start.

b. Index

Motif Kawung like palm fruit arranged in 3 forms.

c. Symbol

There is content taken from the shape of a necklace made from kawung motif in the form of a palm fruit. Motives that contain messages about humans have always been useful collections, like the palm tree in which all parts can be used. Is a symbol of dualism in the colors chosen for world life and the hereafter. The gold color was chosen because it was considered as the
color of victory, prosperity and luxury / brilliance combined with black which is an elegant color and symbolizes elegance, this color can also make other colors look attractive. The interpretation of the 3 forms of kawung symbolizes eastern aesthetics in the form of tritangtu principles in the mindset of Indonesian people in general and Sundanese in particular.

6. Product analysis and discussion based on product theory and aesthetic theory

**Table 2.** Product Analysis and Discussion Based On Product Theory

| No | Type Motif | Product Quality | Theory Product | Conclution Type | Advantage | Deficiency |
|----|------------|-----------------|----------------|----------------|-----------|------------|
| 1  | Tumpal Motif necklace with sticker Adhesive motif | a. Having added value (+) b. The use of stickers does not naturally (-) c. Eliminate the philosophical of being modern(-) d. Satisfy consumers with color brilliance and safe material(+) | a. Safe in use because in the smoothing process. (+) b. Easy to use (+) | Sticker motifs are not durable (-) | easy in maintenance and repair, cheap repair costs (+) |
| 2  | Tumpal motif necklace with coloring on the motif detail | a. Having added value (+) b. The motif is more elegant with colors in classic nuance in accoradence with the philosophical theme of the classic tumpal motif (+) c. Does not meet the overall human needs depending on the customer of the wearer(-) | a. This necklace is safe to wear because the process is tidied up at the end of fine details even if the tip is pointed(+) b. The short neck strap will affect the user's skin and the coloring texture in the painting technique is not too smooth when in contact with the skin (-) | a. The motif is more durable because this motif is made with acrylic paints and brushes so that it has the characteristics of a classic artistic appearance in coloring (+) b. The use of rope from Woll material is not durable (-) | easy in maintenance and repair, cheap repair costs (+) |
Table 2. Product Analysis and Discussion Based On Product Theory (Continue)

| No | Type Motif                  | Product Quality | Theory Product                          | Conclusion Type                  | Advantage/Deficiency |
|----|-----------------------------|-----------------|-----------------------------------------|----------------------------------|----------------------|
| 3  | Kawung motif necklace with  |                 | a. The product or value has increased in| a. The motif is more durable     | 7 point              |
|    | coloring on the motif       |                 | the product when viewed from material  | because this motif is made       | 1 point              |
|    | cetail                      |                 | of plastic waste into the form of      | with acrylic paints and          |                      |
|    |                             |                 | necklace product(+).                   | brushes(+).                      |                      |
|    |                             |                 | b. Motifs are more elegant with colors | The shape of round ornament      |                      |
|    |                             |                 | used in classics in accordance with    | details is more beneficial in    |                      |
|    |                             |                 | the theme of classic kawung motif      | terms of security because it is  |                      |
|    |                             |                 | (-). Attracting consumers attention by | not sharp(+).                    |                      |
|    |                             |                 | natural colors, shapes and classic     |                                  |                      |
|    |                             |                 | accents that are philosophical         |                                  |                      |
|    |                             |                 | (+).                                    |                                  |                      |

Then the conclusion can be drawn from the analysis based on this product theory that type 3 necklaces most meet the requirements of the product theory with the most number of conformities ((+=YES) and the least number of discrepancies ( (-) =NO)and in the sequence below are type 1 and type 2. Resource person:
1. Ratih K., S.Pd, (Costum Designer)
2. Kusnadi, S.Sn., M.Ds., M.kom. (Product Designer)
3. Abidin, S.Sn., M.Ds. (Product Designer)
4. Dra Mariawati Nur (Culture and Course Owner)
### Tabel 3. Product analysis and discussion based on aesthetic theories

| No | Aesthetic Elements of Form consists of the qualities of distinctive forms, such as: | Model Type 1 | Model Type 2 | Model Type 3 |
|----|---------------------------------------------------------------------------------|--------------|--------------|--------------|
|    | Resources Analysis                                                              | Resources Analysis | Resources Analysis | Resources Analysis |
| 1  | (+) More contrast to make it more interesting.                                 | (-) Monotonous contrast. | (-) Must be more contrast. | The color is better only has to be more contrast. |
|    | (-) The color on the supporting accent is darker so that it looks contrasted.  | (-) Less contrast. | (-) 2 point. | (-) 1 point (+) |
| 2  | The use of stickers results in less visible texture.                           | (+) Textures with the use of stickers make it less visible, so the texture looks smoother. | (+) Texture already visible Round and flat shape, round on the supporting accents and flat on the main shape (+) 2 point. | (+) Texture already visible The shape of threaded and flat, threaded on the neck strap supporting accents and flat on the main shape (+) 2 point. |
| 3  | (-), the form must be more varied in terms of size.                            | The shape is less varied from the type of geometric size of the parallelogram used. | (+) Argonomic proportions are already visible in the center with an enlarged size. (+) 2 points. | The shape is in accordance with the proportion (+) of 2 points |

### The Aesthetic Elements of Form consists of the qualities of distinctive forms, such as:

- **Color**
  - (+) More contrast to make it more interesting.
  - (-) The color on the supporting accent is darker so that it looks contrasted.

