

## Profits of Products Processed from Bamboos of the Forest Area of Mareje Bonga, Central Lombok, Indonesia

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### ABSTRACT

The aim of this research is to analyze the profits generated from products processed from bamboo sourced from the Forest Area of Mareje Bonga, Central Lombok, Indonesia. It is expected to bring several benefits, particularly to improve the livelihood of the communities inside and outside the area of the forest. This research used a survey method. The surveys were carried out with semi-structured interviews and field observation to bamboo locations, bamboo growers, bamboo processors, and bamboo traders. These primary data were completed with secondary data. Collected data were analyzed accordingly by applying several analyses, such as descriptive analysis, descriptive statistics, and profit. The study revealed that bamboos from the area of Mareje Bonga Forest are marketed inside and outside the area. The bamboos are then processed into several bamboo products of high and low added values or profits. Inside the area of the forest, a higher profit was generated by large buckets. Outside the forest area, three bamboo products were promising for their profits, i.e., gazebo, set bench, and lazy bench. There are more types of bamboo products and more profitable bamboo products outside the forest area than inside. The novelty of this study is on the finding that more profitable products are located at a longer distance from its resources. This study brings several implications in economics, environment, and policy making.

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## **INTRODUCTION**

Bamboo, often regarded as the "green gold," is one of the most sustainable and fast-growing resources in the world. With a history of use dating back thousands of years, bamboo has gained increasing attention in modern times due to its environmental benefits and economic potential. Particularly in tropical regions, bamboo is widely available, easy to cultivate, and has a diverse range of applications. In Indonesia, bamboo has been an integral part of both traditional culture and contemporary industries, from construction materials to handicrafts, and even in modern applications such as biofuels and textile production (Bhat, Mishra, & Sharma, 2019).

The Forest Area of Mareje Bonga Central Lombok is characterized by abundant bamboo groves that thrive in the local climate and soil, making it an ideal location for bamboo cultivation and processing. In this context, exploring the economic potential of bamboo and its processed products in Mareje Bonga presents a significant opportunity for sustainable development, poverty alleviation, and rural empowerment. Given the rising global demand for sustainable materials and products, it is critical to evaluate the profits generated from the processing of bamboo.

Bamboo-based industries hold immense economic potential, especially in rural and forested areas, such as the Mareje Bonga Forest Area. The region's bamboo resources, if properly managed and processed, could offer a viable alternative to traditional timber industries, which often contribute to deforestation and environmental degradation. By shifting towards bamboo, local economies can tap into a sustainable source of income while mitigating the adverse environmental effects of logging (Sutanto, Ardiansyah, & Sunardi, 2017). The economic benefits of bamboo processing extend beyond just the selling of raw materials, as the development of value-added products can lead to higher profits and greater job creation.

The first stage of bamboo processing often involves the harvesting, drying, and cutting of bamboo poles for use in construction, furniture, and other products (Huang, Lin, & Zhang, 2018). In Mareje Bonga, the bamboo harvested from local forests is primarily used for traditional purposes, such as making handicrafts, furniture, and structures like fences and houses. However, the potential for higher value-added products, including bamboo flooring, bamboo textiles, and even bio-based chemicals, remains largely untapped in the region. The global market for bamboo-based products has experienced significant growth, and the demand for environmentally friendly alternatives is expected to continue to rise (Wu, Zhang, & Zhang, 2020). As a result, there is an opportunity for the region to diversify its bamboo-based industries and create more profitable markets for its products.

Furthermore, the labor-intensive nature of bamboo processing provides a direct opportunity for rural employment. Processing bamboo into various products requires a skilled workforce, ranging from artisans crafting bamboo handicrafts to workers involved in the industrial processing of bamboo into flooring or furniture. As such, developing bamboo processing industries can play

a key role in providing livelihoods for local populations in Mareje Bonga, while simultaneously contributing to the economic resilience of the region.

