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Bamboo Supply Chain Nodes in the Province of Bukidnon, Philippines

Dr. Hazel E. SOLIVEN[1,7]*, Prof. Sheila C. POONON[1,7], Dr. Lowell G. ARIBAL[2,7], Dr. Alex S. OLPENDA[3,7], EnP. Rena Christina C. PUNO[4,7], MSIT Rinante M. BUNTOD[5,7], For. Bryan Allan M. TALISAY[3,7], EnP. Mildred L. TABAOSARES[4,7], Dr. Eric N. BRUNO[4,7], Dr. Rodriga G. AGUINSATAN, Juliet M. IMAN[6,7], Uzzi Kobe Yitzhak F. LIBAYAO[6,7], Jerry Paul M. GUIL-AN[6,7], Mc Kier Lu Q. DELOSO[6,7], Rae Kenneth M. FERNANDEZ[6,7], Ronald Regan C. FORTEN[6,7], Manilyn Grace B. SACAY[6,7]

[1]Department of Agribusiness Management, College of Agriculture. ORCID No. H.E. Soliven: 0009-0001-9760-231X, ORCID No. S.C. Poonon: 0000-0002-2241-9203, [2]Department of Forest Biological Sciences, College of Forestry and Environmental Science. ORCID No.: 0000-0002-8530-3267, [3]Department of Forest Resource Management, College of Forestry and Environmental Sciences. ORCID No. A.S. Olpenda: 0000-0002-7044-3275, ORCID No. B.A.M. Talisay: 0000-0003-1712-0562, [4]Department of Environmental Science, College of Forestry and Environmental Sciences. ORCID No. R.C.C. Puno: 0000-0001-7798-1335, ORCID No. M.L. Tabaosares: 0000-0009-5414-7271, ORCID No. E.N. Bruno: 0009-0002-8055-5980, [5]Department of Information Technology, College of Information Sciences and Computing. ORCID No.: 0009-0007-6769-0068, [6]Research Assistant, Central Mindanao University, Bamboo Research and Development Center (BARDEC); ORCID No. J.M. Iman: ORCID No.: 0009-0008-9594-048X, ORCID No. U.K.Y.F. Libayao: 0009-0006-4080-1111, ORCID No. J.P.M. Guil-an: 0009-0003-0410-2514, ORCID No. M.K.L.Q. Deloso: 0009-0007-8227-1072, ORCID No. R.K.M. Fernandez: 0009-0006-1232-256X, ORCID No. R.R.C. Forten: 0000-0002-7480-8374, ORCID No. M.G.B. Sacay: 0009-0007-5463-0197, [7]Central Mindanao University, University Town, Musuan, Maramag, Bukidnon, 8710 Philippines, 8200 Philippines

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CORRESPONDING AUTHOR:

Dr. Hazel E. SOLIVEN

f.hazel.soliven@cmu.edu.ph

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Abstract

The study was conducted to assess the supply chain of the bamboo industry. It covered the bamboo-producing areas in Bukidnon. The key players identified were nursery operators, farmers, processors, traders, farmers/processors, farmers/traders, and key customers. A reconnaissance survey and visits to local government units in bamboo-producing areas were conducted to identify the study sites. Structured survey questionnaires were developed to gather primary data. Results revealed that the municipality of Malaybalay has the most significant number of identified bamboo species, with a total of four (4). There are eight specific supply chains traced. Bamboo from Bukidnon will be brought to Cagayan de Oro City and other provinces of Northern Mindanao. Bamboo poles and slats were used as is or for further processing both for domestic and export markets. Issues and concerns include poor farm-to-market roads, no vehicles for delivery from far-flung places, a lack of knowledge or awareness among farmers about the potential of bamboo, the absence of a unified and established bamboo farmers' association, price fluctuations due to too much competition for nursery operators, poor to no mobile signal to increase market reach, the usage of chemical inputs to prolong the useful life of handicrafts and furniture, and a lack of support from government agencies for market linkage. Finally, respondents pointed out inefficiencies along the chain like a lack of technology and appropriate machines and limited access to finance. It is highly recommended to develop intervention projects on production, marketing and value-adding technologies to boost the bamboo industry further.

