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Developing the coconut value chain in central Luzon, Philippines: A case study of coco geonets in aurora

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ABSTRACT

The study aimed to assess the status of the coco geonet in Central Luzon, particularly Aurora, which comprises more than 90% of the region's production. The study utilized a participatory method, and a value chain analysis framework was used to examine the roles of different key players. The value chain comprises input provision, farm production, processing, and marketing. Based on the results of the study, coco geonet processors received the biggest share in terms of both value addition and total cost. Nearly all coconut farmers initially obtained planting materials from other coconut farmers whose farms exhibited high-quality characteristics. These farmers utilize simple farming methods that have not changed in many decades. Coco geonet production consists of two processing stages: coco-coir production and coco-geonet weaving. The primary constraint for coco geonets is the lack of access to the institutional market. Customers for the coco geonets produced by Aurora's value chain are currently scarce. Marketing links are necessary to add value to the husks. It is therefore recommended that the products be promoted, their market be developed, and their marketing potential be tapped to allow the industry to become lucrative. Inter-agency support is needed for the value chain to perform efficiently and effectively.

Contribution/Originality: This research examined the coco geonet value chain in Aurora Province, Philippines. The current paper describes the participants in the value chain, identifies constraints, and suggests interventions.

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1. INTRODUCTION

Agriculture helps drive economic growth (Praburaj, 2018; Winters, De Janvry, Sadoulet, & Stamoulis, 1998). This is also true in the Philippines, where agriculture remains the backbone of the economy. Coconut, known as the "tree of life," remains one of the Philippines' most important crops and a key export product. Coconut palms dominate the agricultural landscape of 69 of the Philippines' 82 provinces. According to the Department of Agriculture (2022), approximately 25 million Filipinos are directly or indirectly dependent on the coconut industry. The Philippine coconut industry has significantly boosted employment in the country. This is mainly due to the export of goods made from coconuts, which has grown significantly due to rising global demand.

The Philippine Statistics Authority (2021) noted that all provinces in Central Luzon recorded production of coconut in 2021, totaling 100.9 thousand metric tons. Aurora was the top producer of coconut in Central Luzon with a 93.4 percent share of total production. In the province of Aurora, all eight (8) municipalities contribute a significant amount of coconut to the regional economy.

Products made from coconuts with considerable commercial potential include coco coir and coco geonets. Handwoven coco coir derived from coconut husks is used to make coco geonet. Coco geonet can be utilized for erosion control, slope protection, and coastline rehabilitation (SU Sets up Eco-friendly Christmas Tree, 2018). Furthermore, coir is an excellent waste disposal product that allows producers to earn additional income. However, coco coir and coco geonets face obstacles. This is consistent with the study of Castillo (2021), in which he explains that the problems in the industry are the unorganized supply chain, the vulnerability of coconut to world price fluctuations, low farm productivity, which stems from cocolisap infestations, the aging current crop of coconut trees and their poor nutrition, inadequate infrastructure support and poor farm-to-market roads, low allocation of funds to research and development, and the presence of corruption and bribery. For the coir and geonet value chains to be more efficient, it is necessary to identify bottlenecks and implement interventions. As supported by Khong (2022), a value chain approach is necessary because it is a potent instrument for enhancing producers' market access and competitiveness.

2. MATERIALS AND METHODS

The study employed a participatory approach. According to Vaughn and Jacquez (2020), participatory research is a form of systematic inquiry applied in close cooperation with those impacted by a problem being examined for action or modification. The study focused on the coco geonet value chain in Aurora Province, Central Luzon, Philippines, in 2021.

The roles of key players were explored using value chain analysis. According to Porter, as cited by HBS Online (2020), all activities comprising a company's value chain can be divided into primary and support activities. A value chain study analyzes the chain's participants, from input suppliers to retailers, as well as the variables influencing the performance of the value chain and the interactions between participants, including the power dynamics between firms, their access to learning and innovation, and the distribution of benefits along the chain. According to Panoutsou and Singh (2020), a value chain analysis also suggests policy measures to improve the performance of the chain.