Beyond the economic opportunities, the processing of bamboo also aligns with global trends in sustainable development. Bamboo is often considered a carbon-negative material, as it sequesters more carbon dioxide than traditional timber. This makes bamboo processing an environmentally friendly alternative to timber and other materials that contribute to deforestation and carbon emissions (Huang et al., 2018). In regions like Mareje Bonga, where deforestation is a concern, the cultivation and processing of bamboo can provide an alternative to traditional agricultural practices that often lead to soil erosion and loss of biodiversity.

While the potential for profitability in bamboo processing is clear, there are challenges that must be addressed to maximize the economic returns from this resource. One of the main obstacles in the bamboo industry is the lack of infrastructure and technical expertise in some rural areas. For example, the processing of bamboo into high-quality, durable products such as flooring or furniture requires specialized equipment and skilled labor, which may not always be readily available in rural areas (González, Li, & Wang, 2020). However, these challenges also present opportunities for development initiatives focused on providing training, improving processing technologies, and enhancing market access for bamboo products.

The key to realizing the profitability of bamboo processing in Mareje Bonga lies in fostering an integrated approach that involves local communities, government support, and private sector investment. The Indonesian government has increasingly recognized the importance of bamboo as a sustainable resource, as evidenced by its inclusion in various national development plans and initiatives aimed at promoting sustainable industries (Satria, Rizki, & Firdaus, 2022). Additionally, international organizations and non-governmental groups have supported initiatives that promote sustainable bamboo management and processing in rural areas, providing both technical assistance and access to global markets (Wu et al., 2020).

Developing a profitable bamboo industry in Mareje Bonga requires not only maximizing the efficiency of processing technologies but also ensuring that the products are of high quality and competitive in the international market. This involves adopting best practices in bamboo harvesting, processing, and product design, as well as focusing on marketing strategies that highlight the sustainability and eco-friendly aspects of bamboo products (Sharma & Arora, 2020). By tapping into both local and global markets, Mareje Bonga could become a key player in the global bamboo industry, helping to create a more sustainable and profitable future for its residents.

The aim of this research is to analyze the profits generated from products processed from bamboo sourced from the Forest Area of Mareje Bonga, Central Lombok, Indonesia. This study can bring several benefits, including the following; (1) providing insights for local businesses, investors, and policymakers interested in promoting bamboo as a profitable and sustainable industry; (2) empowerment of local communities through creating job

opportunities, promoting local craftsmanship, and improving the income levels of communities in Central Lombok; and (3) formulating policy recommendations, such as on promotion of bamboo processing as a sustainable economic activity in the region, potentially leading to the creation of supportive frameworks for bamboo industries.

## LITERATURE REVIEW

Bamboo is a renewable natural resource that holds significant economic value and plays an essential role in rural development and sustainable forest management. Various studies have shown that processed bamboo products – ranging from handicrafts and household items to construction materials and bamboo charcoal – can contribute substantially to local income, particularly in community-based forest areas and social forestry programs (Widiyanto et al., 2020; Rahmawati & Nugroho, 2018). In Indonesia, the utilization of bamboo is increasingly encouraged due to growing market demand for environmentally friendly and sustainable products (Purwanto, 2017).

## METHODOLOGY

This research used a survey method (Babbie, 2004; Fink & Kosecoff, 1998; Mosher & Kalton, 1985; Thomas, 1996) to collect data as they found in the locations. The surveys were carried out in the period of July 2024 through to November 2024, focusing on the area of Mareje Bonga Forest, Central Lombok, Indonesia. Data collection techniques applied in the surveys, included semi structured interviews, and field observation. The surveys were conducted to bamboo locations, bamboo growers, bamboo processors, bamboo traders. When population was at least three then three bamboo processors were interviewed for obtaining information on certain product he/she made. The bamboo processors were from inside and outside the area of Mareje Bonga. They are identified through information provided by informants who know the channel of bamboo from its origin (Mareje Bonga Forest Area) through to final processed products. These primary data were completed with secondary data, obtained from relevant sources, including literatures, research reports, and the sorts. Collected data were analyzed accordingly, by applying several analyses, such as descriptive analysis (Agresti & Franklin, 2017; Gartner, 2018; Harlow, 2014; Provost & Fawcett, 2013; Sharda, Delen, & Turban, 2014), descriptive statistics (Fox, 1968; Moore, 2000; Newbold, Karlin, & Thorne, 2007), and profit (Coetzee, 2013; Makeham & Malcolm, 1986; Olson, 2004; Soekartawi, 2002).

