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Marketability of Coconut Water Product and Viability of Integrated Coconut Water and VCO Processing: Pantukan, Davao De Oro Case

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***Abstract*—** *It is estimated that 9.3 billion liters of coconut water from matured coconut are potentially wasted in the Philippines. PHilMech has developed a village level coconut water (CCW) processing system using a pasteurizer-chiller that is capable to produce bottled CCW beverage without any additives or preservatives. The study aimed to assess the marketability and viability of CCW processing system technology integrated with VCO processing. A cooperative with existing VCO processing operation with waste CCW problem agreed to integrate the system with their present operations. Results showed that recovery rate adopting CCW processing system was 90% with a capacity of 2,000 nuts per processing. Cold chain handling system for the pasteurized bottled CCW product with 21-days shelf-life posed a problem to penetrate the supermarkets with 3-month shelf-life requirement for products. Events, trade fairs or niche markets that consumed the product within one or two days were recommended. Partial budget revealed that the cooperator would earn additional income of P515,647.47 per year. Feasibility study results indicated good financial indicators.*

***Keywords*—** *Cold chain handling system, integrated processing, matured cocowater, pasteurizer chiller, pasteurized cocowater, shelf-life, village level processing system.*

I. RATIONALE

International demand for coconut water is increasing as people are getting more health conscious. Drinking coconut water benefits our health by strengthening our body, reducing fatigue and taking care of our normal art function. In 2018, exports totaled to 63 M liters of coconut water valued at USD 89M to various parts of the world with the United States as the biggest (PSA). The University of Asia and Pacific (UA&P) said that non-traditional coconut products such as cocowater (CCW) are requested to takeover from oil as the industry main driver (Business World, 2019). Recently, the CCW export valued at USD 150.02M with the US, United Kingdom and Netherlands as the top three importing countries (https://www.tridge.com/intelligences/coconut-water/PH).

Coconut water from matured coconut which is normally left unutilized during copra processing, is a good substitute to coconut water from young coconut. Based on the assumptions that 80 percent of the coconut production of 37.4 billion nuts (PCA, 2018) with an average weight of 0.393 kg/nut for matured coconut (Santoso et al., 1996) and twenty-five percent water content (%w/w) (Aragao, 2000) are processed into copra, an estimated 9.3 billion liters per year of coconut water from matured coconut are potentially wasted.

Last 2015, PhilMech has developed a village level coconut water processing system that is capable of producing bottled coconut water beverage without any additives or preservatives (100% all-natural coconut water). The system's general processing operations and protocol comprise the following steps: harvesting of matured coconut; de-husking; handling and transporting of dehusked coconut to pilot processing site; pre-cleaning of coconut; washing, sanitizing, and rinsing of pre-cleaned coconut; draining and air-drying of washed and rinsed coconut; extraction and filtering of coconut water; pasteurization of coconut water, pre-cooling of pasteurized coconut water; chilling of pre-cooled coconut water; filling and capping of coconut water to sanitized PET bottles; packaging; and storage of finished product under chilled condition. The bottled coconut water produced from the process ensures the physicochemical stability and safety of the product during three weeks of storage under chilled condition (Caparino, et al., 2015).

The general objective of the project is to assess the marketability and viability of the cocowater processed in the PHilMech developed village level coconut water processing system integrated with a VCO processing level of operations.

II. METHODOLOGY

Conceptual Framework

A coconut water processing system was installed and integrated with an existing VCO processing of the identified cooperator experiencing problem on cocowater disposal. Benchmarking and value chain analysis on the present practices of the members of the cooperative were done to

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understand the coconut industry in the area. Since the VCO processing is already established and the CCW processing system is new, the assessment of the project was focused on the several variables on the cocowater processing such as the technical, operational, and financial or profitability aspects. Technical aspects were on the specifications of the different equipment used for processing the coconut water and taste tests were conducted. On the financial or profitability of the enterprise, partial budgeting, and feasibility study of the integrated processing were done. Meanwhile, to have an effective operational system, its different promotional strategies and marketing agreements with prospective market outlets were implemented. Now based on the observations and experienced by the project, some factors affecting the adoption were identified (Figure 1).

