The Price and Cost Structure of the Pineapple Industry in Nueva Vizcaya Philippines

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ABSTRACT

This value chain (VC) study presents the price and cost structure of the pineapple industry in Nueva Vizcaya, Philippines. A descriptive -qualitative research that gives emphasis on the value created by key players in each chain. It was conducted among farmers, traders, processors and stakeholders of the top three producing municipalities in the province. The producer respondents were selected using stratified random sampling while traders and processors were completely enumerated. Results were established through validating the survey results with key -informants, and eventually were analyzed using the value chain framework and absorption costing. Seemingly, the ''pineapple processing'' segment can best create the best value. However, activities were irregular which is similar to the retail value chain. The ''trading'' segment regularly performed by brokers created the most value, next to the production chain. Finally, gaps in the industry commands the strong commitments of the enabling stakeholders to improve and promote investments. Policy implications such as the support of the local government units to include pineapples in their priority crops is highly endorsed. The results can likewise serve as a basis for identifying commodity investment priorities in the province.

Keywords: Nueva Vizcaya Philippine-Pineapples; Price and Cost Structure; Value Chain.

1. INTRODUCTION

The Philippine Statistics Authority (PSA, 2015) reported 509.68 MT pineapple production in the Philippines in 2014. The volume increased by 2.1 MT, higher than the 2.5 MT output in 2013. This has been due to the following reported developments in the Philippine - Pineapple Industry: "bigger fruits developed and harvested in MIMAROPA (Mindoro, Marinduque,, Romblon and Palawan) and Zamboanga Peninsula due to fertilizer application; increase in area harvested in Cagayan Valley, Northern Mindanao, Central Visayas and SOCCSKSARGEN (South Cotabato, Cotabato, Sultan Kudarat and Sarangani, plus General Santos City); and

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higher demand in local markets; and bigger fruits produced in Western Visayas. Area planted with pineapple expanded by 1.5 percent from 60,759 hectares in 2013 to 61,642 hectares in 2014. Production of Region 2 by province for 2011-2014 were recorded by the PSA (2015) as follows: Cagayan produced 11.4 MT; Nueva Vizcaya achieved 9.4 MT and Isabela posted 7.4 MT. These provinces were ranked 9th, 11th and 12th, respectively, in the top 15 pineapple production by province in the country. In 2013, the Bureau of Agricultural Statistics (BAS, 2014) noted that Nueva Vizcaya had the highest production of pineapple in Region 2. The fertility of its soil including the climate were natural opportunities for the farmers in the province to produce more pineapples. The farmers in Upper Baretbet, Bagabag, Nueva Vizcaya- an Agrarian Reform Community (ARC), dominated the pineapple industry. The geographic location can be found by the coordinates between 121.285^{o} and 121.356 ^{o} east longitudes, and between 16.585^{o} and 16.491 ^{o} north latitudes. Specific production sites known as "sitios" are located in Kurasay, Amballo South, Amballo North, and Palayan. Road and trail density is high within the pineapple sites.

Over the years, the growth of the pineapple industry in Nueva Vizcaya provided a lucrative opportunity for young adults who have engaged in pineapple production. This was true to the producers in the municipalities of Diadi and Quezon. Its specific locations lie on contiguous geographic boundaries; all of which share the "Type 3" climate defined by its dry period (observed during January, February and March), wet period (experienced during August, September and November) and the warmest on the months of May, June and April (Vallesteros and Sarmiento, 2014).

Historically, Sitio Kurasay, Bagabag was home to the biggest producers of pineapples in the province. Production extended to other "sitios" such as Amballo South, Amballo North, and Palayan. A hectare of land normally required 22,000 sprouts at one Philippine Peso per piece. Farmers produced their own planting materials from their own fruit bearing plant, while some bought it from other farmers who had better plant quality. Sharing of planting materials by way of "paluwagan" is a culture in Bagabag to help farmers grow better crops and minimize costs.