## RESEARCH RESULTS

### *Types of Bamboo in the Forest Area of Mareje Bonga*

The bamboo in Mareje Bonga Forest Area are bamboo that has been around for a long time, for many years, without the initial point of its existence being known. Practically, these bamboos already exist as a legacy from their ancestors. Thus, farmers who control existing bamboo plants do not cultivate bamboos from scratch but only maintain existing bamboo, harvest them and let new bamboos emerge by themselves from new shoots.

The types of bamboo in Mareje Bonga Forest Area are Galah bamboo (*Gigantochloa atter*), Aur (*Gigantochloa apus*), Gereng (*Bambusa vulgaris*), Bilok (*Gigantochloa ligulata*), Tali (*Gigantochloa apus*), and Tutul (*Bambusa maculata*). The bamboos grow without maintenance by farmers at that location. Without maintenance is meant as without fertilization, irrigation, or other cultivation measures. Farmers only harvest existing bamboo, then allow the remaining bamboo to grow and develop again so that bamboos can be available for sustainable production in the long term. All the types of bamboo from Mareje Bonga, are utilized for producing processed products of several kinds.

**Marketing Channel of Bamboo Log**

Bamboo in log form is marketed by farmers to final consumers in Mereje Bonga Area, to crafts persons within the village, to collectors from within the village, and collectors from outside the area. Collectors then continue marketing the bamboo to crafts persons outside Mareje Bonga Forest Area. This is sketched in Figure 1.

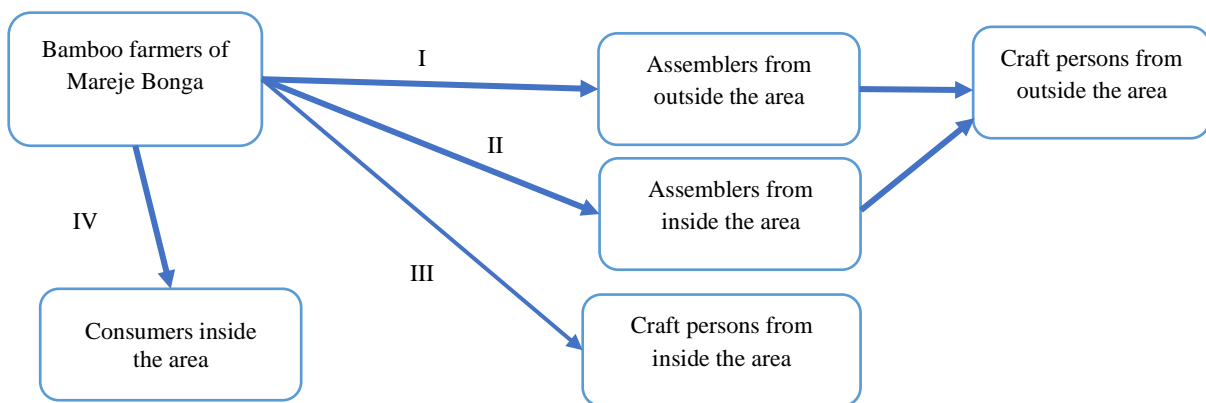


Figure 1. Marketing channel of bamboo logs of Mareje Bonga Forest

Figure 1 shows that bamboo marketing experiences level one and level two marketing. Level one marketing occurs in Mareje Bonga Forest Area, i.e. from bamboo farmers to bamboo consumers and bamboo craftsmen in the area. Second-level bamboo marketing occurs when bamboo sticks are marketed outside the area, through channels starting from farmers to collectors (inside and outside Mareje Bonga Forest Area), to craftsmen outside the area. The grouping of marketing into levels one and two here, or higher levels in other channels, refers to several literatures on marketing channels that describe the product journey from producers to final consumers (Dunne, 1999; Kotler, Armstrong, Harris, & He, 2020; Nijssen, 2022; Stanton, Etzel, & Walker, 2000; Swastha & Irawan, 2005).

