

## Development of Decorative Resin Wall Tiles with Various Natural Fibers



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**ABSTRACT:** Resin tile is an economic tiling solution that's perfect for DIY installations, with attractive patterns, affordable, eco-friendly and designs easily to restyle your walls. This study aimed to develop and determine the acceptability of decorative resin wall tiles with various natural fibers that can be used in by every homeowner. The develop decorative resin wall tiles with various natural fibers was evaluated in terms of appearance, texture, durability by Tile Experts of Floor Center Ilagan City, Isabela. The finished product can be used as handicraft, wall decorations and for interior design purposes. The developmental study was used in determining the level of acceptability of decorative resin tiles with various natural fibers in terms of appearance, texture, and durability. The study used five-point Likert Scale to determine the descriptive rating of the indicators used; the Weighted Mean (WM) to interpret the equivalent meaning of the data gathered. Two set of molder were placed with the composites were measuring-mixing method followed by molding: For T1 contains banana and coconut fiber and T2 contains bamboo and palm fiber their design was a basket weave. Next was applying the Epoxy Resins to the finished with a ratio of 3:100 or 1% to 3% (max) by volume to cure the epoxy resin. Next was removing the decorative tile from molder and trim the edges and corners of the decorative tile and refined. The findings of the study indicated Highly Acceptable in terms of appearance with a total weighted mean of 4.5, moderately acceptable in terms of texture with a total weighted mean of 4.10, Highly Acceptable in terms of durability with a total weighted mean of 4.26 and for the general mean moderately acceptable with a total weighted mean of 4.36. The testing results for the developed product were good because the researchers found that the appearance and texture of their finished product did not change when it was soak in water and applied with a hot object and not easily break when it drop to floor.

**KEYWORDS:** resin; fiber; decorative tile; basket weave; epoxy resin

### 1. INTRODUCTION

Resin wall tiles made from natural fiber such as banana, sheath of bamboo and palm represent a groundbreaking innovation in the realm of sustainable construction materials. This research delves into the intricate process of combining natural fibers with resin to produce durable, eco-friendly wall tiles that offer both aesthetic appeal and environmental benefits. By exploring the properties, manufacturing techniques, and applications of these unique tiles, this study aims to shed light on the potential of natural fiber resin wall tiles to revolutionize the construction industry towards a more sustainable and eco-conscious future.

As a result, we expertly crafted a solution by trying to utilize various fibers as a raw material for creating beautiful tile with the help of epoxy resin, which coats and provides waterproofing, strength, and durability to our product, which is inexpensive and environmentally friendly. We choose various fibers as our main raw material in making decorative tile because some studies have found that banana fiber, coconut fiber, palm fiber, and bamboo sheath fiber have a variety of beneficial physical and chemical properties, making them excellent raw materials due to their natural fibers. Almost every portion of the tree produces fibers of varying strength, color, and beauty, as well as staple length that can be utilized for a lot of purposes. In this way, we can produce a low-cost decorative tile that can be used for decorating in every household, and we can also reduce the amount of banana fiber, coconut, palm, and bamboo sheath that is thrown in our environment, preventing pollution from worsening both on land and in the air due to human waste. Based on the forgoing discussions, the researchers decided to conduct a study to seek a way to transform the various fibers into a decorative tile in the easiest and most eco-friendly way that can help address environmental damage.

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The general objectives of the study are to develop a product from waste prevention and recycling at home for reducing waste and increasing recycling at home. Strategies for designing waste out of products and materials and creating closed-loop systems that reduce waste and promote sustainability.

### CONCEPTUAL FRAMEWORK OF THE STUDY

The input stage consists of the knowledge requirements, the materials, tools and equipment, supplies and ingredients needed in the preparation of the decorative resin wall tiles with various natural fibers. The process contains the methods and process in developing the decorative resin wall tiles with various natural fibers. Then, it is followed by the analysis of the data gathered and determines the level of acceptability of the developed decorative resin wall tiles with various natural fibers using banana fiber, bamboo, palm and coconut sheath as evaluated by the groups of respondents. Hence, in all sequences, evaluation will be given much attention to find out the level of acceptability and general acceptability of development of decorative tile using various fibers.

