Sustainable Design As An Effort To Develop Bali Special Woven-Bamboo Packaging

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The Bali Provincial Government through PERGUB (Governor Regulation) Number 97 of 2018 has regulated the Limitation of Disposable Waste Generation. The implementation of these regulations has been implemented among Small and Medium Industries (IKM) that produce Balinese souvenirs. The IKM sector has begun to switch to using bamboo packaging, which is commonly used to package banten pejati (Balinese traditional offerings) sold in traditional markets. However, this condition causes the appearance of food packaging designs that package Balinese souvenirs to look uniform, lacking a touch of local Balinese culture that can be used as an identity for Bali’s superior products branding to tourists. This creation aims to design bamboo packaging as Balinese souvenir packaging which has the concept of eco-friendly design. The research method was used to formulate the motif design concept and the method of creation to design the bamboo packaging design by adopting the woven bamboo technique at the bamboo craft center in Bali. The novelty of this bamboo packaging design can be seen in the motif design inspired by Geringsing Cemplong weaving motif which is formed with the woven bamboo technique. This motif has never existed before and is able to represent the identity of the local Balinese culture. The color material used as paint is a natural color material. Derived from mixing mango leaves and strobilanthes/indigo leaves through an environmentally friendly process to produce a green color. The creation of environmentally friendly bamboo packaging is expected to inspire woven-bamboo craftsmen to start switching to environmentally friendly products that are safe to use in food packaging.

Keywords: Bamboo Packaging, Sustainable Design, Woven, Bali

Desain Berkelanjutan Sebagai Upaya Pengembangan Kemasan Anyaman Bambu Khas Bali


Keywords : Kemasan Bambu, Desain Berkelanjutan, Anyaman, Bali

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INTRODUCTION

Policies to reduce waste generated from the use of packaging materials and improve resource efficiency have been targeted by governments around the world through the 17 sustainable development goals set by the United Nations (UN) in 2015 (Schmidt Rivera et al., 2019). UN Sustainable Development Goal 12 with the title responsible consumption and production specifically highlights that efficiency in the responsible use of natural resources and recycling of waste is an important target to be achieved (https://sdgs.bappenas.go.id/tujuan-12). The use of plastic waste as packaging has produced 8.3 billion tons of plastic since the 1950s, 9% has been recycled, 12% is burned and the remaining 79% pollutes the environment (Zaman & Newman, 2021). Food packaging made of plastic is the largest contributor to waste, but on the other hand, the use of plastic packaging has the potential to protect and prolong the packaged food product (Schmidt Rivera et al., 2019). Based on a study by Sustainable Waste Indonesia on the value chain and recycling in 2017 in connection with the condition of Indonesia's waste flow, it was found that the second largest percentage of waste components is plastic waste at 14%, organic waste at 60%, paper waste at 9%, metal waste at 4.4% and other waste such as glass, wood, and other materials at 12.7% (Kubonbody, 2019).

The phenomenon of the use of plastic waste as a packaging material is currently a global issue in the midst of the many negative impacts it causes, giving rise to policies for implementing a sustainable packaging system, in order to achieve a free-from-plastic-waste environment and to preserve a maintained environmental ecosystem (Trubetskaya et al., 2022). The world community is starting to think of various solutions to problems as a result of the use of plastic packaging materials. Environmentally friendly packaging materials that can be decomposed into alternative packaging materials are being developed and are becoming a current trend (Granato et al., 2022). The use of environmentally friendly and biodegradable packaging materials has received a positive response from consumers compared to single-use flexible packaging (Steenis et al., 2018). Environmentally friendly packaging according to consumer perception can be classified into three groups as follows: packaging materials, technology in the manufacture of environmentally friendly packaging, and visual appeal through packaging design elements. Therefore, this category can be used as a foothold in developing a sustainable packaging design strategy (Nguyen et al., 2020). The use of environmentally friendly packaging materials has an important role in shaping consumer perceptions, especially regarding the concept of sustainable design, and is able to influence the taste quality of packaged products. The packaging is designed not only to fulfill the function to protect the product, but it is necessary to pay attention to the design of the packaging graphic element as an identity to function as a means of product information (Steenis et al., 2017). However, environmental issues as a result of the disposal of plastic packaging waste are a common issue that must be solved by the world community. This is because single-use plastics are responsible for environmental damage and produce waste, which takes a long time to decompose. Therefore, this problem must be handled properly through efforts to improve packaging design towards zero plastic waste and to limit the use of single-use plastics in various lines of life (Zeng et al., 2021).