INTRODUCTION

Bamboo is considered one of the highest-yielding and fastest-growing plants and has low maintenance and labor costs (Guarin, 2021). Bamboo resources provide the vast economic potential to create employment prospects for the weaker sections of society and alleviate poverty (Bamboo's Role in Fighting Poverty, 2020). It is used for construction and as raw materials for handicrafts and furniture making. It is also a good source of energy, food, and medicine (Scurlock, 2000).

There are currently 62 kinds of bamboo known to exist in the country (DA, 2003). As a result, there are several opportunities for each key player and gaps that develop from the production of seedlings in the plantation, the development of bamboo products, and the distribution of such (DOST, 2022).

Bukidnon, a province in the northern region of Mindanao in the Philippines, is home to a thriving bamboo industry (DTI, 2021). However, the industry has faced significant challenges due to the COVID-19 pandemic (FAO, 2021). To address the existing and new normal threats, the Department of Science and Technology established the NICER Program: Bamboo R&D Center to map the value chain of bamboo. However, the team focused on the supply chain of bamboo (DOST, 2022). The supply chain of bamboo will improve the product supply chain, preventing product waste and profit loss while addressing the rising demand for healthy products without jeopardizing resource conservation (FAO, 2022). Soliven (2023) posits that supply chain study is imperative to develop intervention projects on production, post-harvest, and value adding technologies to boost the still thriving industries in the Province of Bukidnon and Northern Mindanao region.

It will benefit significant industry players, stakeholders, and customers and analyze the supply chains of bamboo in Bukidnon. Integrating relevant national, regional, and local government bodies will help improve market linkage and accessibility, and innovative technologies will be disseminated and transferred effectively. Additionally, the project will enhance product quality by assessing customer preferences and assisting industry participants in promoting and expanding their market reach. Policymakers may also adopt policies and programs to improve the bamboo industry’s future performance and potential (Shen et al., 2019).

This study is designed to assess the existing supply chain for bamboo. Specifically, this study aims to assess the supply chain of bamboo key players, their activities, product requirements, the flow of products and payments, logistical concerns, and external influences.

