



Transforming Cendani Bamboo Waste into Aesthetic, Ethnic-Modern Phone Cases as an Effort to Promote Local Products through Sustainable Innovation

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ABSTRACT

The increasing public awareness of environmentally friendly products has driven the demand for mobile phone accessories that are not only functional but also have aesthetic value and cultural identity. This research aims to produce an innovative eco-friendly mobile phone casing product called CENDARIA, which combines ethnic-modern style with the use of cendani bamboo waste as the main material. The methods used include identifying potential local raw materials, designing ethnic-modern designs, prototyping, product quality testing, and disseminating the development results. The results show that cendani bamboo waste can be processed into a mobile phone casing with adequate structural strength, a unique visual appearance, and high aesthetic value, making it a competitive alternative to plastic casings. This innovation proves that the transformation of local waste can produce value-added products that support environmental sustainability while strengthening cultural identity. CENDARIA has an economic impact by creating business opportunities for local craftsmen and providing environmentally friendly product choices for consumers. CENDARIA can be a model for developing creative products based on local resources that contribute to waste reduction, economic empowerment, and a sustainable lifestyle.

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INTRODUCTION

Indonesia is known as a country rich in natural resources, one of which is bamboo, which grows almost everywhere ([Iyowau, 2021](#)). Bamboo has been widely used for construction, furniture, and crafts, but its use often leaves behind large amounts of waste ([Suriani, 2017](#)). Bamboo waste is generally left to pile up or even burned, causing environmental problems and lost opportunities for added economic value ([Hendrawardani et al., 2023](#)). For example, only a portion of the cendani bamboo culm is used by craftsmen, while the remainder ends up as unmanaged waste. Cendani bamboo, in fact, has the advantage of fine, strong fibers and unique characteristics that are rarely utilized optimally ([Widagdo, 2019](#)). This situation indicates a significant opportunity for innovation in processing bamboo waste to create new uses. Thus, the issue of waste management can be transformed into a strategic opportunity that is economically and socially beneficial. Cendani bamboo waste is shown in Picture 1.



Picture 1. Cendani Bamboo Waste

As public awareness of environmental issues increases, a new trend in consumption patterns has emerged: choosing products that are not only functional but also environmentally friendly and aesthetically pleasing ([Prasetya, 2025](#)). One product closely associated with the modern lifestyle is the cellphone case, which is no longer seen simply as a device protector but as a part of the user's identity and self-expression. Unfortunately, the cellphone case market is still dominated by plastic-based materials that are difficult to decompose and contribute to environmental pollution. The gap between the public's need for sustainable products and the dominance of plastic materials opens up space for new innovations ([Dewi et al., 2023](#); [Nugraha et al., 2024](#)). Cendani bamboo waste can be the answer to this challenge, as it offers a sturdy natural material with a unique texture and the potential to create products that differentiate themselves from conventional casings. Thus, bamboo waste-based innovations can provide solutions while enriching the range of environmentally friendly products on the market ([Dahri et al., 2025](#); [Susanti & Gunawan, 2025](#); [Handira et al., 2024](#)).

Changing consumer tastes also demonstrate a high appreciation for products that blend tradition and modernity ([Dahnial, 2025](#)). In recent years, the trend of ethnic designs combined with modern touches has become increasingly popular, particularly in lifestyle products ([Amri et al., 2025](#)). Cell phone cases with ethnic-modern nuances can be a medium for showcasing local cultural identity while remaining in line with global tastes. This aligns with the growth of the creative industry in Indonesia, which focuses on products based on local wisdom and sustainable innovation ([Laksmi & Arjawa, 2023](#); [Krisnatalia et al., 2023](#)). Processing cendani bamboo waste into ethnic-modern casing designs can bridge the gap between growing market demand and untapped local potential. In this way, local products not only emerge as an alternative but also have their own unique appeal amidst the intense competition in the cell phone accessory industry.

The arrival of CENDARIA, an aesthetic, ethnic-modern style phone case made from cendani bamboo waste, is the answer to this challenge. This product presents novelty by combining the ethnic value of natural bamboo fiber with a modern design that suits the tastes of today's consumers. CENDARIA is not just a functional product, but also an innovative work that elevates local cultural identity while addressing sustainability issues. With this uniqueness, CENDARIA is able to differentiate itself from conventional casing products made from plastic or traditional bamboo craft products that are still limited to decorative aspects.

