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Bamboo-Based Industry in Selected Lgu's of Camarines Sur, Philippines

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Abstract

Bamboo is the fastest growing plant on earth. It reproduces regularly and exponentially since they belong to the woody grass family. Economically and commercially bamboo plays a significant role in poverty alleviation and combating climate change. The focus of the study was to identify the bamboo species used in Camarines Sur, players involved in the value chain of bamboo and conduct inventory on the skills of the bamboo processor. The primary data were collected through field interviews in the Selected Local Government Units of Camarines Sur, as well as secondary data were gathered from different organizations. The study identified four species of bamboo that are economically utilized, these are *Bambosa blumeana* (Kawayang tinik), *Schizostachyum lima* (dâso, ûras), *Bambosa merillana* (kawayan), *Dendrocalamus asper* (botong), and *Bambusa vulgaris* (marubal). Among the four species, the *Bambosa blumeana* (Kawayang tinik) is the preferred species for making bamboo-based products since it is sturdy and has woody culm, and has higher income yield per unit of product. The players identified are the bamboo farmers, bamboo weaver and slat maker, hardware/lumber supply dealer, bamboo furniture maker, bamboo-based product seller, and the consumers. Production of bamboo-based product are mainly manual; the design is still traditional with few variations and mainly focus on basic function rather than aesthetic and ergonomic. Bamboo farming is still considered as auxiliary source of farm income, mainly small scale and with sporadically distributed in Camarines Sur. But with remarkable potential of combating climate change and high latent economic uses that can potentially reduce poverty incidents in Camarines Sur, bamboo industry needs support from various sectors of the government and the society.

Keywords Bamboo- Based Industry; Value Chain

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1. Introduction

Bamboo belongs to the *Gramineae* family and has about 90 genera with over 1,200 species, naturally distributed in the tropical and subtropical belt between approximately 46° north and 47° south latitude, and is commonly found in Africa, Asia and Central and South America, a hardy plant able to withstand calamities, catastrophes and damage, and even nuclear bomb – as observed in Hiroshima and Nagasaki (Lobovikov et al. 2007). Bamboo may range in sizes from dwarf bamboo species that grow to only a few centimeters like *Raddiella vanessiae*, while medium-sized bamboo species may reach a few meters like the *Schizostachyum lima*, and giant bamboo species grow to about 30 m, with a diameter of up to 30 cm. Locsin (2000) stated that bamboo grows almost everywhere in tropical countries in the Philippines, particularly in places close to water such as the riverbanks and by streams. Because it is so easily found and so easily replaced, it is treated with an almost casual disregard and valued only lightly. It is indeed a relatively cheap raw material.

It is estimated that there are about 1,200 species scattered in about 18 million hectares in different ecosystem in the continents of Asia, Africa, and America (Ohrnberger 1999). Rojo (1999) reported that there are 62 bamboo species growing in the Philippines, only 21 species are endemic or native Philippine Bamboo, the rest are introduced species. Vantomme et al (2003) reveals that Bamboo is a beautiful, resistant, flexible and versatile material that can be produced in an environmentally-friendly, renewable and sustainable manner. In India for example, bamboo plantation projects were implemented as part of an economic development. Xuhe (2003)12 highlights how promotion of bamboo helps in poverty alleviation and economic development in China and East African countries. Muralitharan et al (2004) made an attempt to assess the present status, particularly structure, cost of production, long term economic benefits and socio-cultural acceptability of traditional bamboo houses. Banda and Johnsen (2005) stated the positive contribution of bamboo-based handicraft enterprises to household income, the management practices of the bamboo handicraft making, bamboo collections and the activities of stakeholders in the bamboo industries. Hunter (2003)10 explains that bamboo products are well established in international markets but accurate information in this trade is difficult to find. However, the volume of trade exceeds US\$2.5 billion and may reach US\$7 billion.