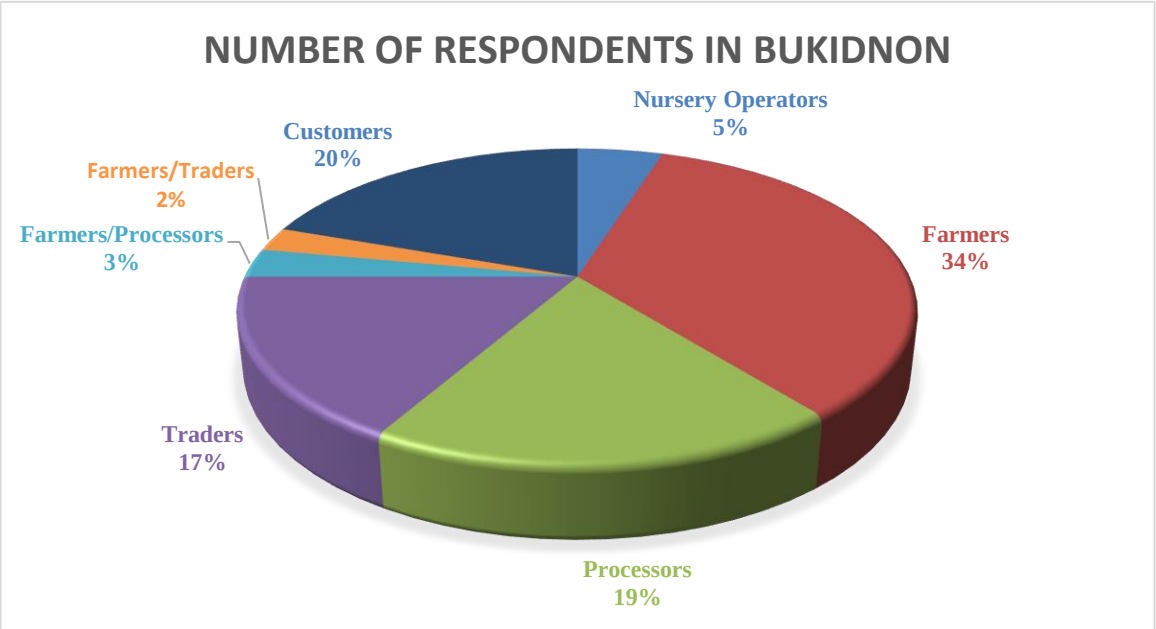
METHODS

Sampling and Areas of the Study

The study covered the bamboo-producing areas in Bukidnon. The team developed survey questionnaires and identified and interviewed respondents from nursery operators, farmers, processors, traders, farmers/processors, farmers/traders, and key customers. Pilot testing of survey questionnaires was conducted. A reconnaissance survey and courtesy calls to the mayors in the municipalities of Bukidnon were conducted. During the study, extensive supply chain mapping was done through personal interviews using structured questionnaires, and the results were validated through the conduct of focus group discussions.

Number of Respondents

Initially communicating with the contact person of each municipality in Bukidnon who responded to the email in identifying the survey sites, a reconnaissance survey was carried out in Barangay Imbayao and San Jose in Malaybalay City, Impalutao, Impasug-ong, and San Fernando. During the data gathering, courtesy calls and site visits were done to the offices of the Municipal Agriculture, Municipal Environment and Natural Resources, City Environment & Natural Resources, and Local Government Units in the municipalities of Malaybalay City, San Fernando, Impasug-ong, Pangantucan, and Valencia City. A total of one hundred sixty-four (204) respondents were interviewed in the province of Bukidnon, composed of 10 nursery operators, 70 farmers, 39 processors, 34 traders, 6 farmers/processors, 5 farmers/traders, and 40 customers.



Pie Chart 1. Number of Respondents in Bukidnon

Types of Data

Secondary data were obtained from books and reports from government agencies concerned with bamboo production. However, primary data are needed to be more extensive and to have more robust data.

The primary data came from key informant interviews using a structured questionnaire. Nursery operators, farmers, processors, traders, farmers/processors, farmers/traders, and key customers were the identified key players in various municipalities of Bukidnon. The socio-demographic profile of the key players, the flow of products, information, payments, logistics, and the activities and services provided by each supply chain member were all covered in the interview.

RESULTS AND DISCUSSIONS

There were eight specific supply chains traced in the municipalities of Bukidnon. The longest supply chain starts from the farmer to the trader, then to the processor, and lastly to the customer; another is from the farmer to the processor to the wholesale retailer, and lastly to the customer. In contrast, the shortest supply chain starts from the farmer directly to the customer or from the nursery operator to the customer. Bamboo from Bukidnon will

be brought to Cagayan de Oro City and other provinces of Northern Mindanao. Bamboo poles and slats are used as-is or for further processing for the domestic and export markets.

Key Players, Customer, and Product Requirements

The research team identified key players, customers, and their product requirements. Likewise, the product requirements were tracked down in terms of quality, variety, and volume.

The key players are nursery operators, farmers, processors, traders, farmers/processors, farmers/traders, and key customers. Each key player, except for farmers, sells bamboo products, raw materials, or planting materials. Farmers sell bamboo only in their neighborhood area and use it as building materials for business (furniture and handicrafts) and farm use.

The customers for the bamboo commodity are usually local. Bamboo poles and slats can be traded and processed to make bamboo products such as handicrafts, furniture, amakan, banana boxes, bamboo huts, chicken cages, building materials, and function halls. And these products were sold to customers who own restaurants, subdivisions, and hardware, and they are even used for home utensils and handicrafts. The customers for nursery operators are usually walk-in customers from neighboring municipalities and all over the Philippines, especially in Manila and Cotabato. For farmers, their customers are just walk-in customers from neighboring municipalities. For processors, the customers are also walk-in customers from neighboring municipalities and outside the province, especially in Tawi-tawi, Sulu, and Misamis Oriental. For traders, the customers are just walk-in customers from neighboring municipalities and outside the province, especially in Carmen, Cotabato. Farmers/processors' customers are also walk-in customers from neighboring municipalities and outside the province, especially in Manila. And lastly, farmers/traders' customers are usually walk-in customers from neighboring municipalities.