CENDARIA's innovation is implemented through research and development grants, enabling the transformation of ideas into tangible products. As a form of innovation in education, research and development activities encourage the application of knowledge, skills and creativity in a contextual manner ([Jumini et al., 2023](#)). The grants carry out a series of activities, from bamboo waste processing and design development to prototyping and product testing. This process ensures that the resulting product not only meets aesthetic standards but also meets quality standards and functions as a mobile phone protector. Thus, this research confirms that local waste can be processed into innovative, highly competitive products.

The main objective of CENDARIA's presence is to utilize cendani bamboo waste to have added value through creative processing that is oriented towards sustainability. CENDARIA is also intended to expand opportunities for developing bamboo-based products in the realm of a more modern creative industry. The benefits of CENDARIA can be felt at various levels. For the environment, this product helps reduce bamboo waste that was previously thrown away. For the community and craftsmen, the presence of this product opens up new business opportunities that have economic value. For consumers, CENDARIA provides an alternative product that not only protects devices, but also conveys a message about environmental awareness and pride in local culture. The output targets to be achieved are publications in Journals/Print & Electronic Media, CENDARIA Casing products that are developed into MSME products, marketing by utilizing electronic media (social media).

METHODS

This research uses a product innovation-based approach, utilizing cendani bamboo waste as the primary material for making mobile phone casings. This approach was chosen because it emphasizes the process of transforming local materials into useful and aesthetically pleasing products through the stages of design, production, and quality evaluation. The research method used is a mix of qualitative and quantitative. The qualitative approach was used to explore the potential of raw materials, processing processes, and design characteristics that align with ethnic-modern values, while the quantitative approach was used to measure the physical quality of the innovative products.

The research design was structured in stages and systematically according to the product innovation flow ([Rindrayani et al., 2025](#); [Muthmainnah, 2025](#)). The first stage involved identifying the problems and potential of cendani bamboo waste through field observations and coordination with local bamboo craftsmen and entrepreneurs. The second stage involved designing an ethnic-modern style mobile phone casing through sketching, motif selection, and initial model development. The third stage was the production process, involving cutting, smoothing, and assembling cendani bamboo according to standard mobile phone casing sizes on the market. The fourth stage involved product quality testing and dissemination through exhibitions, MSME networks, and digital media.

The research instruments used included an observation sheet to identify the characteristics of cendani bamboo waste, an interview guide to obtain information from craftsmen and business owners, and a product quality assessment sheet. Qualitative data were obtained from observations and interviews related to the material selection process, bamboo processing, and phone casing

design. Quantitative data were obtained from product testing results covering aspects of strength, comfort of use, and durability of the casing. Data sources came from local craftsmen, MSMEs, and product testing results conducted during the research process.

Qualitative data were analyzed using descriptive analysis techniques through data reduction, data presentation, and conclusion drawing to identify material characteristics, production processes, and design suitability (Kim et al., 2017). Quantitative data were analyzed using descriptive statistics in the form of average values and percentages to describe the quality level of the Cendani bamboo cellphone casing. The analysis results were used as a basis for product evaluation and design and production process improvements. The analysis provides a comprehensive overview of the product's feasibility from a functional, aesthetic, and environmental sustainability perspective.

RESULTS AND DISCUSSION

The CENDARIA innovation, developed from cendani bamboo waste, has achieved a number of noteworthy results. Raw materials often considered worthless were successfully sorted, cleaned, and prepared until they were ready to be processed into the basic material for a product. This stage demonstrated that bamboo waste actually still has great potential if handled properly. Next, the design idea was developed by combining ethnic touches that reflect the richness of local culture with modern nuances that suit today's lifestyle needs. This design process resulted in a cellphone casing that not only functions as a device protector but also has a unique visual and artistic value. Entrepreneurship is seen as a key engine of economic growth and development (Jumini, 2020). This is because it can transform underutilized resources into sustainable economic opportunities. Next, the design idea was developed by combining ethnic touches that reflect the richness of local culture with modern nuances that suit today's lifestyle needs. This design process resulted in a cellphone casing that not only functions as a device protector but also has a unique visual and artistic value. The production phase then demonstrated that cendani bamboo can be processed using simple techniques while producing considerable strength and durability. Initial testing showed the product was quite suitable for use and aesthetically pleasing, thus opening up the opportunity for market acceptance. Furthermore, the involvement of local craftsmen adds social value because this innovation is not only about the product but also about empowering the community. Initial user feedback also shows interest in the environmentally friendly product, which differs from typical plastic casings and has local characteristics. Thus, the demonstrated success is not only related to the final product, the phone casing, but also to the process, benefits, and opportunities for further development. The process of transforming cendani bamboo waste into an aesthetic, ethnic-modern phone casing involves the following steps.