The Government of Bali through PERGUB (Governor Regulation) Number 97 of 2018, concerning Restrictions on the Generation of Single-Use Plastic Waste has already regulated this. The public is advised not to use the three types of single-use plastic (PSP) in various activities. PERGUB Number 97 of 2018 in Bali has begun to be applied by the IKM (Small and Medium Industries) sector in the process of producing food as Balinese souvenirs. The IKM sector has begun to switch to using environmentally friendly packaging such as besek made of bamboo. The presence of besek (basket) packaging is very familiar to the Balinese because it is often used to package Yadnya/Banten pejati (Balinese traditional offerings) in traditional markets. PERGUB Number 97 of 2018 in Bali has been running for four years, the decline in the use of plastic waste has been reported, but in fact, in traditional markets, many still use single-use plastics.

Bali Governor, Mr. Koster, claims that with this policy, the Bali Government is able to reduce plastic waste in Bali by 90% (news.detik.com, 2021). The use of bamboo basket packaging as Balinese souvenir packaging is quite representative, giving a natural, environmentally friendly impression and as a substitute for plastic packaging, previously widely used by the IKM sector. Besek packaging has the ability to inhibit the growth of anaerobic bacteria because the woven fiber is porous, causing better air circulation (goodnewsfromindonesia.id, 2021). Bamboo has advantages as an ideal raw material because it has elasticity, can be processed into various forms, and has low carbon emissions so that
it does not have a negative impact on the environment (Xu et al., 2022). The advantage of besek with bamboo material as food packaging is that it has the opportunity to be developed into sustainable packaging, of course by definition, it can be used to package Balinese souvenirs. However, the packaging used by the IKM sector to package Balinese souvenirs needs to be designed taking into account the packaging design aspects (Andread et al., 2017). Based on the description above, this creation is a solution to make the besek packaging appear more classy as Balinese souvenir packaging and make the product display a high selling value. The besek packaging is designed not only to fulfill the function to protect and easily carry the product but also is designed to fulfill the information and convenience aspects, by highlighting the Balinese identity as an attraction (Wiyancoko et al., 2018).

Making this happen requires collaboration between visual communication designers, woven bamboo craftsmen and the IKM sector to create bamboo besek packaging designs by highlighting Balinese local cultural identity as an attraction. The presence of besek as Balinese souvenir packaging can be used as sustainable packaging and tourism promotion ambassadors to tourists so that they can generate the community’s economy, especially the IKM sector which produces Balinese souvenirs, as well as bamboo craftsmen affected by the COVID-19 pandemic. The purpose of this creation is to design bamboo packaging designs as environmentally friendly Balinese souvenir packaging and to develop various forms of bamboo packaging designs by considering packaging design aspects, and aesthetics, through the development of shapes and packaging motif designs that carry environmentally friendly concepts. Collaborating with woven craftsmen to produce bamboo packaging that is different and represents the identity of the local Balinese culture. The originality of this creation is highlighted by the shape of the woven motif, and the use of natural colors as packaging dyes so that the packaging design meets the criteria for environmentally friendly products and is safe to use to package Balinese souvenirs in the form of food that can be used for holiday gifts. This creation is important to do because Bali as an international conference destination requires products that also serve as global solutions regarding environmental issues, which can be used as cultural ambassadors by highlighting Balinese local cultural identity in it. The packaging design of bamboo baskets as an eco-design product with the concept of sustainable packaging is useful to help reduce the environmental burden due to landfills while also having economic value. The bamboo packaging created can minimize the use of water resources, and material energy, reduce the dangers of heavy metals, and can be reused, and recycled to reduce waste (Chengcheng, 2022).