This study assessed the challenges and possibilities for boosting the coco geonet industry's competitiveness. Potential sustainable solutions were developed in conjunction with industry participants and stakeholders based on barriers to and opportunities for greater competitiveness. Industry players and stakeholders were engaged in the evaluation and revision of the suggested interventions as active participants and collaborators. A review of reports, secondary research, pertinent studies, key informant interviews, stakeholder consultation, and a focus group discussion were all included in the evaluation.

3. RESULTS AND DISCUSSION

3.1. The Value Chain Segments

The value chain map in Figure 1 is a visual representation of each stakeholder's many roles and responsibilities in the value chain. Input supply, farm production, processing, marketing, and trading and support services are all functions of essential stakeholders in the coconut commodity value chain. This section briefly describes and discusses these functions.

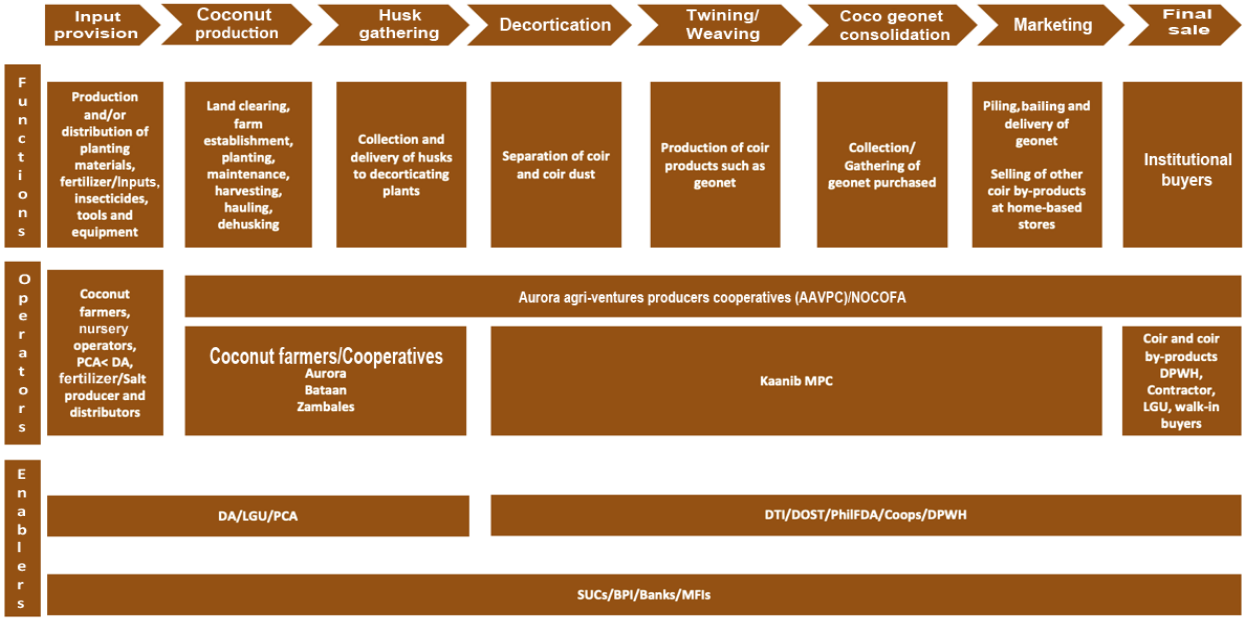

Figure 1. Value chain map for coir and coir by-products in Central Luzon.

3.1.1. Input Provision

The main inputs needed to grow coconuts are coconut seedlings, agricultural-grade salt, organic fertilizer, and insecticides. Farmers utilize two common varieties of coconut, the tall and dwarf varieties. According to the interviews, tall varieties are preferred for planting because their yield is believed to be greater than that of dwarf varieties.