**Marketing of Bamboo Products**

Bamboo is processed into bamboo craft products. These handicraft products or processed bamboo products are marketed both inside and outside Mareje Bonga Forest Area. Processed products in the Mareje Bonga Forest Area

are marketed within the area itself using marketing channels, as shown in Figure 2. Marketing of bamboo craft products in Mareje Bonga Forest Area is level one marketing, i.e. from bamboo craft producers to consumers in the area through retailers of these bamboo products. Bamboo products marketed in this area include large baskets, small baskets, *kecapil*, bird cages and bamboo sticks. Details of this marketing can be seen in Figure 2.

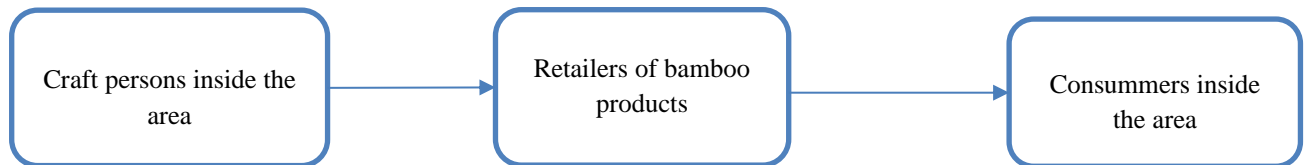


Figure 2. Marketing channel of bamboo products in Mareje Bonga

For bamboo craft products outside Mareje Bonga Forest Area, marketing is carried out directly from bamboo craft producers directly to final consumers, so it can be said as level one marketing (Dunne, 1999; Kotler et al., 2020; Nijssen, 2022; Stanton et al., 2000; Swastha & Irawan, 2005). Marketing channels for bamboo products outside Mareje Bonga Forest Area are presented in Figure 3. It should be stated here that consumers outside this area vary. They consist of hotels, households, restaurants, and cafes. Likewise, as previously mentioned, craft products consist of *gazebo* (sort of small single room, for resting), chair sets, lazy lounges, *lasah* (sort of thick mat) and fences. These marketing channels are presented in Figure 3.



Figure 3. Marketing channels of bamboo products in outside the area of Mareje Bonga

The bamboo that has been harvested is then marketed. The results of this research show that the bamboo harvest is purchased by collectors and local craftsmen. Collectors come from various locations, including Ranggagata, Kuripan and Mataram. Almost all bamboo is purchased by collectors. In practice, these collectors initiate the demand for bamboo. They came to the bamboo location, then asked for the type of bamboo they wanted. When the request by the collectors are agreed to by the bamboo farmers, the bamboo can be harvested by the farmers or collectors, transported by the collector to the collector's destination, such as Mataram, Gunung Sari, Gerung. Transport costs are borne by the collector. The bamboo with the highest demand is pole bamboo. The demand for this type of bamboo is determined by craftsmen in an area. It can be said that the demand for bamboo is almost entirely determined by consumers, especially craftsmen. These are the people who ask for the type of bamboo and the quantity, then the collectors forward the request to the farmers. From

information on demand for this product, bamboo marketing channels are depicted in Figure 3. Apart from that, there is also demand by local communities, but this demand is only small, around 0.5% of the total existing harvest volume. Local people ask for bamboo only for social purposes and for making crafts such as large baskets, small baskets, bird cage caps and stakes.

***Profit of Bamboo Products Processed Inside the Area of Mareje Bonga***

Profit obtained from processing bamboo inside the area of Mareje Bonga varies (Table 1). The main contributors of the profit are production cost and revenues from the products, as prescribed in several literatures (Dolan & Lynde, 2002; Drummond & Goddwin, 2011; Penson, Capps, III, & Woodward, 2015; Samuelson & Nordhaus, 2010; Seitz, Nelson, & Halcrow, 2002). The variations are explained as follows. The cost was majorly sourced from variable cost, with fixed cost was only some IDR 1,000. Revenue of bamboo products depend on the number of products and its prices (Dolan & Lynde, 2002; Drummond & Goddwin, 2011; Penson et al., 2015; Samuelson & Nordhaus, 2010; Seitz et al., 2002). The largest total profit in one time production was for large bucket at almost IDR 800,000. The other products gained profit of about IDR 200,000, and two of the products (small bucket and bird cage) generated below IDR 100,000. Calculation of profit per log gives the following ranks of profit, i.e. hat (ranked 1), large bucket (2), stick (3), bird cage (4), and small bucket (5). These ranks of products indicate the efficiency of using bamboo for providing the products. On the ground of efficiency of the raw material, it recommended to produce products in those orders.