Product requirements were tracked down in quality, variety, and volume. Quality means how well the product satisfies the customer. Variety refers to what kind of bamboo the key players sell or purchase. Lastly, volume means how many volumes of bamboo products, raw materials, or planting materials customers buy or key players sell.

Table 1. Key Players, Customers, and Product Requirements

Key Player / Location	**Key Customer/ Location**	**Reasons for buying**	**Frequency demand**	**Mode of delivery**	**PRODUCT REQUIREMENT**		
					Quality	**Variety**	**Volume**
Nursery Operator	• Walk-in customers from neighboring municipalities • All over the Philippines especially in Manila and Cotabato	• Planting Dispersal of government project •Trading and or reselling	anytime	Delivered by the key player or picked up by the key customer	Good	Giant Bamboo, Moso, Black bamboo	Depending on the need
Farmers	• Walk-in customers from neighboring municipalities	•Building material •Farm use •Materials for business (furniture and handicrafts)	anytime	Delivered by the key player or picked up by the key customer	Good	Giant bamboo, Laak, Chinese bamboo, Bayog, Buntong, Lakap, Kawayan tinik	Limited or No limit
Processors (handicrafts, Amakan, furnitures, and bamboo huts)	•Walk-in customers from neighboring municipalities •Outside the province especially in Tawi-tawi, Sulu, Misamis Oriental	•Used as tokens and giveaways •Building construction •Farm use	anytime	Delivered by the key player or picked up by the key customer	Good	Kawayan tinik, Buntong, Bayog, Giant Bamboo, Moso	Depending on the demand

Traders	•Walk-in customers from neighboring municipalities •Outside the province especially in Carmen, Cotabato	•Used as tokens and giveaways •Building Construction •For reselling business •Farm use	anytime	Delivered by the key player or picked up by the key customer	Good	Giant bamboo, Buntong, Bagtok, Kawayan tinik	Depending on the need
Farmer/ Processor	•Walk-in customers from neighboring municipalities •Outside the province especially in Manila	•Business (bamboo banana box)	anytime	Delivered by the key player or picked up by the key customer	Good	Black Bamboo, Bayog, Giant Bamboo, Lakap	Limited
Farmer/ Trader	•Walk-in customers from neighboring municipalities	•Farm Use •Building Construction	anytime	Delivered by the key player or picked up by the key customer	Good	Giant bamboo, Buntong, Bagtok, Kawayan tinik	Depending on the need