RESEARCH METHODOLOGY

The design method of bamboo packaging design is focused on three groups consisting of materials, manufacturing processes by always prioritizing environmentally friendly principles, and the visual design elements as an attraction functioned as the local cultural identity of the Balinese. The stages of the design process were carried out through two stages consisting of the data collection stage and the packaging creation stage. The data collection stage was carried out in order to obtain primary data through surveys, observations, and interviews as a source of creative ideas as outlined in the design concept which would be applied at the design stage. Secondary data were obtained through a literature review in the form of references to similar works as references for packaging so as to produce packagings that have novelty compared to previously existing works.

The creation stage was carried out to realize the design concept into packaging design products made of bamboo to package Balinese souvenirs. The creation of works was carried out through several stages including: 1. Brainstorming to collect various creative ideas that are in mind to produce alternatives for developing more creative and new packaging designs. 2. Mind mapping is the stage of organizing creative ideas that have been collected through visual graphics to create design concepts. 3. The design concept as the basis for the creation of packaging designs was carried out by collecting visual references as a reference in the creation process. 4. The design sketch stage and the digitization of the motif were used as a reference to be developed using the woven bamboo technique. 5. The stage of creating the packaging using environmentally friendly materials such as bamboo from the type of tali bamboo obtained from Kayubihi Bangli village and buluh bamboo from Tigawasa Singaraja village by adopting the woven bamboo technique. The tools used were a saw to cut bamboo into various sizes, a scraper to clean the bamboo bark, an ax to split the bamboo, and large and small knives for slicing bamboo. The dye used was made from natural ingredients and a brush to apply natural color paint to the bamboo surface.

RESULT AND DISCUSSION

The woven bamboo packaging design is designed to
The gringsing motif as a source of inspiration was distilled into a woven bamboo packaging motif using digital techniques through a vector-based computer application program. The stages of making woven motifs were preceded by selecting several gringsing woven fabric motifs that have the potential to be developed into woven motifs for example cemplong. For the people of Tenganan Pegrinsingan village, the cemplong motif, as shown in Figure 1, is used as a means of praying and traditional rituals (Sukmadewi, 2021). Cemplong according to the tradition of the Tenganan Pegrinsingan village community, better known as cemplong memedi, consists of two words cemplong characterizing large, or small motifs (nyemplong-nyemplong) and memedi meaning an evil spirit that can disturb the harmony of the village community. Cemplong motif for the people of Tenganan Pegrinsingan village is used in the "muhu-muhu" tradition or the memedi-median procession which aims to expel evil spirits from the village (Sukmadewi, 2021).

Figure 1. Gringsing woven fabric with cemplong motif. (Source: Desi’s Document, 2022.)

Cemplong woven fabric motif was then processed digitally using a vector-based computer program. The cemplong motif was re-designed by adopting the woven bamboo technique carried out by the keben (fabric) craftsmen in the Keben craft centers of Bangli, and Singaraja districts, namely the weaving technique with an inclined position. So that in the making process for the gringsing woven fabric, the motif is vertical if it is converted into a woven bamboo shape, thus the shape cannot be realized vertically like the original, but in a horizontal position as shown in figure 2. This is because the weaving stages carried out by the keben craftsmen used inclined weaving techniques so that it can only realize motifs whose woven direction is horizontal (Sari et al., 2022).
**Cemplong** motif design that has been developed through digital techniques was then applied with a woven bamboo technique so that it can be realized. At this stage, collaboration with keben craftsmen was carried out to transfer digital images into woven forms as a reference in making woven motifs. The stages of media transfer from digital to weaving techniques by the craftsmen were carried out by making small kebens filled with samples of new motifs as a reference before being applied to bamboo packaging of various sizes. This keben will be used as a reference in weaving so that it can be imitated by other craftsmen, as shown in Figure 3. The process of making new motifs is difficult and not all craftsmen can make new motifs because it requires skill and intelligence to make it happen.