Based on interviews with key informants, the Philippine Coconut Authority (PCA) and several coconut farmers were identified as the region's sources of coconut planting materials. Nearly all coconut farmers initially obtained planting materials from other coconut farmers whose farms exhibited high-quality characteristics. Additionally, the PCA is a source of coconut planting materials. The PCA purchases and distributes plant materials for new planting, expansion, or replacement purposes. During the study, PCA Aurora had only one supplier of dwarf seedlings and open-pollinated varieties (OPV) seed nuts. The few accredited nurseries in the area restrict coconut farmers' access to quality planting materials. The Bureau of Plant and Industry, as cited by Labastida (2022), has emphasized the importance of plant nursery accreditation to ensure the production and distribution of quality planting materials from recommended crop varieties or species that are true types and are free from pests and diseases.

3.1.2. Farm Production

Central Luzon's upland or coastal regions are where coconut plantations are most prevalent. Coconut is primarily grown by small-scale farmers in Aurora, Zambales, and Bataan. These farmers utilize simple farming methods that have not changed in many decades. Consequently, coconut cultivation is recognized for its low-input agricultural system. Salt is the only fertilizer used by coconut farmers in Aurora, although some farmers refuse to use salt and therefore do not apply fertilizer to their farms. Farmers either produce or purchase organic fertilizer from agricultural supply companies. Coconut cultivation is a major source of income for farmers, especially in Aurora. In coconut farming in Central Luzon, agricultural management practices include farm clearing, sticking, laying out, holing, planting seedlings, fertilization, clearing pesticides if pests are present, and harvesting. However, Ramirez, Lansangan, Tubal, and Catelo (2019) explained the need for more proactive, rather than reactive, mechanisms to support the capacities of value chain members in responding to climate change-related threats, such as vulnerability mapping and zoning/spatial planning, among others.

The PCA assures the continuous expansion and modernization of the country's coconut industry. Sevillano (2023) reported that under the coconut expansion program, the PCA carries out comprehensive strategies, including hybridization, fertilization interventions for quick turnarounds, and intercropping or farm diversification to give farmers alternative sources of income.

3.1.3. Processing

As articulated in a report of the DA Regional Field Office 5 (2019), the industrialization of agriculture through value addition is one of Department of Agriculture Secretary William Dar's paradigms to increase farmers' income and level up the country's agriculture sector. Hence, coco geonet processing has been adopted to boost the coconut industry. Coco geonet production involves two processing stages: coco-coir production and coco-geonet weaving, as presented in Figure 2. The coconut stakeholders' consultation meeting participants declared that the coconut husks are fed into a decorticator powered by a diesel/gasoline engine, and the coir and coir dust are extracted. Coco coir is the output and is the first stage of processing.

The coir is then spun into twine using a hand-powered twining machine, after which the threads are woven into coco geonets using weaving machines. This is the second processing stage, which leads to the final product.

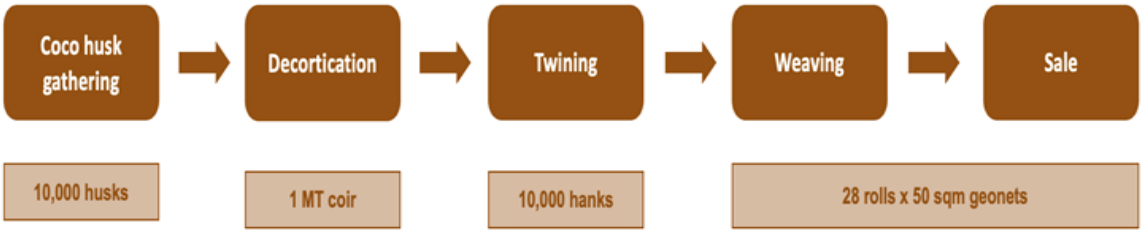

Figure 2. Process flow for coir and geonet production.