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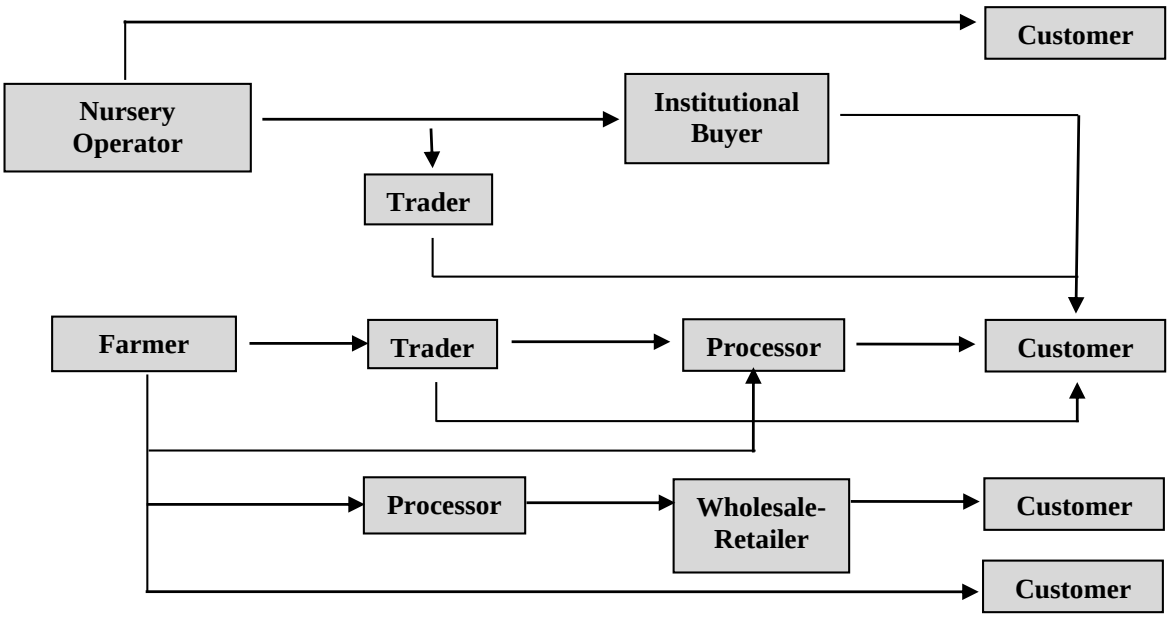
Product, Information, and Payment Flow

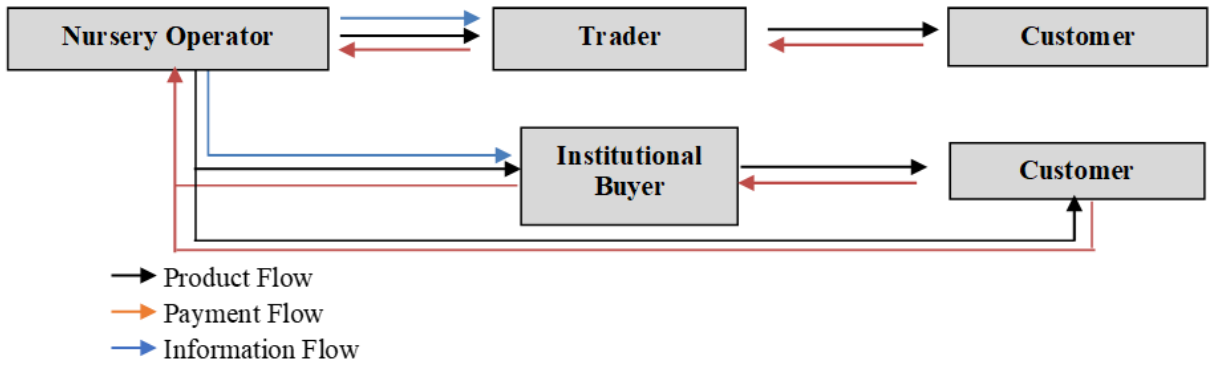
A total of eight (8) chains were traced for the general product flow of bamboo in the province of Bukidnon, of which the longest chain starts from the farmer to the trader, then to the processor, and lastly to the customer; another is from the farmer to the processor to the wholesale retailer, and lastly to the customer. In contrast, the shortest supply chain starts from the farmer directly to the customer or from the nursery operator to the customer.



Channel 1: Nursery Operator – Institutional Buyer – Customer
Channel 2: Nursery Operator – Trader – Customer
Channel 3: Nursery Operator – Customer
Channel 4: Farmer – Trader – Processor – Customer
Channel 5: Farmer – Trader – Customer
Channel 6: Farmer – Processor – Customer
Channel 7: Farmer – Processor – Wholesale-Retailer – Customer
Channel 8: Farmer – Customer