**Coloring Stage of Bamboo Materials with Natural Colors**

In order to realize environmentally friendly and sustainable bamboo packaging as well as the eco-design concept, the packaging materials used all use natural materials and do not use chemicals at all. The natural materials in question consist of bamboo as the main material and dyes sourced from nature. The bamboo material used as a packaging material is selected from the type of string bamboo/itiing tali in Balinese (*Gigantochloa apus*) or buluh bamboo. For the Balinese people, string bamboo is widely used for household crafts, crafts, building construction, and as a means of ceremonies (Arinasa, 2013). String bamboo was chosen because the material is durable and flexible so it is easy to weave to produce various motifs. Before being processed into packaging, bamboo is first processed through several stages as follows: 1). The cutting stage is done by cutting a piece of bamboo into several sizes to be formed into bamboo packaging using a saw. 2). The drying stage aims to clean the rough surface of the bamboo epidermis to make it smoother and easier to apply color using a scraper. 3). The bamboo coloring stage uses natural color paint using natural materials through a series of processes. The green color used as the bamboo dye is produced by mixing mango leaves and *strobilanthes* (indigo) leaves by boiling them for approximately two hours to produce a green pigment. The green pigment is then left to stand a day before being processed into paint by adding an adhesive made from tapioca flour as shown in Figure 4.
The colored part of the motif (foreground) is made with a longer size than the base (background), this stage is shown in Figure 5.

Figure 5. Stages of the painting process with natural colors. (Source: Desi’s Document, 2022)

The Creation Stage of the Bamboo Packaging

The bamboo packaging design was inspired by the Balinese besek and keben packaging used as a container for traditional ceremonies. The technique used is the weaving technique through several stages as follows: 1). The stage of preparing the woven material from bamboo that has been coated with natural color paint consists of nyibakin which means splitting the bamboo with an ax into small parts according to the size of the packaging made. After nyibakin, the next step is nyebid which aims to separate the skin and the contents of the bamboo so that it is easy to weave. The last step is ngangsud by using a knife to clean the bamboo so that it is thinner, smoother so that it is easy to weave into various motifs, as shown in Figure 6. 2). The stage of making woven (nyampelin) begins with making the basic part (bakalan) which functions to form a motif according to a digitally designed design. Bakalan as the beginning of bamboo packaging can be classified into two, according to the form of packaging made. The square-shaped bakalan is intended for square-shaped packaging while the rectangular-shaped bakalan is intended for rectangular-shaped packaging as shown in Figure 7. The base part of the woven bakalan is then continued to the mucuin (corner) stage. Weaving every corner of the bakalan to form a woven cemplong motif according to the desired size of the bamboo packaging as shown in Figure 7. The development of the visual elements of the packaging design motif can be sourced from art and cultural artifacts that are icons of the identity of a region (Mulyanto, 2018). Sustainable eco-design products are currently a trend in the public and have been developed in various fashion products (Nurcahyanti & Septiana, 2018). This design offers novelty by creating bamboo packaging as a form of eco-design development in the field of packaging design and product design.

Figure 6. Stages of the painting process with natural colors. (Source: Desi’s Document, 2022)

Figure 7. The weaving stage of the bakalan (bottom part) is square (top left), rectangular bakalan (top right), and the mucuin for the cemplong motif (bottom left), and the finished packaging design (bottom right). (Source: Desi’s Document, 2022)

CONCLUSION

The design of packaging made of bamboo as Balinese souvenir packaging is realized through several stages while maintaining a sustainable and environmentally friendly design. The sustainable packaging design referred to here is to design packaging made of bamboo so that it can continue to be used after its main function has been performed, in this case, the packaging can be reused for different functions so that it can continue to be used as another useful packaging and can reduce waste while functioning as an art craft icon from Bali. The form of packaging that was designed was inspired by the keben for the Balinese people and functioned as a container during ceremonial activities. Keben as packaging is designed with a new motif that has never existed before, the application of natural color
paint as a color was chosen with the aim of not contaminating the packaged food. Through the creation of bamboo packaging, it is hoped that bright ideas will be born in different fields by carrying out the concept of eco-sustainable design.

The creation of bamboo packaging designs by carrying out the eco-sustainable design concept offers a new trend in the creation of packaging designs made from bamboo. Bamboo packaging was designed as a pioneer to be developed by keben craftsmen in Bali by starting to switch to using natural materials as a form of responsibility to the environment.

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