Table 1. Profit of bamboo products inside the area of Mareje Bonga, 2024

No	Item	Bamboo product				
		Large bucket	Small bucket	<i>Kecapil</i> (hat)	Bird cage	<i>Ajir</i> (stick)
1	Quantity of bamboo (log)	7	3	1.333	1	50
2	Variable cost					
	a. Raw material (IDR)	35,000	5,000	6,667	5,000	266,666
	b. Supporting material (IDR)	95,000	4,167	126,333	5,000	0
	c. Labor (IDR)	5,143	5,000	5,143	5,143	4,667
3	Fixed cost (IDR)	1,333	1,300	1,333	1,333	2,437
4	Total cost (IDR)	136,476	15,467	139,476	16,476	273,770
5	Production (unit)	20	4	600	2	26
6	Price (IDR/unit)	45,000	25,000	50,000	50,000	20,000
7	Revenue (IDR)	900,000	100,000	300,000	100,000	520,000
8	Total profit (IDR)	763,524	84,533	160,524	83,524	246,230
9	Profit/log (IDR)	109,075	28,178	120,423	83,524	4,925
10	Rank of profit/log	2	5	1	4	3
11	Monthly production times (times)	2	2	2	2	2
12	Monthly profit (IDR)	1,527,048	169,066	321,048	167,048	492,460
13	Rank of monthly profit	1	4	3	5	2

These businesses are run for living. Therefore, incomes generated from these businesses have to be sufficient for meeting needs of living. Unfortunately, the given profits from all of bamboo products produced inside the area of Mareje Bonga, are insufficient for living. As a comparison, the monthly regional minimum wage for working in Nusa Tenggara Barat is IDR 2,444,067 (Disnakertrans NTB, 2024). This is nearly IDR 1,000,000 higher than the most monthly profitable bamboo product (large bucket), and it is about IDR 2,000,000 over the remaining of bamboo products. Recommendation from this finding is to produce only large bucket, since other processed products provide only a little incentive for running them, and apparently cannot support the family living.

***Profit of Bamboo Products Processed Outside the Area of Mareje Bonga***

Monthly profits generated from processing bamboo outside the area of Mareje Bonga are generally higher (Table 2) than those of the inside the area (Table 1). These differences are apparently due to more number of bamboo logs used and higher frequency production in a month. Row 1 of the both tables shows that products in outside the area use more raw materials (bamboo logs) than the products from the inside area. Similarly, row 11 of the two tables shows differences in the frequency of production process. Outside the area has more frequency of activities than the inside.

As a result, there was Gazebo that produced income of more than IDR 5 million. This is followed by monthly income from set bench, with income over IDR 1 million. Another bench (lazy bench) scored the income of nearly IDR 1 million, and this took place as third rank of monthly income. The remaining processed products generated monthly profit of less than IDR 500,000, and these appear to be insufficient for supporting family living, since the generated monthly income less than the regional minimum wage.

Table 2. Profit of bamboo products outside the area of Mareje Bonga, 2024

No	Item	Produk bamboo					
		Set chair	Lazy chair	Gazebo	Thick mat	Fence	Bucket
1	Quantity of bamboo (log)	17	7	24	13	20	1
2	Variable cost						
	a. Raw material (IDR)	170.000	70.000	240.000	130.000	200.000	10.000
	b. Supporting materi. (IDR)	95.500	66.700	564.500	216.700	0	5.000
	c. Labor (IDR)	60.000	30.000	400.000	20.000	40.000	4.000
3	Fixed cost (IDR)	5.109	5.063	3.104	3.104	625	1.333
4	Total cost (IDR)	330.609	171.763	1.207.604	369.804	240.625	20.333
5	Production (unit)	1	1	1	1	10	4
6	Price (IDR/unit)	600.000	350.000	2.500.000	400.000	35.000	15.000
7	Revenue (IDR)	600.000	350.000	2.500.000	400.000	350.000	60.000