According to information from the PCA, there were two husk processors in Aurora: (1) Aurora Agri-Ventures Producers Cooperative (AAVPC) and (2) Nonong Coconut Farmers Association (NOCOFA). The PCA and the Department of Trade and Industry (DTI) provide these organizations with decorticating machines. Associations are at the top of the DTI's list of beneficiaries because they want their projects to have multiple effects and benefit more people. Moreover, government entities tend to finance big-ticket projects, such as machinery and facilities, that demand a larger landholding. These data also substantiate DTI Secretary Ramon Lopez's claim that cooperatives and associations have a significant economic influence on their members' lives and are an ally in empowering small and medium-sized enterprises, allowing DTI programs to be implemented in their respective fields.

In Aurora, the AAVPC is capable of decorticating 12,000 coconut husks per day, with a production capacity of 1.2 metric tons of coir fiber and 1.8 metric tons of coir dust. In contrast, NOCOFA produces an average of 100 sacks per week or an average of P60,000 per month from coco peat sales. These cooperatives play a big role in the coco geonet industry in the region; hence, continuous development is necessary.

3.1.4. Marketing and Trading

The Philippine Coconut Farmers and Industry Roadmap (2021-2040) (2021) declared that the coconut trading system in the Philippines is multi-layered. Coconut raw materials from farmers generally pass through several marketing channels before reaching the processing plants.

Traders pick up the husked nuts at the farm gates and transfer them to other locations. Traders are also considered wholesalers. The coco geonets are sold to trader consolidators who in turn sell the coco geonets to construction firms or handicraft makers. Coconut processors most often link with a network of traders and trader-assemblers to procure their raw materials (e.g., copra, dehusked nuts, whole mature nuts, fresh young nuts, coco shells, coco husks, and coco shell charcoal). The local traders have direct contact with the farmers and usually have established long relationships with them (Costales, 2020).

The coconuts from Aurora are shipped to provinces such as Bulacan, Tarlac, Pampanga, Pangasinan, and Nueva Ecija. The peak seasons for coconut dealers, according to the traders, are April, November, and December, especially during the holidays.

3.1.5. Support Services

Through social relationships, farmers and other actors in the value chain gain access to information, knowledge, and guidance. This involves the dissemination of information and advice on prices, markets, varieties, and technology via social networks or traditional cultural methods. This is the most prevalent method by which new types and technology are disseminated among local populations in the province. Government agencies, non-government organizations, state institutions, colleges, and provincial and municipal local government units provide these services. Typically, the depth and breadth of outreach services are limited by available resources. Primarily, the services consist of training and extension services.

Some of the government agencies that support the coconut industry are the following: The Department of Agriculture's Philippine Coconut Authority (PCA) is the only government agency charged with realizing the full potential of the coconut industry in accordance with the new vision of a unified, highly effective, and competitive coconut industry (PCA website). Coconut farmers can use shared-service facilities provided by the Department of Trade and Industry. This agency also provides technical assistance to help coconut farmers learn and improve their coconut husk processing techniques. The Department of Agrarian Reform also supports the coconut industry by providing industry participants with machinery. Extension workers from local government units in the province of Aurora play crucial roles in providing technical assistance to coconut farmers. The transfer of knowledge regarding production technologies, particularly climate-smart technologies, has contributed to an increase in productivity (Listiana, Indah Nurmayasari, Bursan, Muher Sukmayanto, & Helvi Yanfika, 2021). In addition, the Department of Science and Technology is responsible for researching prototype decorticating machines and other coco coir machines, as well as distributing them to farmers and their organizations.

In terms of financial services, various credit policies have been beneficial in facilitating the upgrading of the coconut industry. The Land Bank of the Philippines is among the financial institutions that assist farmers. Cooperatives, as shown by the experiences of organized groups in Central Luzon, can play an important role in mobilizing savings and facilitating credit acquisition for small farmers.