- **Texture**
  - (+) Textures with the use of stickers make it less visible, so the texture looks smoother.
  - (-) 1 point
  - (+) 1 point

- **Size**
  - (-), Less varied than the type of geometric size of the parallelogram.
  - (+) The shape is less varied from the type of geometric size of the parallelogram used.
  - (-) 2 point.

**Notes:**
- More contrast to make it more interesting.
- The color on the supporting accent is darker so that it looks contrasted.
- The colors are too monotonous or lack contrast and tend to be dark, so there should be a contrasting color selection by combining bright and dark colors in a balanced portion.
- The color is better only has to be more contrast.
- Warna sudah lebih baik hanya harus lebih kontras.
- The shape of threaded and flat, threaded on the neck strap supporting accents and flat on the main shape (+) 2 point.
- The shape is in accordance with the proportion (+) of 2 points.
### Table 3. Product analysis and discussion based on aesthetic theories (Continue)

| No | Aesthetic | Model Type 1 | Model Type 2 | Model Type 3 |
|----|-----------|--------------|--------------|--------------|
|    | Resources | Analysis     | Resources    | Analysis     |
| Balance | (+) | Simetris (+) 2 Point | Simetris (+) 2 Point | Simetris (+) 2 Point |
| Contrast | (-) Must be more contrast | Color lacks contrast, because the accent and main object have colors that are too bright. | (-) The color of the motif must be made in contrast. Tends to be dark, classic, natural. | (+) Color must be more contrast. | (-) Color must be more contrast. |
| Harmonious | (+) Harmonious between the size and placement of the main object and the neck strap accents. (+) 2 points | Harmonious between the size and placement of the main object and the neck strap accents. (+) 2 points | Harmonious between the size and placement of the main object and the neck strap accents. (+) 2 points |
| Axis | (+) Already have a contrast accent on the rope and the main shape (+) 2 point | (+) Already have a contrast accent on the rope and the main shape (+) 2 point | (-) For more feather accents, support bright colors and add a rather heavy accent. (-) More varied and mass or heavy. | For supporting accents are made in contrasting / bright colors so that the brilliance of the product looks attractive, and is more varied looking for shapes and accents that are mass (-) 2 points. |
### Table 3. Product analysis and discussion based on aesthetic theories (Continue)

| No | Aesthetic Principle | Model Type 1 | Model Type 2 | Model Type 3 |
|----|---------------------|--------------|--------------|--------------|
|    |                     | Resources Analysis | Resources Analysis | Resources Analysis |
| 1  | Emphasis (-) Must be more specific on the theme. (-) The form has not accentuated the theme. | Shapes should emphasize the theme of dualistic themes of men and women or fertility can be described with 2 colors and 2 opposite shapes | Shapes are so similar that they are less appealing. | There is already an emphasis on the shape of the Oval theme. |
|    |                     | (-) Size must be more varied | (-) Almost the same size is less varied. | (+) 2 points |
| 2  | Proportion (+) There is already a proportion of ergonomic forms. (+) 2 points | (+) there is already a proportion of ergonomic forms. (+) 2 points | (+) 2 points |
|    |                     |                     |                     | There is already a proportion of ergonomic forms. (+) 2 points |
| 3  | Simplicity (+) already looks simple from the coloring and form of the material. (+) 2 points | (+) already looks simple from the coloring and form of the material. (+) 2 points | (+) already looks simple from the coloring and form of the material. (+) 2 points |
|    |                     |                     |                     | (+) 2 point |
| 4  | Repetition (+) There is already a repetition of the object shape. (+) 2 points | (+) There is already a repetition of the object shape. (+) 2 points | (+) There is already a repetition of the object shape. (+) 2 points |
|    |                     |                     |                     | (+) 2 point |

### 7. Conclusion

Based on the results obtained in the analysis of the selection of archipelago ornamental theory with the motifs of tumpal and kawung, it can be concluded that the use of thick type plastic waste material / HDPE can produce a product with more value being a necklace product of archipelago motif creations. HDPE plastic waste material can produce a good necklace product by going through the steps of the design concept, the manufacturing process, to the theoretical analysis in order to produce a product that is in accordance with good product requirements. Step researcher made 3 alternative examples of...
design concepts presented by researchers in the form of archipelago motif necklace creations which were then analyzed based on the use of product theory and aesthetic theory, from the processed interviews with experts in the field of product design, costumes and course owners. Then more specific conclusions can be drawn, namely for type 3 with the concept of kawung motifs that can meet the requirements in the concept of design, product, and aesthetics with the need for a slight improvement from the deficiencies that exist in several points based on theoretical analysis. Archipelago necklace creations products Kawung motif on the results of research on type 3 models are superior in point through the stages of analysis in product theory and aesthetics so as to produce an archipelago creation necklace product in accordance with product and aesthetic requirements can be a special attraction for consumers.

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