Statz (2007) analyzed the current value-added chains of bamboo for Eastern Africa Bamboo project and identified options for their development. Each value chain comprised of four elements such as design/product development, production, marketing, and consumption. He

gave a profile, sourcing, sales and market of various bamboo enterprises in Kenya, but did not look into their contribution to livelihood incomes and environmental conservation. Reza and Arshad (2012) assessment of the socio-economic benefits derived by the rural poor producer from bamboo value chain up gradation, found out that the value chain up gradation as an approach that is very much relevant for poverty reduction, women empowerment and environmental preservation in traditional as well as nontraditional sectors. It helps to develop and upgrade the various parts in the value chain and its direct impact could be observed in the socio-economic development of rural poor and small producer groups.

In Camarines Sur, there is a vibrant bamboo-based industry wherein mostly are backyard industry that produces similar designs for furniture as well as traditional bamboo woven matting (sawali), bamboo poles, and bamboo slat (bala). Engineered bamboo are also produced although not on a large quantity since they produced on a per-order basis because of irregular demand. With the rising cost of wood for construction and furniture making, bamboo is considered as the “poor man’s timber” since it is readily available in the community, less restrictions imposed on its harvesting and transportation as compared to timber, and also for its durability. It is also sought-after construction materials for communities in coastal areas because of its affordability, and versatility wherein it can be used for walling, roof rafter, post, and for fastening woven bamboo matting.

2. Materials and Methods

The research was done based on the activities in the value chain of bamboo-based product. The value chain analysis is an analytical tool which deals with studying and analyzing the process, production of the product from conceptualization, actual production, distribution, and transfer to ultimate consumer and its disposal. The outputs are; the profile of potential agricultural resource of bamboo in selected LGUs in Camarines Sur, and the analysis of bamboo value chain which is analyzed from the aspects of production and markets, business environment, supporting actors, marketing and distribution of added value, stakeholder and institutional analysis. Location of the study was in the different areas in Camarines Sur as shown in Figure 1. The respondents will be those who are involve in bamboo industry and will be randomly selected from across those areas. The researches will use descriptive quantitative design and analysis of primary and secondary data.