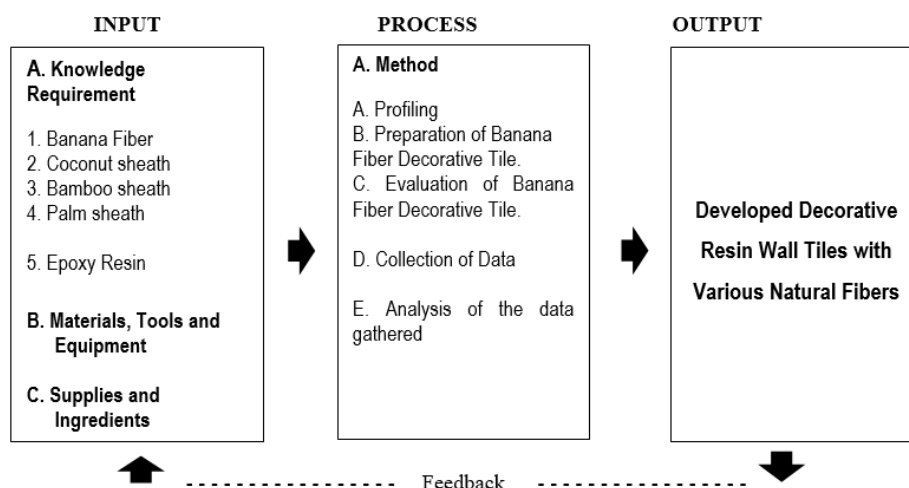


Figure 1. Conceptual Paradigm of the Study.

## 2. METHODS

This Developmental research, as opposed to simple instructional development, has been defined as the systematic study of designing, developing, and evaluating instructional programs, processes, and products that must meet criteria of internal consistency and effectiveness. According to RC Richey · 1994 · Cited by 91 Developmental research is particularly important in the field of instructional technology. The most common types of developmental research involve situations in which the product-development process is analyzed and described, and the final product is evaluated. The researchers conduct harvesting to weaving of raw materials and epoxy filling and finishing.

### A. Developmental Procedure

In order to perform the research properly, the developmental procedure in making of decorative resin wall tiles with various natural fibers was followed consistently.

#### 1. Preparing tools and materials

The first step is to prepare all of the materials, tools, and equipment needed to make the developed decorative resin wall tiles with various natural fibers, including Scissors, Mixing bowl, Epoxy Resin Molder, Face masks, Gloves, ruler, pencil, measuring cup, sand paper, electric, Sander, polyurethanes and etc.



Figure 2 . Preparing all the needed materials.

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### 2. Gathering the raw materials

After the preparation of all the materials needed next is the collecting and selecting of good raw materials from the various fibers such as banana, bamboo, and palm and coconut sheath.



Figure 3. Collecting and Selecting of Good Raw Materials

### 3. Processing of raw materials

- Stripping- removing of extra fibers and cutting the fibers into striped with a length of 1 inch.
- Washing- cleaning the fibers used in making design
- Drying- make it dry to avoid molds on the fibers
- Pressing- to keep the fibers looks flat and presentable



Figure 4. Proper handling of raw materials

### 4. Creating design patterns of the raw of materials

Plan and create patterns of design using the various raw materials collected and selected.



Figure 5. Creating design patterns of the raw materials

### 5. Measuring and mixing of the epoxy resins

Next was measuring the epoxy resin with a ratio of 1:2, 2 cups clear epoxy resin and 1 cup hardener mix them thoroughly in a clean mixing bowl.



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Figure 6. Measuring and mixing of the epoxy resin

### 6. Pouring Epoxy Resins to the molder (first layer )

Pouring the mix epoxy resin in a molder with a thick of  $\frac{1}{2}$  inch and this will be the first layer.

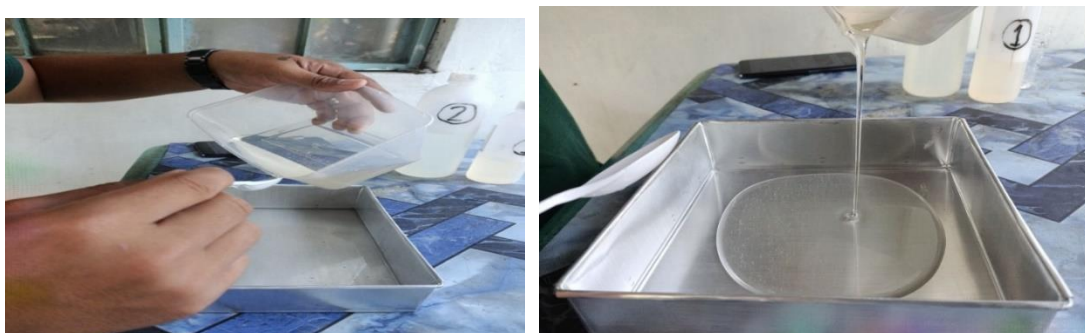


Figure 7. Making the first layer of the epoxy resin

### 7. Drying

The next process is drying let the molder with resin sundry until the resin becomes totally harder and firm.