3.2. Costs and Returns Analysis and Relative Position of Different Key Players in the Value Chain

3.2.1. Costs and Returns Analysis of Key Players

Table 1 presents the costs and returns of processing six thousand husks from a one-hectare coconut plantation. Farmers sell coconut husks to processors at an average price of P0.40 per husk, whereas the labor cost of dehusking is an average of P0.05 per husk. The first stage (coco coir processor) incurs material costs of P4,320 and labor costs of P1,600. The coco coir has a selling price of P13 per kilogram, and 6,000 nuts yield 600 kilograms. The weavers, who are the second-stage processors, create 857 square meters of geonets from 600 kilograms of coco coir. The production cost includes materials (P7,800) and labor (P21,000). The price per square meter for coco nets is P55.

Table 1. Costs and returns analysis of farmers and processors of coco coir and geonets, 2021.

Particulars	Farmer[2]	First-stage processor[3]	Second-stage processor[4]
Sales (PhP)	2,400.00	7,800.00	47,142.86
Expenses	-	-	-
Material cost (PhP)	-	4,320.00	7,800.00
Labor cost (PhP)	300.00	1,600.00	21,000.00
Total cost of production (PhP)	300.00	5,920.00	28,800.00
Net income (PhP)	2,100.00	1,880.00	18,342.86
Return on expenses (%)	14.29	314.89	157.01
Gross profit margin (%)	87.50	24.10	38.91
Average price per unit (PhP)	0.40	13.00	55.00
Average cost per unit (PhP)	0.05	9.87	33.60

Note: 2: Includes costs and returns from sales of 6,000 husks from 1 ha coconut production.
3: Costs and returns of coco coir from processing 6,000 husks.
4: Costs and returns of coco geonet from the coco coir of 6,000 husks.

3.2.2. Relative Financial Position of the Key Players

Table 2 shows how much each participant spends and how much money they make when producing one (1) square meter of coco geonet. The coco geonet processor has the highest share, accounting for 72% of the total value addition. This is proportional to the high production costs incurred (59%). The consolidator has the second-highest share in value-added accounting and total cost accounting, at 28% and 15%, respectively. On the other hand, the farmer has a 7% profit share with a 1% share in total cost. The first stage processors, or coco coir processors, had a 6% value addition with a 12% share in total cost. The farmer, who is the source of the husks, does not directly spend on material since the husks are waste from the coconuts he sells to the trader; hence, no value is indicated in the table. Also, there are no values indicated in the table under the total column for selling price, cost of production, or direct material because these are not added, and the final amounts are those in the consolidator column.

Table 2. Relative financial position of value chain players per square meter of coco-geonet, 2021.

Particulars	Farmer	First-stage processor	Second-stage processor	Consolidator	Total
Selling price (PhP)	2.80	9.10	55.00	70.00	-
Cost of production (PhP)	0.35	6.91	33.60	60.00	-
Direct material (PhP)	-	2.80	9.10	55.00	-
Other costs (PhP)	0.35	4.11	24.50	5.00	33.96
Value added (PhP)	2.45	2.19	21.40	10.00	36.04
Share to total value added (%)	7%	6%	59%	28%	100
Share to total cost (%)	1%	12%	72%	15%	100

3.3. Constraints

The specific constraints identified by each player in the coco geonet value chain are presented in the following subsections.

3.3.1. Input Provision

During meetings with various groups, it was discovered that the vast majority of coconut farmers obtain their planting materials by growing coconut seedlings from freshly harvested coconuts. Farmers use this technique because they cannot afford to purchase coconut seedlings and there are insufficient accredited nursery operators to provide a diverse selection of high-quality coconut planting materials. This is supported by Sathuragiri and Muthumani (2020), who found that the necessity for an agricultural technique that enhances the revenue of coconut farmers becomes important when the coconut business is threatened by repeated uncertainty. Most coconut farmers are illiterate, unorganized, and dispersed, making it more difficult to market coconut.

Inorganic fertilizers and other agricultural chemicals, such as pesticides, are obtained from local agricultural input supply and general market stores. Few coconut farmers use inorganic fertilizers, which are often used on intercrops grown beneath coconut trees. Insecticides are only used when a pest infestation is present. Simple farm equipment is sourced from the public market and agricultural supply retailers.