8	Total profit (IDR)	269.391	178.238	1.292.396	30.196	109.375	39.667
9	Profit/log (IDR)	15.847	25.463	53.850	2.323	5.469	39.667
10	Rank of profit/log Monthly	4	3	1	6	5	2
11	Production times (times)	4	4	4	2	4	4
12	Monthly profit (IDR)	1.077.564	712.952	5.169.584	60.392	437.500	158.668
13	Rank of monthly profit	2	3	1	6	4	5

In brief, there some products that generated more incomes than others. Inside the area of Mareje Bonga Forest, large bucket is the product of the highest profit at IDR 1.5 millions per month. Meanwhile, outside the area, the top bamboo product is gazebo with the profit of IDR 5 millions per month. This is followed in the second and the third by set bench and lazy bench with the monthly profit of some IDR 1 million. These four bamboo products are recommended to be developed further in the business of bamboo processing. The main reason is because they are the most profitable among them, and then the profits can be useful for several purposes, in particular for meeting the needs for the family. Running these businesses in better way than the current practices will need to improve the capacity of the entrepreneurs, such as in businesses management (Barnard, 2021; Cokins, 2017; Drucker, 2008: Casavant, 1999), technical aspect, marketing (Fotiadis, 2022; Kotler, 2020 :Smith, 2002; Stanton, 2000; Ruskin-Brown, 1999; Dunne, 1999), and related so forth.

### *Novelty of the Study*

The novelty of this study is on the finding that more profitable products are located at longer distance from its resources. Previous studies evidenced that products produced at center of inputs or raw materials generated more profits than products produced from a more distance resources (Baldea, Edgar, & Stanley, 2023; Belay & Seid, 2022; Ju & Yu, 2015; Obialor, Agulanna, & Alugbuo, 2022; Porter, 1990). This study found that more profitable products are produced at outside the area of Mareje Bonga Forest than those produced inside the area. Table 2 showed more profitable products processed from bamboo than Table 1. This implies that processing bamboos should be directed to outside the area of Marje Bonga Forest, Central Lombok. This finding has several implications across economic, environmental, and government dimensions. The higher profitability of products outside the Mareje Bonga Forest suggests that better infrastructure, market access, and lower logistical costs contribute to increased economic viability. The lower profitability of forest-based products may increase pressure to expand economic activities into the forest, posing risks of deforestation and biodiversity loss. Policymakers should explore balanced strategies that promote sustainable resource use within the forest while ensuring economic opportunities for local communities.

## CONCLUSIONS AND RECOMMENDATIONS

This study concludes that bamboos from the area of Mareje Bonga Forest are marketed inside and outside the area. The bamboos are then processed into several bamboo products of high and low added values or profits. Inside the area of the forest, the higher profit was generated by large bucket. Outside the forest area, three bamboo products were promising for their profits, i.e. gazebo, set bench, and lazy bench. There are more types of bamboo products and more profitable bamboo products outside the forest area than the inside. Therefore, it is justifiable to recommend developing more bamboo products outside the region than the inside, as also supported by high demand. The entrepreneurs need to improve their business capacities, such as management, technical aspect, marketing, and so forth. The novelty of this study is on the finding that more profitable products are located at longer distance from its resources. The higher profitability of products outside the Mareje Bonga Forest recommends for better infrastructure and market access drive economic viability, while the lower profitability inside may increase pressure on forest resources, requiring policymakers to balance conservation with sustainable economic opportunities.

## ADVANCED RESEARCH

While this study provides valuable insights into the profitability of bamboo products in and around the Mareje Bonga Forest, several key areas warrant further exploration. Future research could conduct a comprehensive value chain analysis to trace the flow of bamboo from harvesting to final product sales, identifying critical value-adding activities and potential inefficiencies. This would help explain why products manufactured further from the resource base tend to yield higher profits.

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