Figure 8. Drying the first layer of the epoxy resin

### 8. Topping the create design patterns

Next is put double sided tape on the design and top on the first layer of hardening epoxy.



Figure 9. Topping the created design patterns

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### 9. Making the final coating

Pouring the mix epoxy resin on the design make it sure that the mixture coated all the design and with a length of ½ inch.



Figure 10. making the final coating of the project

### 10. Drying

Put the finished project under the sun and make it dry, hard and firm.



Figure 11. drying the finished project

### 11. Removing finished project from the molder

Removing the finished project from molder is not so easy it needs extra careful and patient so that the project will not destroy or creates some dents.

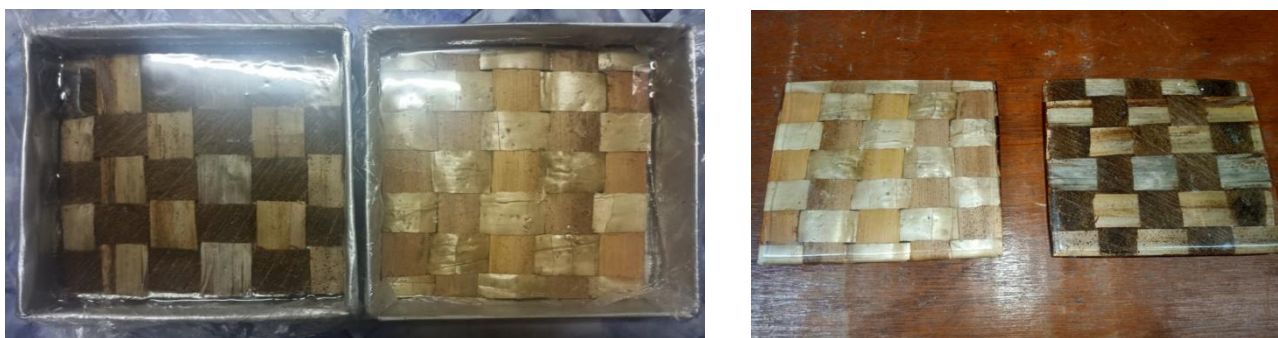


Figure12 .removing the finished project from molder

### 12. Refining the finished project

The next step is refining the project using sand paper and sander machine to refine the sides of the tiles and also level the top and bottom of the decorative tiles.



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Figure 13. Refining the sides of the finished project

### 13. Applying Finishing Touches On The Finished Projects

The last steps is applying finishing touches on the finished project using polyurethanes to make the projects become shinny and presentable.