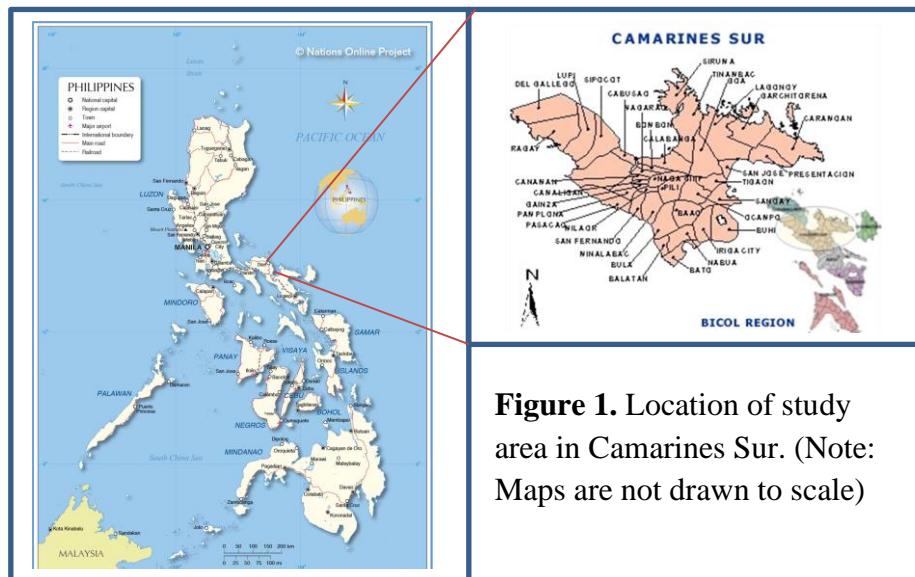


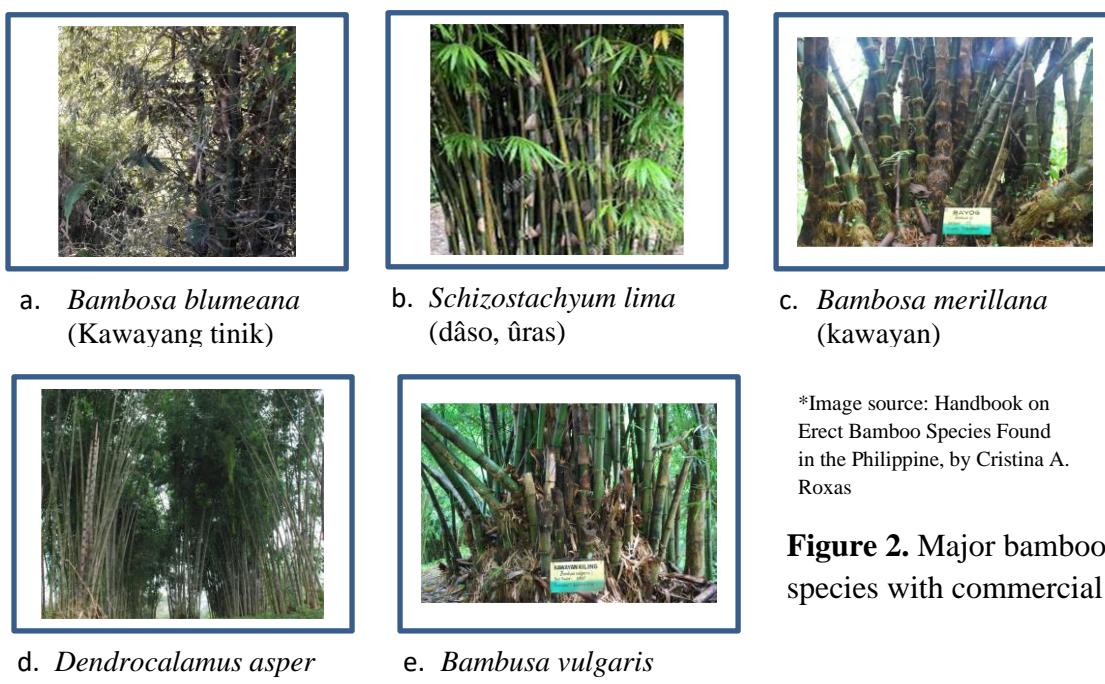
Figure 1. Location of study area in Camarines Sur. (Note: Maps are not drawn to scale)

Secondary data was gathered and analyzed, as well as primary data which was collected by means of observation, key informant interview, and transect walk. Respondents includes five (5) bamboo farmers, four (4) bamboo weaver and slat maker, eight (8) hardware/lumber supply dealer, eight (8) bamboo furniture maker, five (5) bamboo-based product seller. Snowballing method was used to identify the majority of the key informants.

3. Results and Discussion

3.1. The major bamboo species utilized in Camarines Sur

The different bamboo species identified during the study within the area in selected LGU in Camarines Sur are *Bambosa blumeana* (Kawayang tinik), *Schizostachyum lima* (dâso, ûras), *Bambosa merillana* (kawayan), *Dendrocalamus asper* (botong), and *Bambusa vulgaris* (marubal).



*Image source: Handbook on Erect Bamboo Species Found in the Philippine, by Cristina A. Roxas

Figure 2. Major bamboo species with commercial value

3.1.1. *Bambosa blumeana* (Kawayang tinik)

Among the different useful bamboo species, the *Bambusa blumeana* (kawayang tinik) is the top specie wherein there are various product made of, as well as its ubiquitous presence in the market for bamboo, and bamboo-based products.