3.3.2. Farm Production

Despite ongoing public and private sector initiatives, the production sector, the lifeblood of the business and the source of raw materials for the many coconut value chains, is plagued by poor and declining coconut productivity. Coconut production is gradually declining due to several factors. The majority of the coconut farmers in the 2018 National Coconut Farmers Registry (NCFRS) were shown to be food insecure and lack social protection. Coconut farms are fragmented and small – 75% are 2.0 ha and below – and farms in uplands have accessibility constraints. Coconut farmers in Aurora use only salt as a fertilizer, although some farmers refuse to use it. Coconut farmers do not perform clearing or fertilization as part of their management techniques. Several coconut farmers assert that as a result of the low price of coconuts, they do not always employ effective management practices.

In addition, the presence of pests on coconut farms has exacerbated the apparent lack of enthusiasm among coconut farmers. Another noteworthy factor is that natural disasters have significantly affected the region's production volume. Some farmers stated that they did not utilize integrated cropping or coconut intercropping due to a lack of funds to purchase and maintain intercrops.

Coconut production is hampered by the fact that farmers do not make the most of the available technologies to help them grow coconuts. This concern was also highlighted by Rosli, Radam, Rahim, and Abdullah (2020). The negative growth rate of the country's coconut crop is attributable to the presence of numerous pests and unfavorable climatic conditions. Other production issues included the slow adoption of recommended agricultural management practices, the continued use of unselected and genetically inferior planting materials, and the need to replace a growing number of senile and unproductive trees. Similar conditions affect coconut production in Indonesia (Alouw & Wulandari, 2020).

3.3.3 Processing

As a result of the decorticator's double-pass process design, Aurora's processors are experiencing performance issues. This increases the production costs of coir and decreases its production capacity. One processor reported that the engine powering the decorticator was outdated and could no longer be operated continuously. While progress is

being made, processors are still constrained by inefficient operations, a lack of working capital, and the inability to transform the coir dust accumulation into something valuable and marketable. Additionally, the decorticating facilities of coir processors are insufficient to accommodate the current volume of coconut husks. Twines of inconsistent quality and appearance are unsuitable for a market requiring premium geonets. The lack of a specialized twining machine and weaving facilities prevents processors from producing high-quality geonets and other coir byproducts.

The inconsistency in the quantity and quality of coir, coco geonets, and coco peat that one association acquires from its suppliers hinders the organization's operations.

Coco coir is spun into twines using motorized or manually operated twining equipment. Due to a scarcity of coir supply from their decorticator suppliers, the current productivity of twiners is unfortunately poor. Due to a scarcity of coir, twiners are unable to maximize profits by creating as much twine as feasible. Weaving is performed in predetermined groupings. Depending on the location of accessible looming equipment, weaving might be performed off-site, at the weavers' residence, or within the premises of decorticating plants.

3.3.4. Marketing and Trading

In the marketing of and trade in raw materials in the coco coir value chain cluster, consolidators or integrators and traders are the sources of coconut husks of a few coir processors. The husk consolidators are the buying agents of the coir processors. Most coir processors source coconut husks primarily from individual farmers. There are a few that have their own coconut farms to supply them with coconut husks.

At present, the market is dominated by consolidators who collect and buy coco geonets from processors. According to one coconut trader, despite the high demand for coco coir and coco geonets on the global market, a lack of geonets is the result of declining coconut production. The low volume of coconut production in Aurora is consistent with the claim of Moreno, Kuwornu, and Szabo (2020) that coconut production in the Philippines is slowly declining. Furthermore, quality issues limit the ability of coco geonet processors to capitalize on this opportunity. Moreover, the lack of promotional and networking activities aggravates the marketing concerns.

3.3.5. Support Services

Support services enable the different functions or vertical linkages in a value chain. Some examples are financing, research and development, extension, marketing, and other support services aimed at assisting value chain stakeholders to achieve their specific enterprise objectives and goals. Support services are provided by national and regional government agencies, credit and research institutions, local government units, state universities and colleges, and non-government organizations, among others.