Materials and Methods

The identified project site was in Pantukan, Davao de Oro, Philippines (Figure 2). A benchmark survey of the cooperator-members' postharvest and processing practices and problems was conducted. A cost-benefit analysis of the traditional practice of copra processing and other coconut processing practices was compared on its benefits using the coconut water technology integrated with the VCO processing.

After ensuring that the set of equipment was ready for the actual operation; a 5-month operation was implemented by the project team and the cooperators' staff. At this stage, cooperators' staff were trained and exposed to the actual processing and how to strategized in times of bottlenecks during processing. Partial budgeting and feasibility study were done to determine the project is viable.

In marketing, bottled CCW were distributed to the nearby restaurants, school canteens, resorts, shops and government agencies as promotional campaign as well as gathered feedbacks on the product. To introduce the product in the market, the cooperator joined trade fairs and sponsored drinks to sports events as well as leaflets and posters distribution in Davao Region. The coop president was also active in radio interviews, posting advertisements and commercials on the local newspapers and radios.

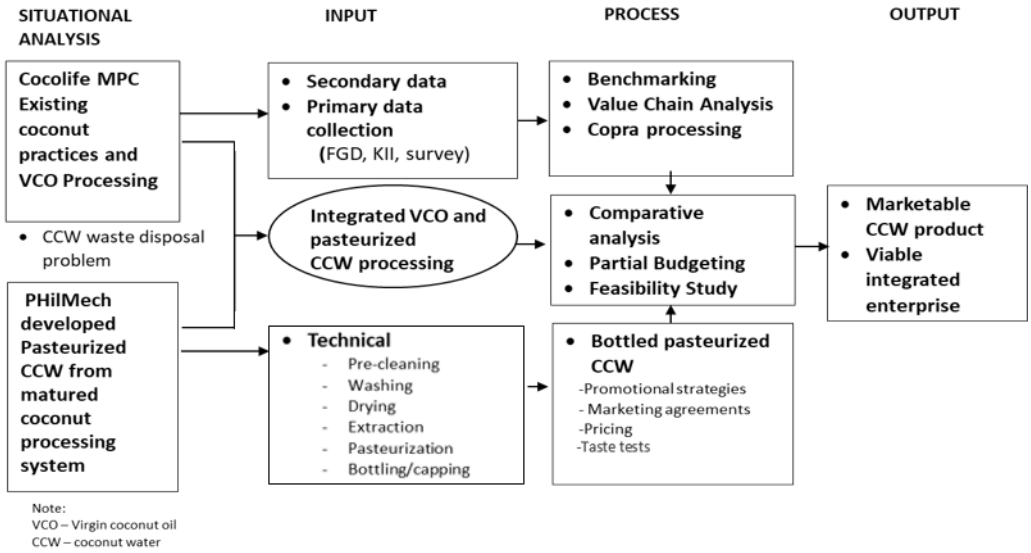

Figure 1. Conceptual framework of the study

Figure 2. Map of the Philippines showing the cooperator's location

III. Results and Discussion

On the onset of the project, observations and assessment on the present practices of the farmers were done so as to determine the best appropriate coconut processing, (i.e., copra or VCO processing) to integrate with the coconut water (CCW) processing. Though in both processes coconut water was wasted, in copra processing it was discarded in the farm while within the facility area for the production of VCO. Assessing these practices and considering the CCW processing facility requirements for current supply in the area and the hygienic handling protocols to produce the beverage product, we conducted pre-feasibility studies on the CCW processing integrated with the copra or VCO processing. Results showed that integrating it with copra processing would not be feasible because of the low-priced copra in the market and the problem on the collection handling protocol of CCW from the farm that concerns food safety. However, with the VCO processing, handling protocols were in placed and VCO

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product commands higher price in the market. Hence, the following discussions were on the results of the integration of the CCW processing with the existing VCO processing of the cooperator.

Establishment of Benchmark Information

Pantukan, Davao de Oro Coconut Situation

The municipality of Pantukan in Compostela Valley now Davao de Oro province has total agricultural land area of 31,447 hectares, of which 7,395 hectares or 23.5 percent was devoted for coconut production. Coconuts and bananas were among the dominant crops in the area, with durian, lanzones and other fruit-bearing trees, poultry and livestock contributing their part in the agricultural sector.

