# BAMBOO COILING JEWELLERY: NATURE'S ELEGANCE IN DESIGN

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## Abstract

Bamboo is one of the abundant natural resources in Indonesia, so bamboo handicraft products can be easily found there. The most widely used technique is the plaiting technique. Many woven bamboo crafts use coiling as a framework for woven products. Although it is often juxtaposed with the popular plaiting technique, the coiling technique is less glamorous and has yet to be developed in Indonesia. This is because coiling has a basic circular shape and is difficult to make in small diameters, ultimately becoming an obstacle to product development using the coiling technique. Bamboo processing also adds to the challenges for craftsmen as bamboo is susceptible to mold and bamboo-destroying organisms. The sustainable market and fashion and jewelry products are popular today, especially among Gen Z. Gen Z, is the key target market for jewelry styling in this design. Gen Z preferences, mainly explored through CJM and questionnaires, will be the main consideration in the design process. Meanwhile, bamboo processing will be explored through field studies of related products and techniques and various experiments needed, such as bamboo type, preservation, coiling form, joining, and coiling finishing. These methods are used to support the design process of bamboo coiling jewelry that suits the preferences of Gen Z.

**Key words:** Bamboo, Coiling, Jewelry

## INTRODUCTION

Coiling is a technique of rolling or winding thin bamboo sheets (bamboo strips) with attention to angles and curves. (Nurfauziah et al., 2023) Coiling is widely developed in Vietnam

and has been applied for centuries. (Nurfauziah et al., 2023; Rahmadani & Hakim, 2019) In Indonesia, the coiling technique is still less popular than the plaiting technique due to the limited number of craftsmen, caused by a lack of knowledge and socialisation of the technique. In fact, coiling is a derivative of the plaiting technique and has been used in the manufacture of several woven products such as tampah, steamer, and basket.

The lack of popularity of coiling products in Indonesia hinders the development of product variations. SMEs' creativity is hampered by the notion that product innovation requires a lot of experimentation with new tools and skills, which increases production costs and uncertainty of results. (Waskito, 2014) In the field, coiling products are still handmade by artisans under SMEs. Coiling products that are widely developed in Indonesia are home decor and furniture, with limited variations. A similar situation exists in the fashion industry, especially in jewellery making, where bamboo coiling techniques are rarely used. However, Indonesian brands Ouboo and Pablo Luna have successfully created jewellery using the bamboo coiling technique.

Coiling products are mostly made manually with tools and materials that are common in Indonesia. Skilled Indonesian artisans should be able to easily apply it, but this is not the case. This is unfortunate because through SMEs and MSMEs, many jobs can be created. According to the Ministry of Cooperatives and SMEs, MSMEs in the field of fashion contributed 18.15% and crafts 15.70% of 7.38% of the total national economy with a total GDP of around Rp. 852.24 trillion. (Asmoro & Meirinaldi, 2021)


Figure 1. Fashion and Jewellery Product Consumers by Age
Source: blog.gwi.com / What to know about targeting fashion and jewelry Buyers/Trifonova 2021

Based on the data, it is known that Generation Z, born between 1995 and 2012 with a current age ranging from 12 to 27 years

old, dominates the fashion and jewellery market. This is because Generation Z tends to see fashion as a means to express their identity, lifestyle and self-expression.


Figure 2. Characteristics of Gen Z Consumerism
Source: www.euromonitor.com / Unlocking the Gen Z Code to Revolutionise Jewellery Sales /Linares 2024

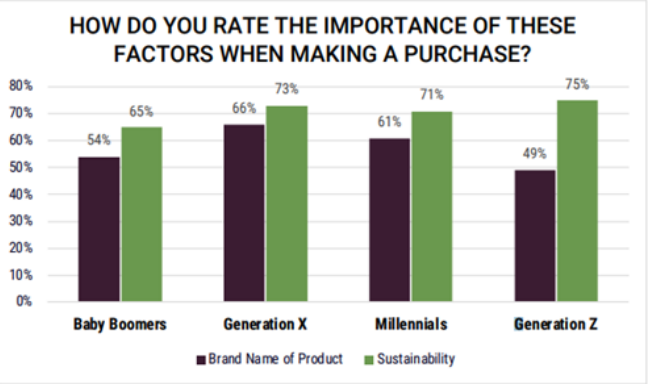



Figure 3. Product Purchase Motivation of Each Generation
Source: www.weforum.org / Gen Z cares about sustainability more than anyone else – and is starting to make others feel the same way/Wood 2022