It is also the specie that the bamboo furniture maker used since it can be turn into products that are comparable to wood-based product. Due to its durability against the weathering and insect pest, it is also the preferred materials for home constructions and repairs. The lower portion of the culm (locally known as ‘guhi’) is also the preferred substitute for wooden post and trusses in constructing native houses (bahay kubo).

The highest priced product made from this specie, as shown in Table 1, is the kubo (large size) at an average price of P30,666.67, while the lowest valued product from this specie is its culm that that can be sold for an average amount of P130.00.

Table 1. Product Made from *Bambosa blumeana* (Kawayang tinik) and Average Profitability

Product	Ave. Selling Price	Ave. Cost	Ave. Profit/Unit
Sala Set	2,600.00	1,904.00	696.00
Bed	1,800.00	990.00	810.00
Bed (Double Deck)	3,250.00	1,875.00	1,375.00
Kubo			
Large	30,666.67	11,610.00	19,056.67
Medium	20,000.00	11,450.00	8,550.00
Small	18,000.00	9,880.00	8,120.00
Dining Set (With chair)	3,500.00	2,450.00	1,050.00
Bamboo pole (upper culm)	130.00	80.00	50.00
Bamboo pole (lower culm) “Guhi”	130.00	80.00	50.00
Chicken cage	1,500.00	500.00	1,000.00

3.1.2. *Schizostachyum lima* (dâso, ûras)

For flexibility and durability, the *Schizostachyum lima* specie, locally known as dâso, or ûras, can be pounded until flattened and be woven to be turned into matting which can be sold as rolled or unrolled. As stated in Table 2., the rolled woven bamboo matting command high price at an average amount of P263.33 because it is light weight and flexible, while the unrolled woven matting though sturdy, it is stiff and not light weight, hence it is averagely priced of P220.00.

Table 2. Product Made from *Schizostachyum lima* (dâso, ûras) and its Average Profit per Unit

Product	Ave. Selling Price	Ave. Cost	Ave. Profit/Unit
Woven bamboo matting			
Rolled	263.33	220.00	43.33
Unrolled	220.00	170.00	50.00

The woven bamboo matting is also used as alternative for plywood, and also used for decorative double walling, ceiling, and as well as for walling in constructing native houses.

3.1.3. *Bambosa merillana* (kawayan), *Dendrocalamus asper* (botong), and *Bambusa vulgaris* (marubal)

Considering the other bamboo species utilized in Camarines Sur, it is used mostly for bamboo slat and bamboo pole as shown in Table 3. Among the bamboo slat, it is the 12' size that has the highest price, and the 6' size the lowest, although it is among those bamboo slat with high average profit per unit. These species include *Bambosa merillana* (kawayan), *Dendrocalamus asper* (botong), and *Bambusa vulgaris* (marubal).

Table 3. Product Made from *Bambosa merillana* (kawayan), *Dendrocalamus asper* (botong), and *Bambusa vulgaris* (marubal) and its Average Profit per Unit

Product	Ave. Selling Price	Ave. Cost	Ave. Profit/Unit
Slat (Bala)			
12'	220.00	180.00	40.00
10'	200.00	156.67	43.33
8'	176.67	133.33	43.33
6'	153.33	110.00	43.33
Bamboo pole (culm)		70.00	40.00
			30.00

With the high demand for *Bambusa blumeana* (Kawayang tinik) since it is the specie used for furniture making and main component for native house (kubo) frame, the three species fill in for the need for other bamboo product such as slat, pole and other miscellaneous uses requiring low cost bamboo component. Bamboo slat can be utilized for various uses such as rafter for native house roofing, wall bracing for bamboo woven matting, low cost flooring materials, low cost fencing materials, Regarding the culm of these three species, though not as strong and durable as the culm of *Bambusa blumeana*, it serve as a low cost alternative. With the declining availability of wood and coco lumber, bamboo culm used for constructing buildings are becoming common practice. Bamboo pole cost P70.00 as compared to coco lumber costing about P78.00.