The growing number of producers in parallel to the vast areas intended for production depicts a purely competitive market structure which is common to agricultural commodities like fresh pineapples- sharing between favorable and poor market conditions within its corresponding season. While trading pineapples clearly adhered with "oligopolistic" market structure, it was worthy to note that some pineapple growers in the province had learned and had entered the game of trading, playing as either assembler- shippers or retailers. Few traders bought and sold significant volumes of pineapples. People found them in the public markets of Urdaneta,

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Pangasinan; San Jose City, Nueva Ecija; and Tarlac. For processed pineapples, few processors produced limited volume which were commercially displayed in trade fairs and pasalubong centers. This scenario can be explained by some factors like limited technical and resource capacities of the two identified players, the Nueva Vizcaya State University (NVSU), and the Amballo South Agricultural Association (ASAA).

Figure 1 shows the key functions and key players in the VC. Farmers were noted to have varied production practices in terms of the farm areas' degree of elevation. Inputs were commonly procured from farm suppliers, co-farmers and cooperatives. Farming activities were assisted by enablers like the Department of Agriculture (DA), office of the Provincial Governor, Office of the Provincial Agriculture (OPA), Department of Agrarian Reform (DAR), and Department of Trade and Industry (DTI). Among the farmers were 10 brokers who regularly traded the fresh pineapples to four identified wholesalers in Urdaneta City Public Market "Bagsakan Center." Along the chain were processors who occasionally transform the pineapples. A processor procured pineapples from the farmers while the other did it during peak seasons. These processors were sponsored by enablers through capability building seminars and trainings, provision of processing facilities, and financial assistance.

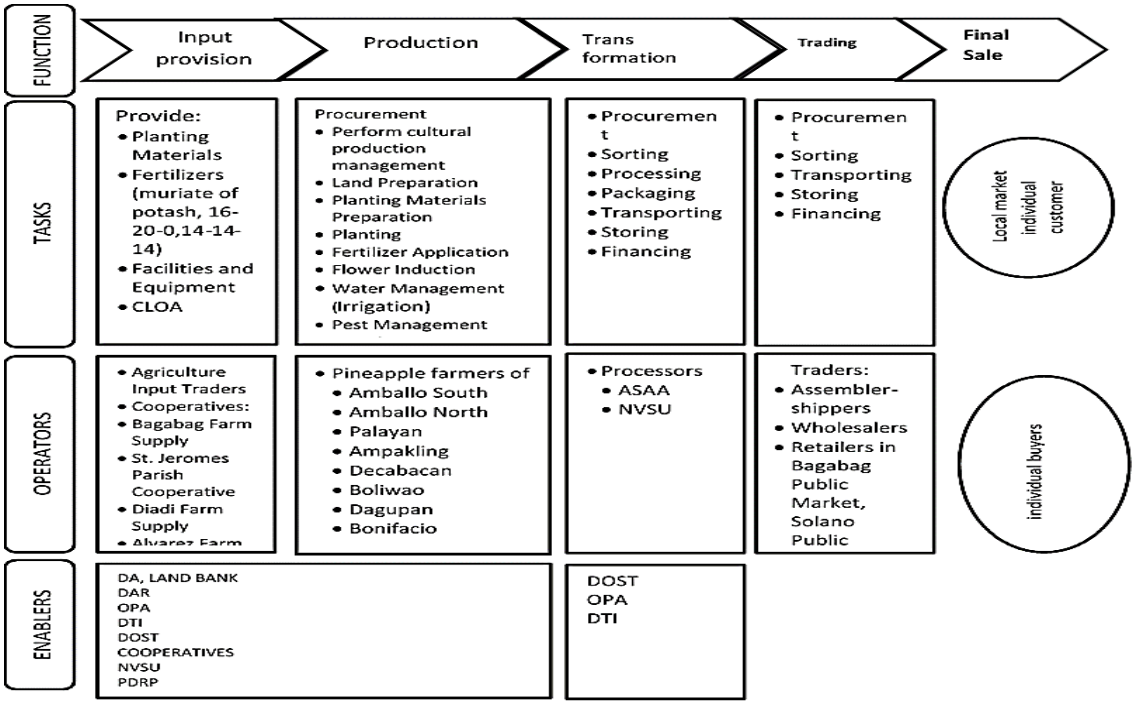

Figure 1. The Value Chain Map

These are facts declaring how the pineapples in Nueva Vizcaya were managed.