According to the Philippine Coconut Authority (PCA), Davao de Oro had an estimated three hundred thousand bearing trees, for which contributed to a roughly 20 million nuts a year. A farmer's average farm holding area is estimated at 2.13 hectares. With coconut as primary commodity, around 73 percent of the farmers were into copra production while the remaining 27 percent were marketing whole nuts.

The Cooperator: Cocolife Multi-Purpose Cooperative (Cocolife MPC)

Through the efforts of various individuals, businessmen, and other concerned citizens with regards to the issue on vast increase in the conversion of coconut trees into coconut lumbers in Pantukan, several provisions were established so as to further avoid the cutting of coconut trees and instead thought of other coconut products that can benefit both the environment and the constituents of the municipality. One major product identified that had greatest potential to boost the economic state of the municipality was through the virgin coconut oil production. Last February 8, 2006, Mr. Rudy Ang, the founding chairman established the Cocolife MPC, a coconut farmer's cooperative. He spearheaded the advocacy of inspiring and strengthening coconut farmers to plant more coconut trees for a sustainable environment as well as promoting consistent business community. Moreover, the organization was not discriminating anyone as it welcomed indigenous people to be its members. Average area per farmer was around 2.98 hectares.

The cooperator operated a small-scale virgin coconut oil processing with a capacity of 2,000 nuts per day and produced an estimated 80 - 100 L of VCO per day. They had established the market outlet distribution of VCO to various commercial establishments and markets around the locality.

Coconut Farmer's Profile

A survey was conducted to 160 coconut farmers in Pantukan, and results show that they were in their early 40's and late 80's. The youngest was 24 years old and the oldest was 84 years old. Sixty percent were males and almost all of them are married. Forty- six percent reached secondary education and more than twenty percent had college education. Ninety- one percent of the farmers interviewed were members of farmer's organization/ cooperative.

Majority of the farmers owned more than 2 hectares of coconut farm where durian, *lanzones*, banana and some other fruit bearing trees were also intercropped. Ninety-three percent (93%) of the farmers owned the land, four percent were shared tenants and the rest were either amortizing or a leaseholder. They had been engaged to farming for an average of 18 years. The share tenants followed the established sharing arrangements, the most common of which was 60/40 sharing in cash per harvesting.

Postharvest Practices

Harvesting. The gestation period for coconut tree is eight to ten years. Majority of the coconut farmers harvested their crops every 3 months (86%). The current harvesting cycle varied from 45 days to 60 days or 90 days. Most of the farmers followed the 90-days cycle. Harvesting started in the morning until in the afternoon depending on the land area of the farm. The use of *karit/ halabas* or scythe for harvesting was the common practice in the area.

Piling and Hauling. Simultaneous with the harvesting, another worker was gathering and piling up the coconuts. Seventy-three percent (73%) used '*kariton*' or carabao cart to transport the nuts from the small piles to the work area or nearest road where the buyer would pick up the nuts.

De-husking. Eighty-six percent (86%) of the farmers practiced manual dehusking with the help of an iron rod mounted in the ground. This was a strenuous and skill-oriented activity. Presently mechanical devices were available for dehusking but not being patronized by the farmers.

Copra Processing. Seventy-three percent (73%) of the coconut farmers in Pantukan were copra processors. There were two ways in drying the coconut kernel, sun drying and smoke drying. Sun drying was the traditional way of copra drying. It took about 8 days to dry the coconut kernels. During sun drying, deposition of dirt and dust on wet coconut meat resulted to low quality copra. Further, cloudy weather and low atmospheric temperature also reduced the quality of copra. Another way of drying was to heat it indirectly with fire or smoke drying which took 2 to 3 days. Most of the farmers were practicing it especially if the weather is not good. The optimum moisture content needed in copra is 5-6%. Sun drying, smoke drying, kiln drying and indirect hot air drying are commonly used drying methods in the country.

Hauling and Transport. Hauling from the farm to the road side was done manually (91%) or with the use of carabao sled (9%). Traders picked-up the commodity using elf truck or motorcycle to deliver the nuts to the trader's warehouse.