1. Provision of Raw Materials

The raw material procurement process in the production of CENDARIA Casing is the most important stage in determining the quality and sustainability of the resulting product. The raw material procurement process in the production of CENDARIA Casing begins with the selection of cendani bamboo waste as the main ingredient in its manufacture. This cendani bamboo waste was chosen because it has strong fibers, a unique texture, and high aesthetic value. In addition, the utilization of cendani bamboo waste can also be an effective solution in reducing the amount of

organic waste from local cendani bamboo craftsmen, which often causes environmental problems for the surrounding community ([Wicaksono, 2023](#)). Before being used, the obtained cendani bamboo waste goes through a selection, cleaning, and drying stage to ensure that the bamboo is truly ready to be processed into ready-to-use casing products.

In addition to the main material of cendani bamboo, various additional materials also need to be carefully prepared. Additional materials such as resin, epoxy glue, dye, varnish, gold foil paper, silver foil paper, glitter, and clear coating are also needed to strengthen the structure, add beauty, and protect the product to produce a durable and high-selling casing. In addition to production materials, other supporting materials such as the outer packaging of the product are also one aspect that supports the selling value of the product, plastic packaging, packaging cardboard and product logo must be carefully designed to produce a quality final product and be able to increase its appeal in the marketing process. With careful and well-planned preparation of raw materials, CENDARIA Casing is able to produce innovative, environmentally friendly and high-selling products.

2. Ethnic-modern design

The ethnic-modern design applied to the CENDARIA Casing is the main characteristic that distinguishes this product from various cellphone casing products that have been widely circulated in the market. The ethnic element in the design of the CENDARIA Casing is shown by the use of cendani bamboo which has its own characteristics, thus adding a strong and unique aesthetic value to the final result ([Naryono, 2020](#)). This bamboo material shows a unique local identity and shows local cultural wisdom, which makes each product produced have a different appearance and structure depending on the bamboo material used in each casing, this is the main characteristic of the CENDARIA Casing design and provides a unique and exclusive nuance for each casing produced. This ethnic nuance is then combined with a touch of modern value, the use of decorations such as foil paper, glitter, and the finishing process using resin and clear coating is able to present a casing that not only looks unique and aesthetic but can also show an elegant, shiny impression and is able to follow the tastes of today's consumers.

The combination of these two things is able to produce a casing product that not only functions as a cellphone protector but also as a high-value artistic item that has an aesthetic, unique and exclusive visual appeal. The ethnic-modern design carried by CENDARIA Casing makes this product not only an ordinary accessory but also a symbol of an environmentally friendly lifestyle that is currently trending in various circles. This product concept is able to reach a wide market by presenting uniqueness, originality, a sustainable lifestyle and a symbol of environmentally friendly concern with a unique local cultural identity, stylish and contemporary.



Picture 2. CENDARIA Casing Design

3. Production process

The production process of CENDARIA Casing is carried out through several structured stages starting from the processing of cendani bamboo waste to the product packaging process.

The first stage carried out in the production process of CENDARIA Casing is the processing stage of cendani bamboo waste obtained from local craftsmen. Cendani bamboo waste is collected from the remaining bamboo produced by cendani bamboo craftsmen that is no longer used and has no selling value. The collected bamboo is then sorted from parts that are still strong and not rotten, to maintain the quality of the product produced. Then the bamboo that has passed this sorting stage is washed until clean and dried in the sun for 3-5 days to reduce the water content until it is completely dry. After the bamboo is dry, it is then cut according to the size of the casing to be made using a cutting machine carefully. The pieces are then smoothed with sandpaper and then soaked in polish to provide a shiny nuance but without eliminating the original value of the cendani bamboo. After being coated with polish, the bamboo is dried again in the sun until dry to increase the bamboo's resistance to water and mold before proceeding to the printing stage.