Figure 1. General Product Flow of Bamboo in the Province of Bukidnon

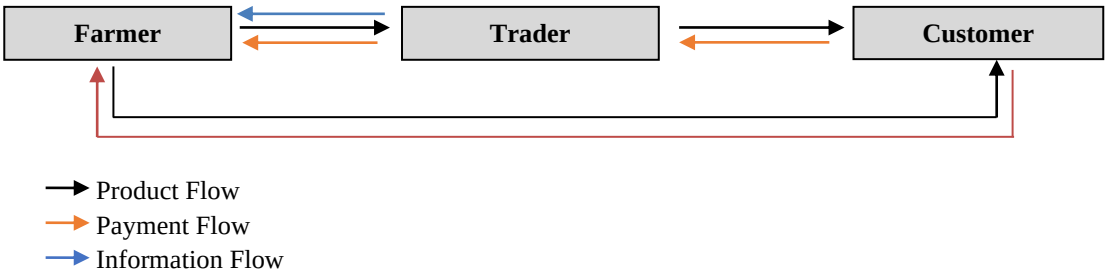
Three (3) supply chains were traced for the product flow of planting materials in the municipalities of Bukidnon. The longest chain starts from the nursery operator to the trader to the customer, or from the nursery operator to the institutional buyer to the customer. The shortest chain is from the nursery operator to the customer.



Channel 1: Nursery Operator – Trader – Customer
Channel 2: Nursery Operator – Institutional Buyer – Customer
Channel 3: Nursery Operator – Customer

Figure 2. Product, Information, and Payment Flow of Bamboo Planting Materials in the Municipalities of Bukidnon

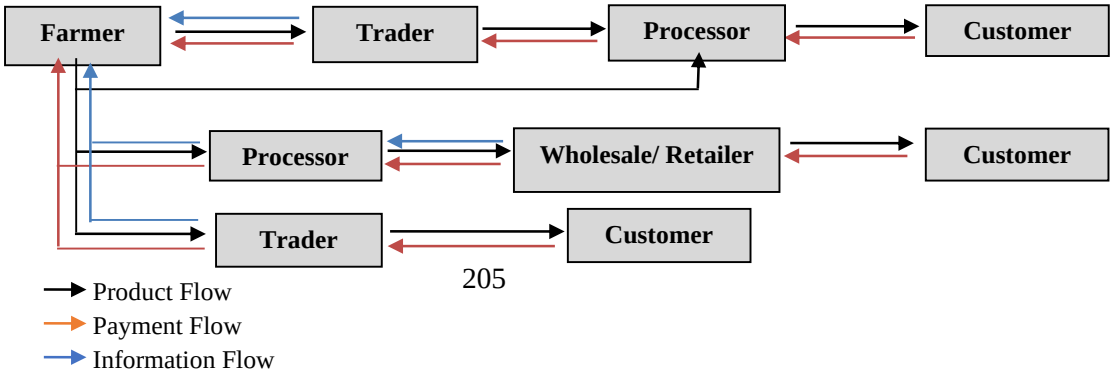
A total of two (2) chains were traced for the product flow of bamboo poles and slats in the municipalities of the customer, or from the nursery operator to the institutional buyer to the customer. The shortest chain is from the nursery operator to the customer.



Channel 1: Farmer – Trader – Customer
Channel 2: Farmer – Customer

Figure 3. Product, Information, and Payment Flow of Bamboo Poles and Slats in the Municipalities of Bukidnon

Four (4) chains were traced for the product flow of bamboo products such as amakan, bamboo huts, furniture, handicrafts, and barbeque sticks in the municipalities of Bukidnon. The longest chain starts from the farmer to the trader to the processor and to the customer, or from the farmer to the processor to the wholesaler or retailer and to the customer. The shortest chain is from farmer to processor, then to customer, or from farmer to trader to customer.



Channel 1: Farmer – Trader – Processor – Customer
Channel 2: Farmer –Processor – Customer
Channel 3: Farmer – Processor – Wholesale-Retailer – Customer
Channel 4: Farmer – Trader – Customer

Figure 4. Product, Information, and Payment Flow of Bamboo Products (Amakan, Huts, Furniture, Handicrafts, and Barbeque Sticks) in the Municipalities of Bukidnon

Actual Mapping of Bamboo Key Players

The supply chain map for bamboo in Bukidnon typically involves key players such as nursery operators, farmers, processors, traders, farmers/processors, and farmers/traders. The map shows the production and demand rate of each key player in the province of Bukidnon per month, wherein the smallest figure indicates the minimum range of poles/slats/planting materials/bamboo products that each key player has supplied and demanded, while the biggest figure indicates the maximum range of poles/slats/planting materials/bamboo products that each key player has supplied and demanded.