3.2. The Local Value Chain Map of Bamboo-Based Industry In Selected LGU's In Camarines Sur

The value chain map of the bamboo-based industry in selected LGU's in Camarines Sur as presented in Figure 3, shows the following players in the chain; the bamboo farmers, bamboo weaver and slat maker, hardware/lumber supply dealer, bamboo furniture maker, bamboo-based product seller, and the consumers.

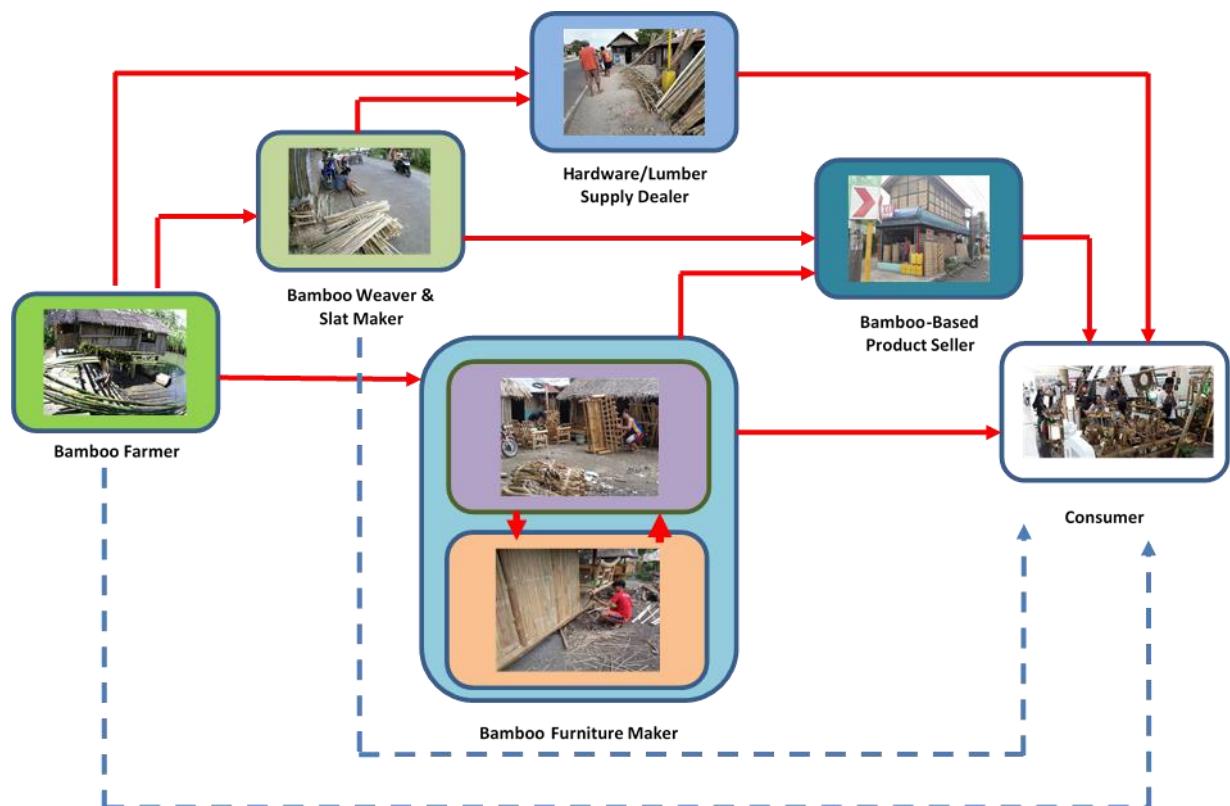


Figure 3. Value Chain Map of Bamboo Based Industry in Selected LGU's in Camarines Sur