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Thus, it calls for researchers to conduct product management research that will lead researchers to create better strategies or develop tools to manage the value chains.

1.1 Objective of the Study

A VC for any commodity initially provides the decision maker on which chain can accrue the most value and develop product strategies. This paper specifically aimed to describe the price and cost structure of the pineapple industry in Nueva Vizcaya. This required the description of key players' functions with the analysis of cost and price structures per chain, which are the bases to forward pragmatic implications.

1.2 Significance of the Study

The price and cost structure of the pineapple VC is significantly useful to the provincial government in their commodity investment plan. The awareness of local government units as well as other regulators on both the pricing practices and cost structure of the pineapple key players can also be useful for their agricultural policy formulations, support mechanisms and project concepts. This purpose is similar to the study of Iamratanakul (2018) entitled "*A Conceptual Framework of Implementing Business Strategy for the NPD Process*" which provided a guideline to a product team to effectively perform process activities. The strategies served as a mechanism to deploy business strategy to the operational level of product management.

1.3 Conceptual Framework

The price and costs structure analysis is grounded from the VC framework developed by Value Links (2007). The functional view (Figure 2) of the pineapple VC describes the sequence of related business activities from the provision of inputs to primary production, transformation, marketing, and to the final sale of the particular product to consumers. Each specific VC activity performed by key players accrues amount of money, which can be in the form of net value relevant to price and cost.

Relevant cost and return generated by each key player in each VC of Nueva Vizcaya pineapple supports the description of its respective functions as presented in Figure 1. The basic functions per chain describe the creation of value. It was measured from the first chain that is from acquisition of inputs to the point of final sale. The value created by each key player relative to their specific chain functions are accounted in terms of price, cost, and profit. The profitability of each key player in the VC map utilized cost and profit analysis. The Income Statement structure and common size income statement supported the discussion of findings. These tools were used in several VC studies for agricultural commodities such as banana, onion, peanuts, and

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other fruits (Sansano, 2010; Sansano, 2011; Sarmiento, 2014).