According to Euromonitoring International, 20% of Generation Z choose fashion products and accessories based on current trends to explore and express their style. This leads them to shop for fashion products at least three times a year. Gen Z also tends to use social media actively, reaching 60%

higher than the global average. The impact is seen in their fashion purchasing habits, where many choose to shop through e-commerce platforms. In addition, the 2023 survey results show that 55% of Gen Z is concerned about climate change. (Linares, 2024) This makes Generation Z more mindful of the environmental impact of their consumption activities and tend to favour products that are environmentally friendly and socially responsible. (Hidayati, 2023)

Bamboo material is highly supportive as a sustainable product due to its abundant potential in Indonesia reaching 10.4 million tonnes, with rapid growth within 3-5 years. (Rizqi et al., 2023) In addition, bamboo has positive environmental impacts, such as 30% greater oxygen production than timber forests, watershed enhancement, erosion prevention, restoration of degraded soils, and neutralise toxins from contaminated soil. (Artiningsih, 2012) Seeing the many opportunities of bamboo coiling jewellery development and Generation Z's great interest in eco-friendly products, the topic of bamboo coiling jewellery for Generation Z was chosen with a focus on sustainable, natural, and exclusive concepts. '

The sustainable concept is adapted to create products that are environmentally friendly. The natural concept is applied by adopting the shape of Indonesian endemic flowers. The natural concept is applied to support the sustainable concept by using natural materials and the concept of the shape of Indonesian endemic flowers, as a form of jewellery. In addition, in this design, the exclusive concept is raised to match the preferences of buyers (Gen Z), with options for customisation and personalisation of products according to their preferences.

**Problem statement**

1. The limitation of thinking that coiling can only be circular and cannot be small.
2. Market opportunities for sustainable and fashion products in Gen Z, which is Indonesia's largest population to day.
3. The abundant potential of bamboo and the potential of wicker craftsmen in producing bamboo coiling products in Indonesia.

4. The low selling value of bamboo in Indonesia has the potential to be used as raw material to increase its selling value.

Jewellery is an object used to beautify oneself and support one's appearance. (Hendranto, 2019) Bamboo is a plant that has high strength and elasticity that allows it to be processed into various shapes while remaining sturdy. (Mutiara et al., 2021) Coiling itself is a technique of winding thin bamboo sheets (bamboo slices) repeatedly by paying attention to the large angle in the curve of the shape you want to make. The smaller the angle the more difficult the coiling is. (Nurfauziah et al., 2023)

Field studies were also conducted to expand the range of information that could be obtained. The field study was conducted at Bamboo Tutul (Magelang, Central Java) to explore information related to bamboo coiling with the conclusion of the discussion with the owner of Bamboo Tutul, Mr Yudi that coiling can illustrate the characteristics, skills, accuracy, neatness and ability of the maker. Robustness, appearance and function determine the success of bamboo coiling products. Re-application of finishing should also be done regularly to prevent bamboo coiling from mould and damage.

The second field study was conducted at Joglo Ayu Tenan (Sleman, DI Yogyakarta) to gather information related to bamboo jewellery with the conclusion of the discussion with the owner of Joglo Ayu Tenan, Ibu Yayuk, that the combination of uncured bamboo with metal will oxidise the metal. Another obstacle is related to precision, where it is difficult to make handicraft products using natural materials for mass production. But that's where the value of uniqueness and exclusivity of the product can be raised.

Based on field studies, it is evident that bamboo is highly susceptible to damage without proper processing. The high moisture content and starch content of bamboo can reduce its durability. This can be overcome by preservation. Preservation can be done non-chemically by soaking the bamboo in water or mud for a duration of 1-24 weeks or fumigating the wet bamboo for 15-20 minutes. (Laarasati & Tristiyono, 2019; Tumonglo et

al., 2020) While chemical preservation can be done by boiling the bamboo using salt water for 15 minutes or soaking the bamboo in petrol, baron, zinx chloride, sodium penda chloror phenate, copper chrome acenic, copper chromium baron or karosete with a certain composition. (Laarasati & Tristiyono, 2019) In addition to preservation, as Mr Yudi said in the Bamboo Tutul field study, regular finishing can protect bamboo coiling from damage. Bamboo finishing can be done by applying wood stain, tung oil, bees wax, and waterbased lacquer. (Laarasati & Tristiyono, 2019)

Gen Z is the generation born between 1995-2010. They grew up with technology, making them highly skilled in using technology and always expecting technological innovations. (Rachmawati, 2019) Interestingly, Gen Z has the best environmental awareness of any generation. (Wood, 2022)

## METHODS

1. Literature Study

   Literature study is the process of collecting, reviewing, and analysing various sources such as books, journals, and articles related to the research topic. This method aims to understand current issues in depth (Amin Lasaiba, 2022). This literature study includes journals, articles, reports, and trusted websites published in the last 5 years. Materials collected include Gen Z characteristics, bamboo jewellery, bamboo processing and dyeing techniques, and current design trends.