3.2.1. Bamboo Farmers

Bamboo Farmers cultivate bamboo of various species, although they put premium on the following species such as *Bambosa blumeana* (Kawayang Tinik), *Schizostachyum lima* (dâso, ûras), *Bambosa merillana* (kawayan), *Dendrocalamus asper* (botong), and *Bambusa vulgaris* (marubal) since these are the species that are demanded in the market. Since there is no large-scale farming for bamboo, it is considered as auxiliary income for the farmer. Bamboo clumps are usually planted intermittently along property boundary, creeks, riverbanks, as well as within coconut plantation. They may be the one selling the harvested bamboo culm or they may sell it to interested buyers on a per clump basis. These players is considered as the starting point of the bamboo based product value chain.

3.2.2. Bamboo weaver and slat maker

Bamboo weaver and slat maker purchase bamboo raw materials from farmers as well as on a per piece basis or on a per bamboo clump basis similar with the hardware/lumber supply dealer. Their produce is majority delivered to their regular buyer – the hardware/lumber supply dealer. They utilize various bamboo species specially for making bamboo slat, while for making woven bamboo matting, they exclusively used the *Schizostachyum lima* (dâso, ûras) since its culm is thin and flexible. Other kinds of bamboo-based product are also made by these players on a per order basis taking into consideration the specifications required by the buyer.

3.2.3. Hardware/lumber supply dealer

Regarding the hardware/lumber supply dealer, they sell woven bamboo matting (locally known as sawali), bamboo pole (upper portion), bamboo pole (lower portion, known as guhi), and bamboo slat (locally known as bala). For pricing and costing, they regularly practice negotiated pricing and costing as they regularly haggle with customer and supplier of bamboo. Concerning the pricing, they exhibit typical behavior of merchandising business activity wherein they implement cost-plus-profit pricing strategy.

Hardware/lumber supply dealer are flexible in acquiring their supply of bamboo as they can purchase processed bamboo product or they can go directly to farmers to harvest bamboo and the purchasing arrangement is on a per bamboo clump basis ranging from P1,500.00 per clump to P5,000.00 per clump depending on the estimated culm to be harvested excluding hauling fee of P500.00 to P2,000.00 depending on the distance. They also practice lending money to bamboo farmers as advance payment for the purchase of bamboo products.

3.2.4. Bamboo furniture maker

The bamboo furniture maker, uses mainly the *Bambusa blumeana* (Kawayang Tinik) specie as it is known for its durability and can be used for furniture and other bamboo-based product that are comparable to wood-based furniture. Bamboo furniture maker in Camarines Sur produced typical and traditional designs and majority are copied from other furniture maker design. Product made by bamboo furniture maker may include sala set, bed (single deck and double deck), table and chairs, bamboo hut (kubo), engineered bamboo, decorative bamboo product, they also make product based on the customers specifications and designs. Concerning the selling price, they practice flexible pricing strategy as they can negotiate with their customer as to the amount wherein, they usually factor in the quantity being bought by costumer as well as the timing of purchase, as they can increase their price during peak season, and lower it during lean seasons.

During peak season, bamboo furniture maker near urban areas will purchase from other bamboo furniture maker, specially those located in the rural areas, whenever their inventory becomes low. Regarding design and production process, they are not particular with patenting their designs as well as they may readily copy other designs.

3.2.5. Bamboo-based product seller

Bamboo-based product seller, typically practice the merchandizing strategy wherein they constantly keep contact with bamboo furniture makers to replenish their inventory. These group of players are located in urban areas wherein they can display their ware to large number of potential buyers. They also stated that due to limited space available in urban areas, they do not have enough space to manufacture bamboo-based product, hence they rely on bamboo furniture maker for their inventory. Regarding the setting of price, they also practice flexible pricing strategy wherein, during lean season they are willing to lower their price and during peak season they can raise their price, also for customer buying large quantity, they are also amenable to decrease in price.