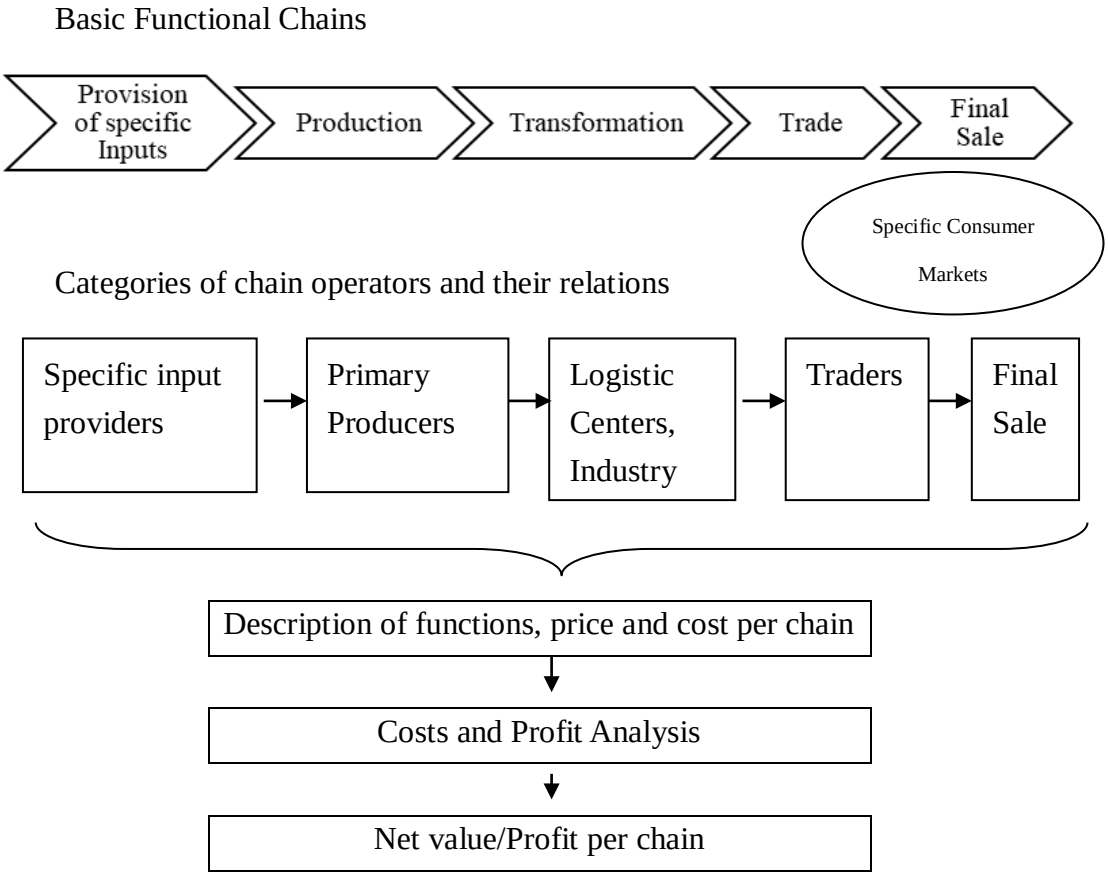

Figure 2. Framework of Value Chain Mapping (Value Links, 2007), and the Analysis of Price and Cost Structure

2. METHODOLOGY

This descriptive research used stratified random sampling. The population of the study involved four categories namely: farmers, traders, processors and stakeholders. The participants were the top three pineapple producing municipalities of Nueva Vizcaya; which accounted 381 farmer producers, 10 traders and 2 informal processors. Seventy -nine samples represent the farmers and the other respondents were all enumerated. Key informant interviews and focus group discussions among "Influential" respondents such as farmers, traders, processors and stakeholders validated the responses declared in the survey questionnaires. The cost and profit are limited to the production in 2016. Frequency counts and weighted means were the descriptive statistical tools for the analysis of farm production data, cost and prices. Financial statements showed the cost and profit coupled with its common size. The descriptions

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of activities performed by each key player per production cycle in the value chain of pineapples in Nueva Vizcaya has relative nominal values. These were the basis to develop the price and costs structure of the pineapple industry in Nueva Vizcaya. As such, net profit explains the value contribution of each chain.

3. RESULTS

3.1 Description of Key Player's Functions, Cost and Profit

The cost and profit described the value added in each VC. This section, presents the cost and return structure per VC (Table 1) and according to production cycle. VC 1 declared the farmers' 18-month production period. Both assembler- shippers (VC2) and wholesalers (VC 3) considered one elf truck shipment. VC 4 considered one shipment for retail and finally VC5 (processors) considered 80 pieces pineapples for one production cycle.

3.1.1 Value Chain 1. The Farmers Functions, Cost and Profit

A farmer generated a gross income of about P259,000 in growing 22,000 cayenne-planting materials in 18 months. This incurred around P 99,000 direct expenses. The inputs of production included planting materials known as "slips" or "sprouts'', herbicides, fertilizers and minimal pesticides. Customarily, slips were bought from co- farmers' good crops that had generated good fruit size and volume of produce. This "slip"s were dispersed over some decades and generations. On one hand, farm implement traders in Bagabag, Solano and Diadi sell other inputs earlier mentioned. Production activities are traditionally laborious. It accrued huge costs next to direct material inputs like fertilizers. The system of land preparation and planting vary according to the farm area's degree of elevation. Plowing and harrowing by means of man animal labor is common to rolling areas with a maximum of 35- degree elevation. In highly elevated areas farmers depended much on spraying of herbicide before direct planting was done with a bamboo stick called "tukit''. For some flat areas, farmers either hire or own hand tractors to prepare their farm. Weed management was the most laborious and expensive production activity. Weeding starts from land preparation up to harvest period and its regularity depended on the farm elevation. Highly elevated farms are weedy, covering pineapples grown. According to farmer- respondents, weeds may had caused decline in yield due to pest infestation. All farmer- respondents further claimed that good quality and yield of pineapples is an attribute of good weed management. For water management, farmers manually watered the plants during dry season and when observed necessary. This practice is

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contrary to the irrigation requirement prescribed by Pineapple Infocomm (United Nations Conference of Trade and Development [UNCTAD],2016). All farmers applied only minimal pesticides to protect their pineapples from damages. However damages to fruits caused by pests and diseases was one of the problems declared. Ninety- one percent of the plants on the average normally fruit; this was equivalent to 20,000 sprouts or 20,000 fruits, valued at P19 average price per piece (Table 1). This yield is claimed by farmers and support agencies to have caused by the choice of planting material "slips" carrying un identified diseases.