Marketing Practices

Place of sale, Market outlet and Location. There were several market outlets cited by the coconut farmers. These included the wholesalers and local agents. The other outlets mentioned were the coconut farmers' cooperative, exporters, retailers. Place of sale was usually done in the farm (96%). The buyer's truck/elf picked up the nuts and the farmers were paid immediately. Around 73 percent of the farmers sold their product to the local trader, 23 percent to the cooperative, and 3 percent to an industrial processor.

The coconut farmers chose their market outlet for the following reasons: the price was higher than the others; they have a long-term buyer-seller relationship; cash basis

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transaction upon pick up/delivery of the nuts, convenience in trading and the trader provide financial assistance.

Postharvest Agreements

Farmers were spending around P3.65 per nut from harvesting up to copra processing and marketing. It started with the harvesting of nuts with husk, then dehusking of nuts to copra processing and copra as the final product. The bulk of the postharvest costs or 33.15 percent of the total costs went to the marketing processed copra from the *tapahan* or smoke dryer to the trader's warehouse. Meanwhile, the expenses for copra processing got the second highest share at 30.41 percent from the postharvest budget and transport of nuts from farm to the trader's warehouse in the third spot. The rest were divided among the harvesting, dehusking, piling and hauling (Table 1).

TABLE 1. Postharvest agreements of farmers and laborers in copra processing in Pantukan, Compostela Valley, 2017, in PhP/nut

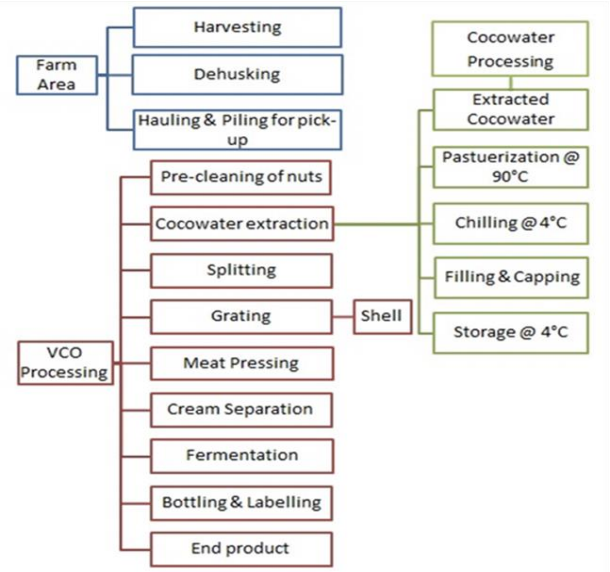
Postharvest system	Activities	Payment	Percentage	Remarks
Harvesting	Use of *'karit' or scythe*	P0.20/nut[1]	5.48	Some of the owners provide meals
Dehusking	Use of upright *'karit' or scythe*	P0.20/nut[1]	5.48	
Hauling and Piling	Piling of nuts near the trees Hauling of nuts to the nearest road network	P0.20/nut[1]	5.48	
Transporting	Farm to the trader's warehouse	P0.73 per nut [2]	20.00	Traders picked-up the dehusked nuts from the farm
Copra processing	Splitting, drying and sacking	P1.11/nut[3]	30.41	
Marketing	From '*tapahan*' or smoke dryer to the trader's warehouse	P1.21 per nut[4]	33.15	
	Total	***P3.65/nut***	***100.00***	

Source: Survey Note: [1]P200/1000 nuts [3]2000 nuts/ (P200/day x 3labor x 3 days)
[2]P20/sack / (25-30 nuts/sack) [4]P20/sack / [(75-90kg copra/sack)/5nuts/kg of copra)]

Integration of CCW processing system with VCO Enterprise

In establishing the coconut water processing system, equipment such as washing bins, coconut sanitation cage, coconut water extractor, pre-pasteurizer holding tank, pasteurizer – chiller and filling and bottling equipment were required. These were installed and underwent commissioning before the processing system was integrated with the existing virgin coconut oil processing of the cooperator, the Cocolife MPC.

Moreover, Figure 3 described that with the existing VCO processing, CCW processing was integrated in the CCW extraction activity wherein collected CCW was pasteurized to produce the bottled CCW while the dewatered nut went to the VCO processing. The right most boxes showed the activities done in the processing of the CCW while the left most boxes were for the on farm and VCO processing undertakings. Further, the different processes in this CCW processing system were described below.