Figure 14. applying finishing touches on finished project

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## 3. RESEARCH DISCUSSION

### B. Product Description

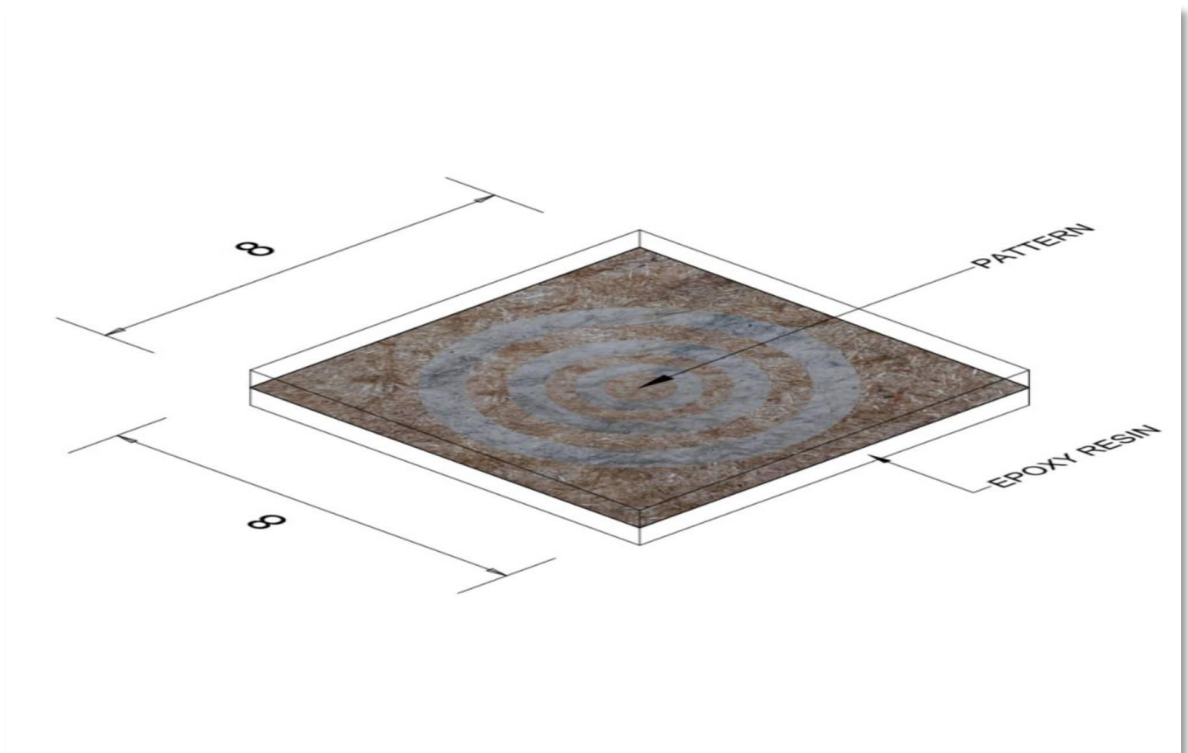


Figure 15. Pictorial view of the Product

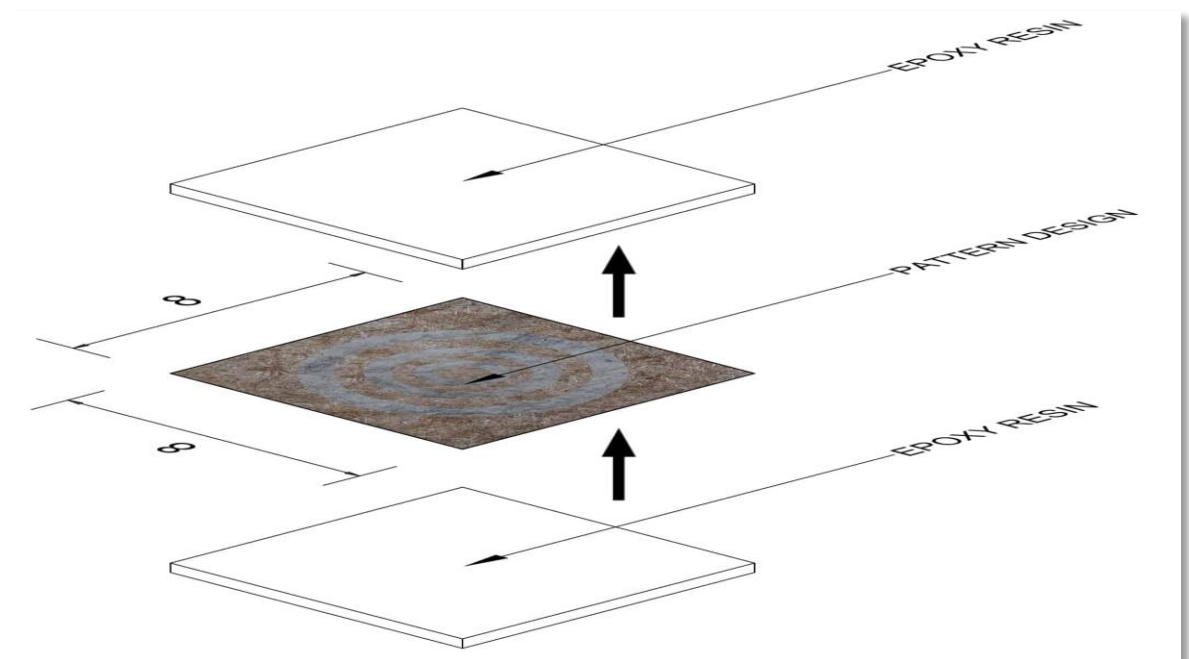


Figure 16. The exploded view of the developed decorative tile

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### C. Product Presentation



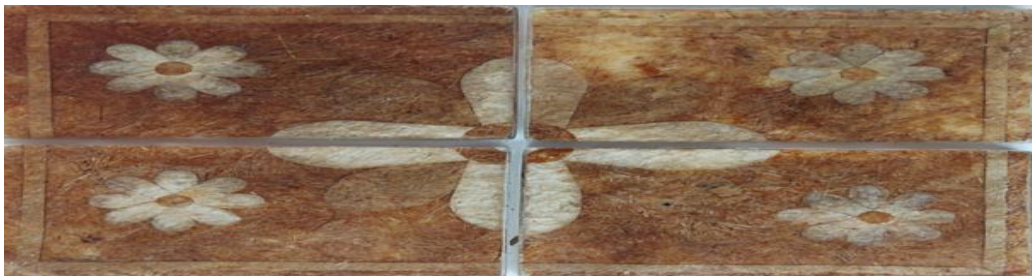
(a) 8×8 cm

*Coconut sheath and banana fiber decorative wall tile with different design*



(b) 12×8 cm

*Coconut sheath, banana fiber and bamboo sheath decorative wall tile with bricks design.*



(c) 15.×20 cm

Coconut sheath, banana fiber, Palm and bamboo sheath decorative wall tile with flower Pattern design



(d) 17 x 17 cm

Coconut sheath, banana fiber, Palm and bamboo sheath decorative wall tile with basket weave Pattern design

**Figure 17. Photos of the different design patterns of the developed decorative tiles.**



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### PRODUCT TESTING AND EVALUATION

Appearance and Texture Test using Heat Test and water soaking test

#### A. Pouring hot water test



Figure 18. Pouring hot water on develop decorative resin wall tiles with various natural fibers.

#### B. Placing cup of coffee on the tiles surface test



Figure 19. Placing cup of coffee on the tiles surface.

#### C. Placing hot frying pan on the tiles surface test



Figure 20. Placing hot frying pan on the tiles surface test.

#### D. Soaking Test



Figure 21. Soaking the fiber decorative tiles surface test.

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### E. Durability test using Drop test on the floor



Figure 22. Dropping the fiber decorative tiles surface test

The figure 22 shows that when the fiber decorative tile was drop on the floor it will leave a small dent. However, it will not affect the appearance of the developed fiber decorative tile.

### F. Adhesiveness



Figure 23. Decorative tile attaching in a wall.

### Analysis and Interpretation of Data

To determine the acceptability of the project, the proponents conducted the evaluation process. Tiles experts were tapped to evaluate the instructional tool. The respondents evaluated the project on the following criteria: **Appearance, Texture, and Durability**.