4. Skills, and manpower development in bamboo-based industry in Camarines Sur

The current bamboo farming practices in Camarines Sur, is considered as an auxiliary activity as there are no large scale bamboo plantation, and bamboo are preferred to be planted along property boundary area, as well as in areas wherein the land are not suitable for planting cash crop like rice and corn. Hence skills in propagating bamboo cuttings or seedling for maintain

bamboo plantation is not well developed. Although the technology and process of planting bamboo and maintaining bamboo farm are readily available, as well as high demand, there are still no farmer that focuses on operating bamboo farm, except those farm operated by the government agency. Majority of the bamboo farmers, relies on their existing bamboo clumps in their land that naturally grows or was planted intermittently along with other trees and coconut, to serve for various purpose in the farm, and in household repair and construction. Sales of bamboo culm and clumps are from these farmers are more of incidental rather than significant part of their farming activity. For bamboo weaver and slat maker, traditional design for the woven matting are still being produced and aesthetic elements in the design are minimal as compared with bamboo woven matting produced from Tacloban, Leyte as shown in Figure 4.



- a. Locally produced Bamboo woven matting with basic design
- b. Creative Bamboo woven matting design from Tacloban, Leyte, sold at Bato, Camarines Sur

Figure 4. Comparison of woven bamboo matting, locally produced matting and the matting from Tacloban Leyte.

Comparing the price, the locally produced woven bamboo matting is sold at an average of P263.00 while the price for woven bamboo matting from Tacloban, Leyte – known as “Amakan” can be sold for P250.00 to P300.00, depending on the length as shown in Table 4,

Table 4. Woven bamboo matting from Tacloban, Leyte (Amakan)

Product	Ave. Price	Selling	Ave. Cost	Ave. Profit/Unit
Bamboo woven matting (Amakan)				
4'X8'	300.00	250.00		50.00
4'x7'	280.00	230.00		50.00
4'x6'	250.00	200.00		50.00

The players in bamboo furniture makers are the groups wherein innovations in their output can be observed as there is an evident competition in selling their products. The products made by this group ranges from engineered bamboo planks that can be comparable to wood planks, to simple money box (alkansya). Skills for making furniture and novelty items requires a degree of mastery on carpentry and painting. Joints for furniture must be firmly joined to make it secure and sturdy.



c. Bamboo furniture maker



b. Common tools used for furniture making



a. Novelty items made from bamboo

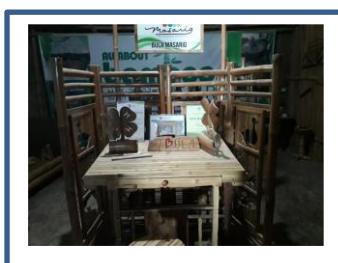
Figure 5. Furniture making, carpentry tools, and bamboo novelty item

Designs of furniture and novelty items are observed as identical since variations with respect to decorative pattern, highlights, and color are small. The structure and design of the furniture are basically geared towards functionality rather than designing aesthetic and ergonomic design. Regarding manufacturing of engineered bamboo, skills and training to operate machines is necessary. For skills development, the local government of Bula, Camarines Sur is operating a Common Service Facility as sponsored by Philippine Commission on Women. The Department of Science and Technology and Department of Trade and Industry also contribute technical assistance and provision for machines and other necessary equipment in manufacturing bamboo-based products. The players of hardware/lumber supply dealer practice merchandising activity hence it involves mostly handling of inventory- that is from purchasing

of bamboo-based product, up to selling it to costumers. This is also observed to the players in bamboo-based product seller as they are also practice merchandising activities.