Source: Calica, et al, 2021

Figure 3. Coconut water processing integrated with VCO processing flowchart

Pre-cleaning, washing, drying of nuts and coconut water extraction

Pre-cleaning of matured nuts include mechanical shaving of excess fibers found in the husk with the use of pre-designed coconut shaver of Cocolife MPC. It used two fabricated sets of metal brush strips to remove excess fibers that remain on the surface of the nuts after dehusking to avoid any foreign matter sticking on the nuts. For a 1,000 nuts daily operation, two laborers took around 2.17 hours to finish the pre-processing stage. The next step of washing and sanitation of pre-processed nuts were accomplished by the two workers in about 2.07 hours. Pre-cleaned nuts were washed and sanitized per batch (300 - 350 nuts, depends on size) due to the carrying capacity limitations of the washing bins. By drilling two holes in the nut, the extraction and collection of coconut water were completed by the two workers within 1.09 hours.

Pasteurization, bottling and capping

The extracted CCW was subjected to pasteurization utilizing pasteurizer- chiller at 90 degrees Celsius that took around 4.11 hours. Then the pasteurized- chilled cocowater was manually filled into PET bottles and capped/sealed. The filling and capping processes took about 3.05 hours and 1.16 hours, respectively.

Taste Tests

Based on the taste test results of around 200 respondents, hundred percent of the school age said that it was bland while 90 and 100 percent of the adults and foreigners tasted it just right. In terms of price, it was expensive for the younger ones, just right for the 83 percent of the adults and low for the

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foreigners. For the packaging, no comment was given by the young ones, 60 percent of the adults liked it while 90 percent of the foreigners said that packaging did not matter for as long as it was nutritious. Since the product is natural without preservative added, hence the taste was not consistent as commented by the regular consumers.

Viability of the integrated CCW and VCO processing enterprise

To establish the viability of the integration of the CCW to the VCO processing, a 5-month operation was conducted wherein the first 3-months operation was a project team led and the last 2-months operation was managed by the cooperator. Results showed that an average of 1,968 nuts per month were processed with a 90 percent recovery (laboratory result was 96 percent recovery).

The integration of the cocowater processing with the VCO production is a 10-year project with an investment cost amounting to P8.08 M. Operating thrice a week at 2,000 nuts per processing recorded operating costs at P6.35 M comprising of 26.30 percent fixed costs and 73.70 percent variable costs. The major fixed and variable expenditures went to depreciation and packaging material costs, respectively. The expected gross income in the first year registered at P7.47 M and a net income of P 2.27 M. Using a 15 percent hurdle rate, the total investment would be recouped within 3.21 years, the project would have a BCR of P1.07 which was economically viable. With a positive NPV and an IRR of 16.12 percent signifies a viable project. Breakeven point volume and price for the cocowater was around 104,117.40 nuts and P11.90 at 350 ml bottle, respectively. Meanwhile, for the VCO with four different packaging (e.g., 1 li, 350 ml, 250 ml and 100 ml), the breakeven point volume and price were at 5,479.86 bottles in liters at P277.60 per bot; 438.39 bottles in 350ml and 250 ml, selling it at P 198.28 and P142.76 per bottle, respectively; and 657.58 bottles in 100ml priced at P63.45 per bottle (Table 2). Based on the sensitivity analysis done, the project was sensitive both to a 10 percent change in price and volume.

Moreover, a partial budgeting was done to determine the viability of the cocowater processing system integrated with VCO production. Additional costs were for the depreciation, repair and maintenance and variable costs registering a total of P2,603,392.53 per year. The variable costs incurred were for labor, cleaning agents, fuel and oil, power, and packaging costs. On the other hand, sales from the cocowater drinks amounting to P3,119,040.00 would be received by the cooperator giving them an additional net income of P515,647.47 per year or PhP1.79 per nut (Table 3).

Table 4 shows that in selling copra, farmers spent around P22.85 per kg (5 nuts=1 kg copra) plus the processing costs of P3.65 per nut resulting to a net income of P0.92 per nut. However, selling in wholenuts at P6.00 per nut, they would have additional income of P4.48 per nut. On the other hand, if they would engage in processing CCW and VCO and considering the recovery rates per nut of 315 ml and 150 ml, respectively. With selling price at P13.50 for CCW and P60 for VCO, higher returns for the cooperative would be realized at P56.32 and P51.84 per nut. This data results show that the farmers were better off selling in wholenuts as well as CCW and VCO than processing them into copra.