**Acceptability of the *Developed Decorative Resin Wall Tiles with Various Natural Fibers* as evaluated by the selected Tile Expert of Floor Center City of Ilagan**

**Table 1 .Level of acceptability of the *Developed Decorative Resin Wall Tiles with Various Natural Fibers* as perceived by the selected Tile Expert of Floor Center City of Ilagan in terms of general acceptability.**

Criteria	SELECTED TILE EXPERT OF FLOOR CENTER CITY OF ILAGAN	
	Weighted Mean	Descriptive Rating
Appearance	4.5	Highly Acceptable
Texture	4.10	Moderately Acceptable
Durability	4.5	Highly Acceptable
Overall total as perceived by the selected Tile Expert	4.36	Moderately Acceptable

**Table 1.** shows the assessment of the selected Tile Expert of Floor Center City of Ilagan.As to the level of acceptability of the *Developed Decorative Resin Wall Tiles with Various Natural Fibers*, all respondents rated the finished product “Highly Acceptable”. For the appearance, have a total weighted mean of 4.5 under the Descriptive Rating “Moderately Acceptable” for

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the texture, it has a total weighted mean of 4.10 under the Descriptive Rating “Highly Acceptable” for the durability, it has a total weighted mean of 4.5 under the Descriptive Rating “Highly Acceptable”. Finally, the overall have a total weighted mean of 4.36 under the Descriptive Rating “Highly Acceptable”. Generally, the results were “Moderately Acceptable” as the level of general acceptability of *Developed Decorative Resin Wall Tiles with Various Natural Fibers*.

### 4. CONCLUSION AND RECOMMENDATION

Based on the findings of the study, it is concluded that coconut sheath, banana fiber, bamboo and palm sheath are potential raw materials in creating decorative tile products. The researchers found out that the fiber decorative tile maintains its appearance when topped with hot items and even soak in water. The respondents rated the *Decorative Resin Wall Tiles with Various Natural Fibers* to be Highly Acceptable in terms of appearance and durability, and Moderately Acceptable in terms of texture. Therefore, it is recommended for production and product promotion.

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