5. Current trade and development of bamboo-based product.

Demand for bamboo-based product in Camarines Sur is ubiquitous, and traverse through economic status as bamboo can be turn into high priced product to low cost construction materials, as well as ornamental plants as shown in Figure 4. Product development tend to be active among bamboo furniture maker than other players, and the local government of Bula is spearheading in this undertaking as they have already established a Common Service Facility to develop potential products from bamboo, specifically engineered bamboo – tiles and planks, for the benefit of women micro entrepreneurs, enhance the access to technology and technical assistance to local bamboo-based product maker, including development of various livelihood skills. (Philippine Commission on Women, 2013, P4.5M Common Service Facility, para. 2)



a. Engineered bamboo, a high value product



b. Bamboo based products at Mall Exhibits



c. Bamboo as low cost construction material



d. Ornamental bamboo



e. Locally designed woven bamboo matting



f. Woven bamboo matting from Tacloban, Leyte

Figure 4. Sample of bamboo-based products available in Camarines Sur

Regarding the behavior of demand of bamboo-based product, it follows peak season and lean season. The peak seasons for the bamboo furniture are observed during March-April-May, as well as during the months of September until December. The month of June-July-August are considered as the lean months. The first peak season coincide with summer vacation and fiesta celebrations and the second peak period coincide with the Peñafrancia celebration and

Christmas holidays. Concerning the demand for woven bamboo matting and bamboo slat, the hardware/lumber supply dealers observed that peak season happens during the month of March to April, as well as during October up to January, the first peak coincide with the summer events which usually characterize by scheduled household repair such as roof replacement, fencing, and repairing walls and bracing. The second peak pertains to repair during rainy and typhoon prone months.

Conclusions

Based on the gathered information concerning the various types of bamboo, there are five species identified used in making the bamboo-based products in Camarines Sur. These species include: *Bambusa blumeana* (Kawayang tinik), *Schizostachyum lima* (dâso, ûras), *Bambusa merillana* (kawayan), *Dendrocalamus asper* (botong), and *Bambusa vulgaris* (marubal). The most utilized species is the *Bambusa blumeana* (Kawayang tinik) as it is the most used species for making bamboo furniture, engineered bamboo, substitute for wood in house construction, specially the native house designs. In terms of average profit per unit of bamboo-based product from *Bambusa blumeana* (Kawayang tinik), have the highest value compared to other commercially used bamboo species. The *Bambusa merillana* (kawayan), *Dendrocalamus asper* (botong), and *Bambusa vulgaris* (marubal) are also commercially viable species, although mostly used as bamboo slat and as substitute for coco lumber. The *Schizostachyum lima* (dâso, ûras) with its thin clum and high flexibility, is utilized as woven bamboo matting, that can be a substitute for plywood for walling and ceiling.

Bamboo sold in the market of Camarines Sur passed through different marketing agents from producers to consumers. The major actors involved in the value chain of the bamboo are the Bamboo Farmer, Bamboo Weaver and Slat Maker, Hardware/ Lumber Supply Dealer, Bamboo Furniture Maker, and the Bamboo-Based Product Seller and the consumer. For product development furniture making are still using the traditional manual method, with few variations in design which focus more on basic functionality rather than aesthetic and ergonomic. There are also few concerns regarding securing patent to protect their design and also possible infringement to the copied design. With the vast areas of open lands in Camarines Sur suitable for large-scale bamboo plantations, bamboo farming should be established to supply the increasing demand of bamboo poles to be used in making different kinds of furniture's and for the constructions of buildings. Also, the creation of Bamboo nursery should be established to sustain the availability of the bamboo culms used in making bamboo-based product.

Because of the great potential of bamboo in combating climate change and economic uses that can reduce poverty incidents in Camarines Sur, it is suggested that training programs should be initiated regarding bamboo production to create livelihoods in the community. And concerning constraints faced by bamboo industry players, these cannot be addressed by a single organization, since various actors including researchers, decision makers need to collaborate in search of appropriate solutions to the problems. Government institutions can also provide support in the form of assisting technology development, providing financial support, skills development through trainings, market linkage through information dissemination and product exposure, and product design that assimilate aesthetic and ergonomic feature.

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Conflict of Interest

The authors declare there is no conflict of interest

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