TABLE 2. Investment analysis of integrated processing of VCO and cocowater, Cocolife MPC, Pantukan, Davao de Oro, 2018 (3x a week processing at 2,000 nuts per processing)

Item	Amount (PhP)	Percentage
Investment cost, PhP	**8,078,067.00**	
Fixed cost, PhP/year	**1,671,325.11**	**26.30**
Depreciation	697,168.03	41.71
Repair and maintenance	130,465.61	7.81
Registration and licenses	329,591.48	19.72
Land rental	44,100.00	2.64
Facility Loan	400,000.00	23.93
Working capital	70,000.00	4.19
Variable cost, PhP/year	**4,682,823.25**	**73.70**
Stock cost	1,152,000.002	24.60
Salaries and wages	543,600.00	11.61
Electric power cost	1,252,628.43	26.75
Packaging materials	1,345,174,08	28.73
Fuel and cost	107,337.00	2.29
Other variable cost	282,083.74	6.02
Total operating cost	**6,354,148.36**	**100.00**
Buying price (PhP/nut)	7.00	
CCW Selling price (PhP/bot@350ml)	15.00	
Gross income, PhP/year	**7,471,872.00**	
Net income for the first year, PhP	**2,269,723.64**	
Payback period (PBP), years	***3.21***	
Internal Rate of Return (IRR), %	***16.12***	
Benefit Cost Ratio (BCR), PhP	***1.07***	
Net Present Value (NPV), PhP	***632,700.33***	
Breakeven points	***Price, PhP***	**Volume, nuts**
Cocowater 350ml	11.90	104,117.40
VCO 1000ml	277.60	5,479.86
VCO 350ml	198.28	483.39
VCO 250ml	142.76	483.39
VCO 100ml	63.45	657.58

USD 1 = PhP50

TABLE 3. Partial budgeting of the integration of cocowater processing with VCO processing in Pantukan, Davao de Oro, 2018 @ 2,000 nuts per processing 3x a week

Item		Amount (PhP)
A. POSITIVE RETURNS		**3,119,040.00**
Added Income		
Sales of bottled Coconut Water		3,119,040.00
Reduced costs		***0***
B. NEGATIVE RETURNS		**2,603,392.53**
Added Costs		***2,603,392.53***
Depreciation		697,168.03
Repair and Maintenance		130,465.61
Variable costs		1,775,758.89
Cleaning agents	*240,240.00*	
Labor	*72,000.00*	
Fuel and Oil	*36,000.00*	
Power cost	*851,518.89*	
Packaging materials	*576,000.00*	
Reduced income		***0***
Positive Returns – Negative Returns		**PhP515,647.47/year or PhP1.79/nut**

USD 1 = PhP50

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TABLE 4. Comparative analysis on selling copra vs. selling wholenuts and CCW and VCO, Pantukan, Davao de Oro, 2018

Item	Selling copra	Selling wholenuts	Selling CCW & VCO
Raw material	1 kg of copra = 5 nuts	1 nut= P6.00	1 nut= 315ml CCW 150ml VCO
Selling price	1 kg of copra = P22.85	5 nuts = P30.00	1 nut (CCW)= P13.50[4] (VCO)= P 60.00[5]
Gross income/nut	P4.57/nut[1]	P6.00/nut	P73.50/nut
Less: Processing/labor cost per nut	P3.65/nut[2]	P0.60/nut[3]	P16.26/nut[6]
Income per nut	**P0.92**	**P5.40**	**P57.24**
Additional income per nut		P4.48	P57.24 – P0.92 **= P56.32** P57.24 – P5.40 **= P51.84**

[1]P22.85/5 wholenuts = P4.57
Note: USD 1 = PhP50
[2] See Table 1
[3] See Table 1 (harvesting, dehusking, hauling and piling)
[4][(P15/350ml) x 315ml] = P13.50
[5]P380/1000ml x 150ml = P60.00
[6]See Table 2 (total variable costs/288,000 nuts/year)