The next stage is the casing molding stage. At this stage, the prepared bamboo is then arranged into a casing according to the type of phone to be produced. The resin is measured at 100 ml and mixed with epoxy glue at 30% of the resin volume. If necessary, resin dyes or natural pigments are added to create attractive color variations. The mixture is poured onto the bamboo pieces and allowed to harden. The resulting casing is then inspected for quality and durability before proceeding to the next stage.



Picture 3. Casing Printing Process

The next stage is the product finishing process. The finished casing is then smoothed again to even out the surface. Then, holes are made in the casing such as button holes, charging ports, and speakers so that the resulting casing truly matches the desired cellphone model. After that, the surface of the casing is coated with clear coating and varnish to provide a glossy effect, strengthen durability, and enhance the aesthetic value of the product. If necessary, various additional elements such as glitter, voil paper or other ornaments can be added as a finishing touch that can add aesthetic value and a modern feel to the casing produced according to your wishes.



Picture 4. Final Result of CENDARIA Casing

The final stage of the CENDARIA Casing production process is product packaging. Product packaging is carried out with a two-layer system, namely the inner layer and the outer layer of the product. The inner layer uses transparent plastic to protect the casing from dust and moisture, while the outer layer is an environmentally friendly cardboard that is attractively designed with the product logo and identity. This packaging not only functions to protect the

product from damage during distribution, but also as a branding medium that can increase consumer appeal. The production process of CENDARIA Casing not only prioritizes quality and aesthetic value, but also prioritizes environmentally friendly values and empowerment of existing local potential. The combination of natural materials, handmade techniques, and ethnic-modern designs that are carried make this product unique, high economic value, and able to compete in the highly competitive mobile phone accessories market.

4. Packaging

Product packaging is one of the important requirements in CENDARIA Casing production activities as an effort to maintain quality, maintain cleanliness, increase sales value in the market while maintaining product safety until it reaches the hands of consumers. The concept of this product packaging carries an ethnic-modern nuance, which combines environmentally friendly elements and contemporary modern designs. CENDARIA products are packaged in layers to ensure the product remains protected from contamination, damage and environmental influences during the distribution process. The product is packaged using transparent plastic as the first layer to protect the product from dust, dirt, moisture, to protect the product from damage. Furthermore, the product is packaged in a specially designed cardboard packaging with an attractive and aesthetic appearance to attract the attention of consumers in the market. This cardboard is designed with a simple but exclusive pattern without eliminating the unique, aesthetic and strong impression that is the hallmark of CENDARIA Casing. This cardboard packaging not only functions as a protector to maintain the condition of the product from impacts and pressure during the distribution process but also as an important medium to show the identity of the product.

The packaging design is designed in such a way with a unique selection of colors, materials and visual elements so that it can reflect the character and value of the resulting product. The CENDARIA Casing packaging logo displayed has aesthetics, uniqueness, and function and shows the meaning of the product which is not only present as a cellphone protector, but also as a symbol of an eco-friendly lifestyle. Each package presented carries the nuances and stories of sustainability, creativity, and pride in local culture. The specially designed packaging makes consumers feel like they have a unique, exclusive product, while also being beneficial for the environment so that consumers can easily recognize and remember this brand.



Picture 5. CENDARIA Casing Packaging

5. Marketing

In marketing this CENDARIA Casing product, a strategy is used starting from a simple understanding by inviting consumers to get involved in utilizing sustainability and an environmentally friendly lifestyle. With an affordable price of Rp. 25,000.00 per unit, this product is deliberately made at an affordable price by considering market segmentation, namely teenagers to young adults who generally have a high interest in gadget accessories at affordable prices. The market reach from teenagers to adults is a group that is close to technology and likes new trends, but is also starting to care about sustainability issues, so it is very suitable for the environmentally

friendly concept developed by CENDARIA Casing. This pricing is also done by considering the many competitors who also offer similar casings, with an affordable price CENDARIA Casing will be able to compete in the market without reducing the quality of the products produced.