2. Document Study

   Document study is a technique of collecting data from various written documents, images, or other works, which are then analysed to obtain systematic study results. In this research, document studies use images, photos, and videos from various sources such as Youtube, Google Lens, and Pinterest to support the course of research and data visualisation.

3. Questionnaire

   A questionnaire is a form filled out by respondents to collect data, in this research it is used to find out the preferences of gen Z towards bamboo jewellery with the

coiling technique. The questionnaire used Google Forms for efficiency and was distributed online via Whatsapp and Instagram.

4. Expert Interview

   Expert interviews are conducted with experts in related fields to gain knowledge and input related to product development. In this research, interviews will be conducted with natural material jewellery experts and bamboo coiling experts.

5. Customer Journey Mapping

   Customer Journey Mapping (CJM) helps designers understand the user experience from the stage of knowing to using the product, as well as identifying pain points and gain points to prevent problems that may arise in the design product.

6. Experimentation/Exploration

   Experimentation is a method to find out the impact of a treatment that is deliberately carried out. In this research, experimentation is used to deeply understand the characteristics of bamboo to determine the optimal processing method.

**SUBTITLE**

1. Questionnaire

   The survey was conducted on 52 female Gen Z respondents with an age range of 19 to 29 years. The survey results showed preferences on jewellery design, material and budget. The majority of respondents chose to wear jewellery for special occasions with less than 6 hours of wear per piece. Bamboo was preferred as the main material with a tendency towards natural colours and silver-coloured metal as the supporting material. The majority of respondents were also willing to use bamboo jewellery, but preferred trinkets with small dimensions. Thus, the jewellery design will feature organic shapes with a casual and elegant theme. In addition, the jewellery will be sold in the price range of IDR 100,000 to IDR 500,000.

2. Mood Board

   Moodboards are used to provide a visualisation of the

concept with related images such as materials, atmosphere, target user outfit, and more. It helps designers maintain a well-defined theme. The moodboard includes photos that reflect Gen Z's daily life and preferences, and includes the main keywords, colour palette, and materials and shapes that will be used in the jewellery design. This research will create jewellery with Indonesian endemic flower designs, incorporating elements such as daily activities, routines, likes, outfits, places, and things related to Gen Z listed in the moodboard.


Figure 4. Mood Board
Source: Processed by the author from various sources.

Figure 5. Image Board
Source: Processed by the author from various sources.

3. Image Board

The image board contains images of jewellery in terms of shape, mechanism, concept, material and manufacturing

techniques for the development of bamboo coiling jewellery products. The jewellery design will take on floral shapes with the concept of interchangeability, as Gen Z likes personalised customised products. A joining system will be used to connect each piece of jewellery. The jewellery to be made is bamboo coiling jewellery that applies asymmetrical concept, especially for earring jewellery.

4. Explorations

Aims to explore different types of bamboo by observing their characteristics. The thickness of the bamboo slats used for bamboo coiling is less than 1 mm. The following is the process of making coiling for the exploration of bamboo species.

**Table 1 - Stages of Making Bamboo Coiling**

| 1. Shaving Bamboo | 2. Splicing Bamboo | 3. Levelling the Joint |
|---|---|---|
|  |  |  |
| Cutting the divider between the bamboo segments to facilitate the bamboo shaving process. | The bamboo slats are joined using G-glue for length. | The joint parts are sanded to make the coiling look neat. |

| 4. Coiling the Bamboo | 5. End the Coiling | 6. Applying Wood Glue |
|---|---|---|
|  |  |  |
| Bamboo is rolled using a coiling tool to the desired size. | The ends of the bamboo slats are glued with G glue so that the coiling results do not decompose again | Bamboo coiling is treated with wood glue on the top and bottom so that the structure is sturdy and the shape is fixed. |

| 7. Drying the Coiling | 8. Caulking | 9. Drying the Coiling |
|---|---|---|
|  |  |  |
| Coiling is dried in the sun so that the glue dries completely. | Seal the coiling cavities using a mixture of wood glue and bamboo sawdust. | Coiling is dried in the sun so that the putty dries completely. |

| 10. Sanding the Coiling | 11. Finishing |
|---|---|
|  |  |
| Sanding is done to flatten the surface of the coiling so that the bamboo fibres can be seen. | Finishing is done to give the coiling a protective layer and an attractive appearance. |