One of the significant value adding activities done by farmers was the alternate land tillage system for pineapple to produce all year round pineapples. With this cropping system, farmers were accustomed to lay idle some portion of their farm area. While an area was being prepared, other portions were grown with pineapple slips, and a portion of land area was ready for harvest. Flower induction technique "fit" for pineapples is also a good production practice of some farmers in Nueva Vizcaya. This is a technique to produce pineapples in 12- month period. The timing of "fit" is however, imperfect for many farmers as they fail to grow fruits as expected. This case suggests for a training for proper timing and technique from technical experts.

Table 1.

Summary of Production Cost and Return of Farmers, Traders and Processors at average current nominal value. (Actual Data, 2016 Output)

Structure	VC1	VC2	VC3	VC4	VC5
Sales	380,000	80,500	95,000	23,000	13,923
Production Costs					
Direct Materials	65,044.3	66,500	70,000	10,000	8,115.00
Labor	28,425.58	3,500	17,500	250	1,412.50
Direct Overhead	5, 423.17	2,500	3,500	250	800
Sub Total	98,892.88	72500	91,000	10,500	10327.50
Gross Profit	281,107.12	6,833	4000	12,500	3,915.50
Selling and Administrative	22,145.00	1,167	128.57	1,500	500.00
Total Expenses	121,037.8	73,667	91,128.57	12,000	10827.50
Net Income before Tax	258,961.2	6,833	3,871.43	11,000	3,095.50
Net Profit Margin	Php 0.68	Php 0.08	Php 0.04	Php 0.48	Php0.22
Return above Total Costs	Php2.14	Php 0.15	Php 0.04	Php0.92	Php0.29
Net Income per Piece	P12.94				
Average Unit Price of Pineapple (piece)	19	20	30	50	50

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During harvest seasons, water buffaloes pulled carts while farmers picked fruits. Other big farmers allowed traders to pick and harvest their produce; some manually fill-in their sacks and carry and gather their produce to the roadsides before hauling. Small farmers used tricycles to haul their produce and deliver this to roadside stalls, public markets and consumer homes. Big farmers were able to up themselves as assembler-shippers. The farmers yield were assembled and shipped on a consignment basis. With this system, farmers are paid only upon return of the assembler – shippers. Incidentally, payment will depend on the result of the assembler – shippers trading transactions on site. The expected sale value are most of the time lesser due to product grading discrepancy between the farm trader and the trading site wholesaler. Poor road conditions incur additional cost in selling the farmers' output- a common constraint encountered by most farmers.

3.1.2 Value Chain 2 and 3: Traders' Functions, Cost and Profit

Assembler - shippers and wholesalers had relative range of cost and profit (VC 2 and VC 3). These are small players operating on an "atom- size capital". An assembler-shipper cost in wholesaling required larger amount of working capital and overhead cost, but generated better value (VC2). Wholesalers (VC3) on the other hand incurred lower risk on spoilage than in shipping activities. These would mean that each single peso spent in shipping and in wholesaling returned P 0.15 and P 0.04, respectively; values generated were 20 to 24 times larger than production when calculated on a monthly basis though (Table 1). These values were created by activities such as negotiations with farmers, hauling and assembly, sorting, shipping, re -assembly and grading, displaying and wholesaling. Shipping activities of traders considered negotiation with farmers, assembly, hauling and shipping. Wholesalers normally maintain initial negotiations with assembler- shippers and only pay pineapples in good form on site.