Marketing of CCW

Potential markets

Results show that with the 5-month operations monitored by the project team, the cooperator recorded around P43,518 sales. To introduce the cocowater product in the market, several potential markets were tapped. The major market outlets were the government agencies (46.46%) and events and trade fairs (25.97%). The government agencies usually ordered coconut water during their conferences, meetings, trainings, and the like. Being a Department of Trade and Industry (DTI) and Food and Drug Administration (FDA) registered cooperative, the cooperator got invitations in events and trade fairs to promote their products that served another venue to market the cocowater product. There were also walk-in individuals (9.74%) from different cooperatives from Mindanao or even those from Luzon and Visayas who were on their field trips. Some were nearby cooperatives (5.02%) that ordered cocowater for their events to help promote the product. Shops (6.58%), resorts, hotels and restaurants (3.04%) and schools (3.19%) were also tapped to sell the CCW products.

Market Strategies

Marketing strategies adapted by the project were offering consignment basis for the schools, shops, resorts, hotel and restaurants. Sometimes they offered discounts to their target clients, participating to events and trade fairs to promote the cocowater product to the public. These were strategies adapted by the team to position the product in the market.

Moreover, in support to the Department of Education E.O. No. 13 series of 2017 on banning the carbonated drinks inside the school premises, the cooperator entered into a marketing agreement with the 7 different schools in Pantukan to supply their canteens of cocowater drinks. In addition, the coop president was also active in the local radio interviews, posting advertisements and commercials on the local newspapers and radios, respectively. Also, leaflets and posters were distributed in Davao Region.

Feedbacks and Observations in Marketing CCW

Based on the experiences and observations of the project team during the five-month actual operations, factors influencing the marketability of cocowater could be attributed to the selling price of the bottled cocowater, the shelf life of the product, the storage facilities available in the market outlet, the type of transport vehicle used for the delivery, and the target markets. Furthermore, demand for the VCO in the international market was also an important factor to note because low demand and price would result to stop its operations as well the CCW processing.

The price of P15 per 350 ml bottled cocowater was not acceptable to the school pupils in the municipality of Pantukan because of the readily available low priced young coconut water in plastic cups outside the campus. On the other hand, it was acceptable to the professionals and health-conscious people in the cities as well as the foreigners.

Cold chain system for the market outlets such as *sari-sari* stores or neighborhood stores, convenience stores and some tourist spots were not observed because of unplugging the chillers at night were being practiced to save usage of current caused the deterioration of the cocowater. Consequently, with its 21-days shelf life, the cocowater product could not penetrate big groceries and supermarkets because of the general requirement of 3 to 6-month shelf-life for drinks and juices. Since the product is perishable, the type of transport used in the delivery affects the quality of the product in the market. Thus, target markets such as events and trade fairs or niche markets were highly recommended because the product would be consumed within the day and styrofoam boxes stacked with more ice as storage were sufficient to maintain its quality.

To sustain the community business and to help maintain the quality of the product in the schools, the board of the directors of the cooperative through their collective effort crafted a proposal on providing chillers as CCW storage to those schools with existing marketing agreements and then submitted to and was approved by the Philippine Rural Development Project (PRDP).

IV. CONCLUSION

Integrating the PHilMech CCW pasteurizer-chiller system with the existing VCO processing addressed its CCW disposal problem of the cooperative. Operating the integrated enterprise processing thrice a week showed a good financial indicator. Moreover, partial budgeting on the integrated processing showed that farmers would have additional income of around PhP515,647.47 per year.

Since the CCW product is natural (no preservative added), it has a short shelf-life of 21 days, thus product disposal in events, trade fairs and other niche markets wherein it would be consumed within a day or two especially if the buyer has no cold chain system to maintain its quality, is recommended.

Potential Uses of Findings

These research findings could be utilized by cooperatives

Gigi B. Calica, Ofero A. Capariño, Lester Angelo D. Alfonso, and Aina Marie A. De Leon, "Marketability of Coconut Water Product and Viability of Integrated Coconut Water and VCO Processing: Pantukan, Davao De Oro Case," *International Journal of Multidisciplinary Research and Publications (IJMRAP)*, Volume 6, Issue 3, pp. 115-121, 2023.

or group of individuals with accumulating waste cocowater to convert it as a source of additional income instead. Moreover, for policy makers, these could be a good basis in crafting government policies or programs for the coconut industry.

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