From this process, the following are the results of the observation of the exploration of bamboo species:

1. Type of Bamboo

   The bamboo species explored were selected based on their availability in e-commerce and the area around the design, namely the ITS area to ensure availability during the research. Each bamboo has a different character. Of the eight bamboo types, black bamboo is the easiest to coil due to its elastic and unbreakable fibres, as opposed to ater bamboo whose fibres are easily dispersed making it quite difficult to coil. As for colour, ori bamboo and black bamboo have the most suitable colours to be applied to jewellery as ori bamboo has the brightest colour and black bamboo has a distinctive colour. Since appearance is an important point of jewellery, ori bamboo was chosen to be used in this design.

**Table 2 - Coiling Various Types of Bamboo**

| *Bambusa blumeana* | *Bambusa vulgaris* | *Gigantochloa apus* | *Gigantochloa pseudoarundinacea* |
|---|---|---|---|
|  |  |  |  |
| *Gigantochloa atter* | *Dendrocalamus asper* | *Schizostachyum brachycladum* | *Gigantochloa atroviolacea* |
|  |  |  |  |

2. Coiling Forms

   The basic shape of coiling is a circle, but because in this design coiling will be implemented on jewellery with the inspiration of endemic flower shapes, an exploration of the shape of coiling was conducted. The exploration of shapes uses the basic forms of the quilling paper technique, which is similar to coiling, except that the material uses paper. Exploration of the basic shapes of the quilling technique was successfully carried out using relatively thin strips of bamboo. In this exploration, the shapes chosen were closed shapes rather than patterned ones so that the coiling does not have many voids that complicate product maintenance.

**Figure 6 Exploration of Coiling Shapes**
Source: Author's processing.

In this exploration, it was also found that it is possible to achieve small coiling sizes by considering the thickness of the bamboo strips. The thinner the bamboo strips, the smaller the inner diameter that can be achieved, the smaller the coiling size can be made.

3. Joining System between Bamboo

   Joining between bamboos is done to find the best connection between bamboos to apply to the coiling, joining between bamboos is necessary because one bamboo segment is sometimes insufficient to make one coiling. A parallel joint does not interfere with the shape of the coiling, but in appearance the connection between bamboos is very visible, characterised by a small ronga at each part of the joint. The overlapping joint is the easiest type of joining to do, but the overlapping part of the joint is very visible in appearance,

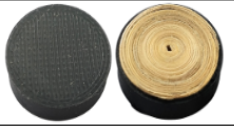
which ultimately affects the shape of the coiling. Of the three types of joins explored, the scarf join is the most time-consuming due to the longer process involved, but is the best join in terms of structure and resulting appearance as it does not interfere with the appearance of the bamboo fibres and the shape of the coiling so this is the join used in the coiling.

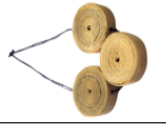
**Table 3 - Exploration of Joining between Bamboo Strands**

| Paralel | Overlap | Scarf |
|---|---|---|
|  |  |  |

4. Joining System between Materials
   Exploration of joining between materials was carried out using 3D printed models. Of the six types of joins, all joins can be implemented in coiling. Each joining has its own intended use. However, the most potential to be applied in this design is the beading and list joining because the coiling can be clearly exposed without the joining being disturbed. In addition, in terms of maintenance, it will also be easier because the bamboo is exposed.

**Table 4 - Exploration of Joining between Materials**

| Frame | Stab | Clasp |
|---|---|---|
|  |  |  |

| List | Crown | Bead |
|---|---|---|
|  |  |  |

5. Finishing

   Finishing exploration was conducted to find the most suitable type of finishing to be applied to bamboo coiling jewellery. The finishing results are divided into two, namely glossy and matte finishes. Glossy finishing can be achieved by using nail polish, varnish and spray paint. While doff finishing can be achieved using linseed oil and beeswax. Glossy finishing adds to the lustre of the bamboo. Texturally, the use of linseed oil is most effective in maintaining the natural texture of the bamboo even after finishing. In terms of safety (water resistance) all types of finishing except linseed are able to protect the bamboo by forming a finishing layer that covers all the pores of the bamboo. However, since the concept of this design is natural, linseed oil was chosen as the finish because it is still able to showcase the natural texture of the bamboo and this type of finish is also made from seed oil so it is chemical free and safe for the skin.