One of the emerging constraints in coconut farming is the lack of access to financing to enable farmers' associations and cooperatives, especially newly organized ones that are not yet bankable, to engage in coconut farming, processing, and trading activities, as well as for microlending to members. Additionally, micro, small, and medium enterprises lack financing to upgrade or modernize their processing facilities to enable them to improve their competitiveness.

3.4. Recommendations

Based on the results of the study and the identified constraints for each segment of the coco geonet value chain, the following recommendations are provided.

3.4.1. Input Provision

For producers to have access to high-quality coconut seedlings, it is essential to establish additional nurseries. The development of nursery operators' capacity to provide technical assistance to farmer-clients is crucial for the growth of the coconut industry. This is a method of mitigating producers' risks while simultaneously boosting their confidence in the products. By assisting their clients in achieving success, nurseries are laying the groundwork for the expansion of their planting materials market.

Providing producers with timely access to high-quality coconut seedlings with the desired nutrition, utilization, and agronomic traits is one of the most crucial aspects of effective agricultural production and development. Utilizing high-quality planting materials will considerably contribute to increased agricultural production and productivity and, consequently, to food security and market competitiveness. The availability of improved varieties and the distribution of high-quality planting materials will provide the necessary basis to maintain coconut's status as a food security crop and convert it into a market-oriented crop. This intervention seeks to improve farmers' and end-users' access to coconut seedlings of existing and novel improved varieties.

When soil fertility levels are maintained, agricultural yields are likely to be sustainable. Nutrients extracted from the soil during crop harvesting or lost through erosion and runoff must be replaced. It is widely acknowledged that modern inputs such as fertilizers and enhanced seeds are intimately associated with increased agricultural productivity and food security. Long-term use and reliance on chemical fertilizers are not only prohibitively expensive and out of reach for many smallholders, but they also degrade the environment through the emission of the greenhouse gas nitrous oxide. Commercial producers can reduce their fertilizer expenses by using organic and inorganic fertilizers. These efforts can enhance the soil's biophysical properties, water infiltration, and organic matter content while enhancing cationic exchange. This will help enhance the soil's ability to retain nutrients and improve its fertility, thereby enhancing soil productivity in an environmentally favorable and sustainable manner.

The proposed intervention strategy entails the establishment and/or strengthening of the local capacity to commercially produce and distribute organic fertilizer, as well as the promotion of the efficient and prudent use of fertilizer so that producers can derive the maximum benefits from the use of these inputs.

3.4.2. Farm Production

It is necessary to strengthen coconut farmers' associations as conduits of PCA interventions. As stated by AR, Asmara, and Fahriyah (2023), the government should improve technological innovation to mitigate the technology gap. Good agronomic practices and climate-smart agriculture can help farmers become more resilient and productive in the face of climate change while reducing practices that contribute to the problem by increasing greenhouse gas emissions. As explained by Perlas (2020), climate-smart agriculture provides the means to help stakeholders – from local to national and international levels – identify agricultural strategies that are suitable to local conditions. The adoption of good agronomic practices and climate-smart agriculture can deliver multiple benefits, including more sustainable resource use, reduced greenhouse gas emissions, enhanced resilience, and reduced food waste and loss, while simultaneously increasing productivity and profits for small and large farmers and contributing to national food and nutrition security and development objectives.

Participatory and inclusive processes must ensure farmers can access pertinent skills and information and make informed decisions regarding climate change adaptation and productivity improvement options. Farmers' understanding of the ecological processes that influence the production of coconut must be strengthened through field learning activities such as field observations, basic experiments, and group analysis. The knowledge acquired from these activities will allow farmers to make locally specific decisions regarding crop management techniques.

Lastly, it would be advisable to explore the possibility of putting up salt production enterprises in Aurora province. The relevance of salt production is supported by the Business Diary (2019), as the application of sodium chloride (NaCl) can increase nut production, copra weight per nut, and copra yield per tree.