Product marketing is conducted both online and offline. CENDARIA's online marketing is present in spaces familiar to the digital generation, namely by utilizing social media and online marketplaces such as Shopee, TikTok, Lazada, WhatsApp, Instagram, and Facebook as a showcase and storytelling medium. Product photos, short videos about the manufacturing process, or testimonials from consumers who are proud to use local bamboo casings are all packaged to create a deep sense of closeness between users and the environment. It is not just a promotion, but a narrative that every purchase means participating in the effort to transform waste into works of art that are unique and exclusive and protect the earth by changing lifestyles to be environmentally friendly and sustainable.

Meanwhile, offline marketing remains a key element of interaction, offering personalized offers to consumers. Products are introduced through social circles, campus communities, and local exhibitions. Potential buyers can directly touch the bamboo fiber, smell the natural aroma of the finishing touches, or hear the story behind the production process. These simple moments often leave a deeper and more touching impression than mere social media ads. By combining personal connection through offline marketing with broad reach through online marketing, CENDARIA aims to grow beyond just a phone case product, but also as a movement of creative young people proud of local potential and concerned with environmental sustainability. Each case carries a unique story and artistic value, and each story makes CENDARIA a worthy choice for embodying the eco-friendly trend.

6. Dissemination and Sustainability Strategy

The dissemination strategy is a planned and systematic step to introduce the CENDARIA Casing innovation so that it can be known, accepted, and utilized by consumers widely. The goal is not only to introduce the product, but also to ensure that the designed message can be conveyed and understood, and have a positive impact on society. The CENDARIA Casing dissemination strategy is carried out in a planned manner to introduce this product made from cendani bamboo waste to the wider community. The main targets are teenagers to adults as well as environmental groups. The message to be conveyed emphasizes that the CENDARIA Casing not only functions as a cellphone protector, but also presents an ethnic-modern design, aesthetic value, strong, affordable, and at the same time supports the environmentally friendly movement and local empowerment.

The product was widely introduced through promotional activities to nearby communities such as schools, campuses, and gadget accessory enthusiast groups, as well as utilizing social media channels and online marketplaces such as Shopee, TikTok, Lazada, WhatsApp, Instagram, and Facebook. Creative content in the form of product photos, unboxing videos, and customer testimonials were chosen to attract consumer attention. In today's era of digitalization, everything can be controlled using technology from various platforms that have been widely developed and used by the public. By utilizing social media and these technological advances, CENDARIA Casing was able to expand its network and create partnerships in various circles ([Rahmawati, 2022](#)). The effectiveness of dissemination was then evaluated through consumer responses, sales levels, and testimonials, which then became the basis for product improvements and subsequent

promotional strategies to increase the selling value and expand the market reach of CENDARIA Casing products.

The sustainability strategy of CENDARIA Casing is focused on environmentally friendly principles, empowering local potential, and planning existing resources to have high value through sustainable innovations. Creativity and innovation activities create change by optimally utilizing available opportunities and resources to produce added value ([Jumini et al., 2022](#)). Cendani bamboo waste that was originally worthless is processed into unique and high-value products, with product and packaging designs that are continuously developed in accordance with market trends that continue to develop following the current era and changes. Effective dissemination expands product acceptance, while sustainability ensures its long-term benefits. The strong synergy between the two is able to make CENDARIA Casing able to continue to develop as a unique, strong, exclusive, and environmentally friendly ethnic-modern product innovation while having high economic value and being able to compete with other competitors amidst the current developments.

CONCLUSION

This research shows that cendani bamboo waste has high potential to be processed into aesthetic, ethnic-modern style mobile phone casings that are functional and add value. Utilizing local waste through product innovation can produce alternative, eco-friendly mobile phone accessories that are competitive in the modern market. The research findings confirm that combining elements of sustainability, function, and aesthetics can strengthen the identity of local products while increasing their economic value. This innovation also encourages the growth of business opportunities for artisans and MSMEs based on natural materials. These results have a real impact in the form of reducing bamboo waste, creating business opportunities for local artisans, and increasing consumer awareness of environmentally and culturally based products. The CENDARIA innovation shows that creative processing of local resources can be an effective strategy in supporting a sustainable creative economy and contributing to strengthening regional potential towards a wider market.

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