**Table 5 - Finishing Exploration**

| Nail Polish | Varnish | Spray Paint |
|---|---|---|
|  |  |  |

| Linseed Oil | Beeswax |
|---|---|
|  |  |

**RESULT**

The realisation of ideas begins with the visualisation of ideas into ideation sketches. The initial ideation sketches were done to search for the broadest form possible. From the 30 ideation sketches made, 3 ideations were selected which were then developed into 15 ideations and then the following top 3

ideations were selected to be realised into the final product. Furthermore, a 3D model was made as an operational and size simulation to minimise product failure.

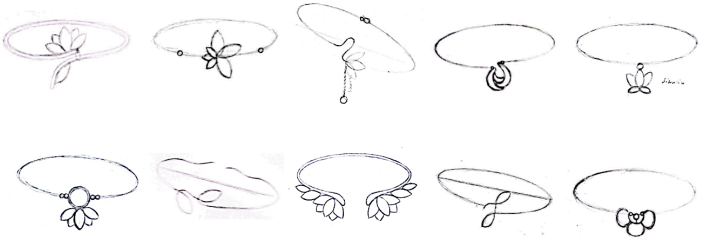


Figure 7 Ideation Sketch
Source: Author's processing

Figure 8 3D Modelling Design
Source: Author's processing

After the 3D model is deemed to be in accordance with the target size and assembly system is deemed successful, then proceed to the process of making a model study using the original material according to the size and shape of the 3D that has been made. This is done to find out the characteristics of the material in the field, whether the design can actually be realised with the specified material or not. If this initial prototype is successful and there are no problems in the manufacturing process or built quality, then the final prototype can be made.

Figure 9 Low Fidelity Prototype
Source: Author's processing.

The final prototype was made with an interchangeable pin system to support Gen Z's preference for customised and personalised products. Thus, by using magnetic pins in the form of endemic flower shapes, users are expected to be more able to express and create through the bamboo coiling jewellery. Endemic flowers were chosen as the inspiration for the shape of the magnetic pins with the hope that the jewellery can also serve as a means of promoting Indonesia's natural wealth that needs to be preserved and preserved at all times. The use of the magnetic pin is very easy, the magnetic pin is placed on the front of the jewellery (the round part that has depressions on the front and back) while the partner magnet is placed on the back so that the magnetic pin can stick to the jewellery.

Figure 10 Final Prototype
Source: Author's processing.

## DISCUSSION

1. The use of natural finishing takes a longer time because it takes time for the finishing to seep into the pores. Based on the author's experience, 1 week is enough for the natural finishing set so that the finishing results can be used comfortably.
2. The shape of the jewellery needs to be considered because it affects the weight, asymmetrical jewellery is very prone to weight imbalance which when used will be heavy to one side so that it does not match the expected appearance and has the potential to make the user feel uncomfortable.
3. Bamboo coiling can still be further explored in terms of product form and variation.
4. Bamboo coiling has a similar technique to the lamination technique, where the bamboo slats are attached to each other, so the difference between the two is the roll. Bamboo coiling is made by rolling while lamination is only attached in parallel.

## CONCLUSION

From this design, the following conclusions can be drawn regarding bamboo processing, coiling techniques and Gen Z preferences:

1. Bamboo is an organic material that is easily attacked by fungi and destructive organisms so that processing bamboo without preservation treatment will make the results less than optimal. Natural bamboo preservation can be done in several ways such as boiling, soaking, drying and so on. However, in this design, a boiling technique is used which successfully preserves the colour and condition of the bamboo slats.
2. Coiling can be made in any diameter with respect to the thickness of the bamboo, the thinner the bamboo slice the smaller the diameter that can be made.
3. Coating wood glue on the bamboo strips can make the fibres in the strips less prone to tearing.
4. Gen Z likes products that can be personalised and customised. Despite wanting to showcase their self-image through their appearance, based on the survey results, Gen Z

prefers medium to small-sized jewellery with natural colours even for certain occasions.

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