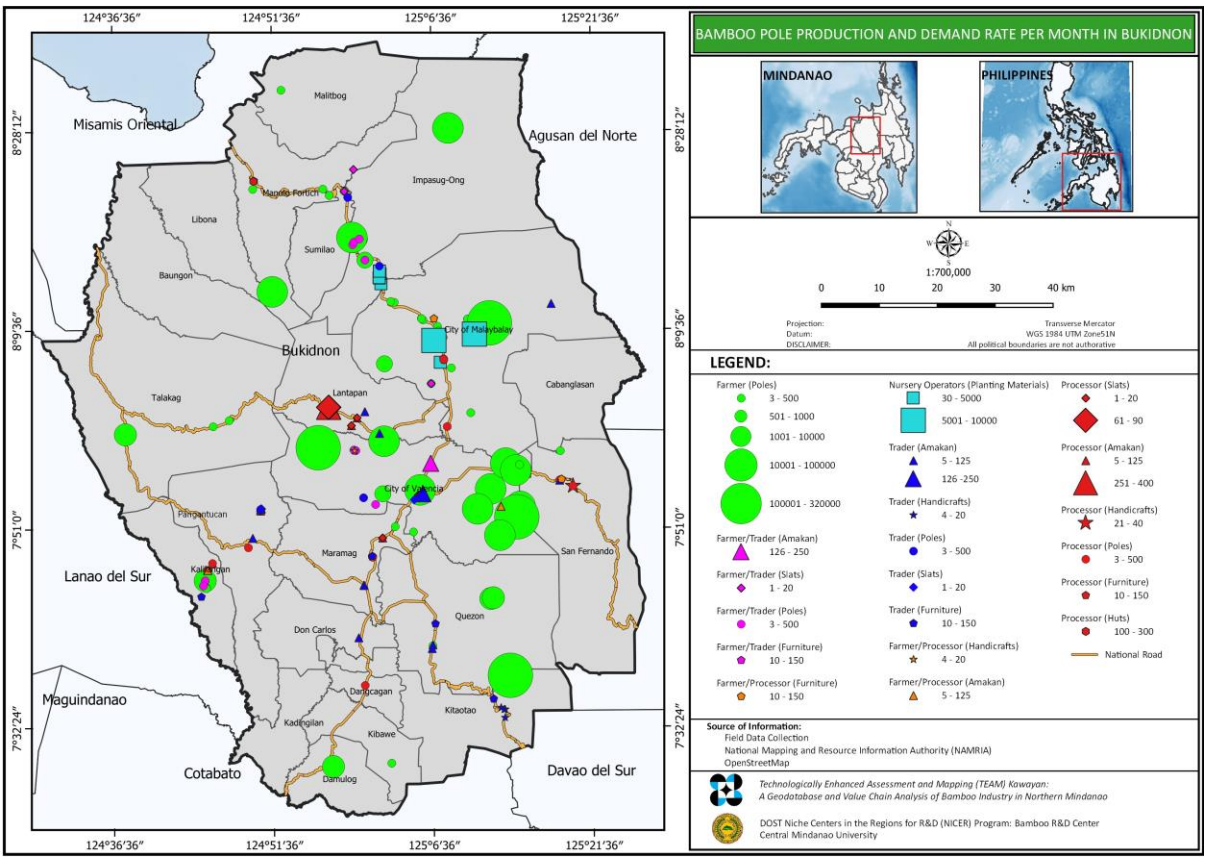


Figure 5. Supply Chain Map

CONCLUSIONS

According to the findings, there are eight distinct supply chains for bamboo in Bukidnon, each with a different length and degree of complexity. Farmers, traders, processors, and wholesale retailers are just a few middlemen who comprise the longest supply chain. The shortest supply chain involves farmers or nursery operators selling directly to customers. Most of the bamboo from Bukidnon is transported to Cagayan de Oro City and other Northern Mindanao regions, where it is used for various purposes in domestic and export markets.