3.4.3. Processing

The decorticating equipment must be replaced with a single-pass decorticator that is more modern. The processors' existing decorticating equipment is not efficient enough. In addition, blades are continually falling off, resulting in longer production times. The anticipated rise in coir production as a result of this intervention will alleviate the current constraints on twiners and weavers. This will increase production while decreasing production costs. Experts in the field must be consulted regarding the procurement of the most effective, market-appropriate decorticating apparatus. To better meet the increasing demand for coco geonets in the Aurora region, more decorticating facilities must be built. Other PCA and local government programs intend to establish additional decorticating facilities for the coconut processors.

Also recommended are benchmarking activities to stimulate the business of geonet processors. When twines are retrieved from the twiners, their quality is not evaluated. A quality control system must be developed in collaboration with wire assemblers. By measuring the length and girth of twines supplied by twiners, assemblers can determine the product's quality. Those twines that do not meet product specifications are rejected and sent back to the twiner for reprocessing. Within the reach of decorticating facilities, village-level twining ventures may be developed to expedite this process and reduce the cost of transporting coir and twines. This will encourage the community to collect and sell their coconut husks to the decorticating facility so that they can earn extra income through twining and weaving. These new enterprises will employ superior, more efficient twining equipment.

3.4.4. Marketing and Trading

To enhance the geonet value chain, it is necessary to identify market opportunities and establish market connections through DTI, PCA, and Department of Agriculture market matching. This can be supplemented by market research in ongoing product development. The demand for coir and coco geonets is rising, and there is a risk that the coconut industry will not meet market demand due to a limited coir supply. This constraint can be readily overcome by combining the raw fiber from other decorticators in adjacent provinces. Interfirm relationships must be established to promote the collective marketing of coir products among diverse decorticating facilities in Aurora. The International Labour Organization (2018) has emphasized the importance of cooperatives by stating their role in meeting the needs of their members by providing them with services that help optimize their production. This is supported by Lansangan and Dizon (2017), who noted that the increased economies of scale in production lead to maximized use of the raw material, reduced costs through sharing common service facilities, and better government assistance. Collaboration among micro, small, and medium enterprises would help improve their bargaining power regarding prices and the access to other forms of support.

Moreover, facilitating organizational development activities can further enhance the operation and management of a cooperative's coco geonet business expansion. Proposed proponent organizations must be assisted with strategic business planning activities tailored to community-based enterprises to prepare them to implement effective cooperative management. Finally, upgrading farm-to-market roads can reduce production costs, further increasing farmers' income. Transport and other transaction costs are typically reduced by good roads, thereby increasing marketing margins. Access to production sites and external markets via improved roads is a prerequisite for commercial production. The improvement of farm-to-market roads has the potential to increase the flow of agricultural inputs and services to producers and agricultural outputs to domestic markets.

3.4.5. Support Services

The policy and directives for encouraging the use of coco geonet are in effect. The quantity of square meters of coco geonets required for specific Department of Public Works and Highways (DPWH) projects is predetermined in the specifications. Therefore, the DPWH, local government units, and mining companies must support the increased use of coco geonets. Crismundo (2022) emphasized the role of the government in strengthening the support for local

farmers and businesses as the country opens itself to more free trade deals like the Regional Comprehensive Economic Partnership (RCEP). Additionally, Vitug (2021) claimed that business development services such as training in online marketing strategies, product distribution procedures, new product development, crisis costing and pricing strategies, and customer database management might be the foundation for a management plan for both enterprises and farmers.

To facilitate planning, key industry players should participate in developing annual work programs for government agencies and other comparable activities, allowing them to provide first-hand information on the status of the coconut industry in the region.

4. CONCLUSION

The Aurora coconut value chain comprises the input supplier, farmers, sub-processors, and the final processors and consolidators. In terms of cost, the final processors bear the highest share (72%), which is commensurate with their share in the total value addition, which is equivalent to 59%. Customers for the Aurora value chain's produced coco geonets are currently scarce. Marketing links are necessary to add value to the husks. Inter-agency support is needed to allow the value chain to perform efficiently and effectively.

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