The results of this study indicate that there is substantial potential to increase the effectiveness of the bamboo supply chain in Bukidnon. This might be done by decreasing the number of intermediaries in the supply

chain, making investments in transportation and processing facilities, and creating new markets for bamboo products.

The study also emphasizes the value of bamboo as a significant economic resource for Bukidnon. The bamboo supply chain of the province provides a living for thousands of people, and it has the potential to expand and add additional employment opportunities in the future.

RECOMMENDATIONS

First, the Local Government Unit should intensify information dissemination to the farmers and other key players on the importance and potential of bamboo in the economy to make it their livelihood.

There should be close monitoring of the farmers' organizations and bamboo processors that will be linked and enrolled in CMU ATBI for a sustained bamboo enterprise. Lastly, for the implementation of the intervention models, technical experts will be consulted on the appropriate topics and technologies to be covered in capacity-building activities related to production, marketing and value adding .

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COMPETING INTERESTS

The authors have no competing interest to declare.

Author's Affiliation

Dr. Hazel E. SOLIVEN[1,7]*, Prof. Sheila C. POONON[1,7], Dr. Lowell G. ARIBAL[2,7], Dr. Alex S. OLPENDA[3,7], EnP. Rena Christina C. PUNO[4,7], MSIT Rinante M. BUNTOD[5,7], For. Bryan Allan M. TALISAY[3,7], EnP. Mildred L. TABAOSARES[4,7], Dr. Eric N. BRUNO[4,7], Dr. Rodriga G. AGUINSATAN, Juliet M. IMAN[6,7], Uzzi Kobe Yitzhak F. LIBAYAO[6,7], Jerry Paul M. GUIL-AN[6,7], Mc Kier Lu Q. DELOSO[6,7], Rae Kenneth M. FERNANDEZ[6,7], Ronald Regan C. FORTEN[6,7], Manilyn Grace B. SACAY[6,7]

[1]Department of Agribusiness Management, College of Agriculture. ORCID No. H.E. Soliven: 0009-0001-9760-231X, ORCID No. S.C. Poonon: 0000-0002-2241-9203, [2]Department of Forest Biological Sciences, College of Forestry and Environmental Science. ORCID No.: 0000-0002-8530-3267, [3]Department of Forest Resource Management, College of Forestry and Environmental Sciences. ORCID No. A.S. Olpenda: 0000-0002-7044-3275, ORCID No. B.A.M. Talisay: 0000-0003-1712-0562, [4]Department of Environmental Science, College of Forestry and Environmental Sciences. ORCID No. R.C.C. Puno: 0000-0001-7798-1335, ORCID No. M.L. Tabaosares: 0000-0009-5414-7271, ORCID No. E.N. Bruno: 0009-0002-8055-5980, [5]Department of Information Technology, College of Information Sciences and Computing. ORCID No.: 0009-0007-6769-0068, [6]Research Assistant, Central Mindanao University, Bamboo Research and Development Center (BARDEC); ORCID No. J.M. Iman: ORCID No.: 0009-0008-9594-048X, ORCID No. U.K.Y.F. Libayao: 0009-0006-4080-1111, ORCID No. J.P.M. Guil-an: 0009-0003-0410-2514, ORCID No. M.K.L.Q. Deloso: 0009-0007-8227-1072, ORCID No. R.K.M. Fernandez: 0009-0006-1232-256X, ORCID No. R.R.C. Forten: 0000-0002-7480-8374, ORCID No. M.G.B. Sacay: 0009-0007-5463-0197, [7]Central Mindanao University, University Town, Musuan, Maramag, Bukidnon, 8710 Philippines, 8200 Philippines

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