3.1.3 Value Chain 4. Retailers' Function, Cost and Profit

Retailers (VC4) were the smallest scale operators in the pineapple VC, but somehow generated reasonable income that was P 0.92 for every unit cost incurred. Activities in the retail chain were manageable and was the lightest, with a notable small amount of capital. Retail price for each piece ranged from P50 to 120. The creation of its value were accounted by trading transactions, hauling from the farm site or from the wholesalers, sorting, shelf display and selling (Table 1).

3.1.4 Value Chain 5. Processors' Function, Cost and Profit

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This segment is supposed to have derived the best value which is enjoyed by Dole and Del Monte. However, the following deficiencies in manufacturing limits the supply for distribution. Processors have irregular processing schedules, Poor conditions of the processing facilities and equipment, unskilled processors, branding identity, and poor packaging. Their current manufacturing practices need improvement and have to comply with the requirements of the Food and Drug Administration (FDA). There were only four months of processing period in the province. June and July were the peak months that had weekly production, while March and April were the lean months that provided lower yield. The capital requirement for processing activities entailed large peso value. Working capital requirement such as direct materials and direct labor accounted the biggest share on the total cost. These were the costs directly associated in generating an estimated value of P 0.27 above unit cost. Price of processed pineapples vary on the packaging material used (Table 1).

About 80 pieces of pineapples can be processed into 357 bottles of vinegar. A bottle of a vinegar can be produced out of less than one piece of pineapple that is 22.41% of one pineapple. The cost to cover each 1.5 kilogram (kg) processed pineapple is P135.24. This included selling and administrative expenses. A piece of big pineapple that is approximately 1.5 kg., can be transformed to approximately 4.46 bottles of vinegar. The value added per piece can ideally be P38.70 per production cycle; and if production and resource capacities will be sustainable, monthly profits can be better than 29% (Table 1).

Of these scenarios, the value received for each chain provided a better analysis when these are comparable over time. As such, net values per piece were computed per production cycle per month.

3.2 Description and Analysis of Costs

The costs incurred by each key chain player per unit were further discussed with the common size income statement on Table 2. Farmers (VC 1) absorbed the least cost of sales (26%) providing the highest possible gross profit (74%) followed by retailers (VC4), processors (VC5), assembler –shippers (VC2) and wholesalers (VC3). Wholesaling (VC3) bore the huge cost of goods sold (96%) resulting to a meager gross profit (4%) per transaction.

Yet again, this illustration on Table 2 was only true to one production period and these values can only be comparable with a common time horizon and volume. VC1 length of profit conversion takes 15 to 18 months where results of operation had the least value since the rest of the key players had multiple sales turnover starting from the processor's point of view to that of the retailers. Processors (VC2) in the province

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normally produced vinegar in 10 production cycles over four months. Its peak which were June and July had 8 total production cycles and only once each of March and April. The trading function considered 6 shipments per week.

Table 2.

Common Size Income Statement (In Percentage %)

Structure	VC1	VC2	VC3	VC4	VC5
1.Sales	**100%**	**100%**	**100%**	**100%**	**100%**
2.Cost of Sales (Cost ÷ Sales x 100)	26	90%	96	46%	72%
3.Gross Profit (1less 2)	**74**	**10%**	**4**	**54%**	**28%**
4.Selling and Administrative	**6**	**1.4%**	**0.14**	**7%**	**3.6%**
5.Total Expenses (2+4)	**32**	**91.4%**	**96.14**	**53%**	**75.6%**
6. Net Income before Tax(1 less 5)	**68%**	**8.6%**	**3.86**	**47%**	**23.4%**
7. Net Profit Margin (6 ÷1)	**Php 0.68**	**Php 0.08**	**Php 0.04**	**Php 0.48**	**Php0.25**

3.2.1 Price and Cost Structure

Expected returns otherwise known as productivity are mostly associated with its chain revenue and cost. Cost can be recovered at the highest level of prices, while poor market conditions create lower prices; Hence, the value added are primarily affected by price. This applies to pineapple in that price varies according to the months of trade and to the movement along the chain.

Figure 3 presents these scenarios where the best months of trade set high prices from November to March. Eventually, supply dramatically increased to its peak resulting to the decline of price from June to August. September and October normally posted high prices as these were the months where there was inadequate supply.

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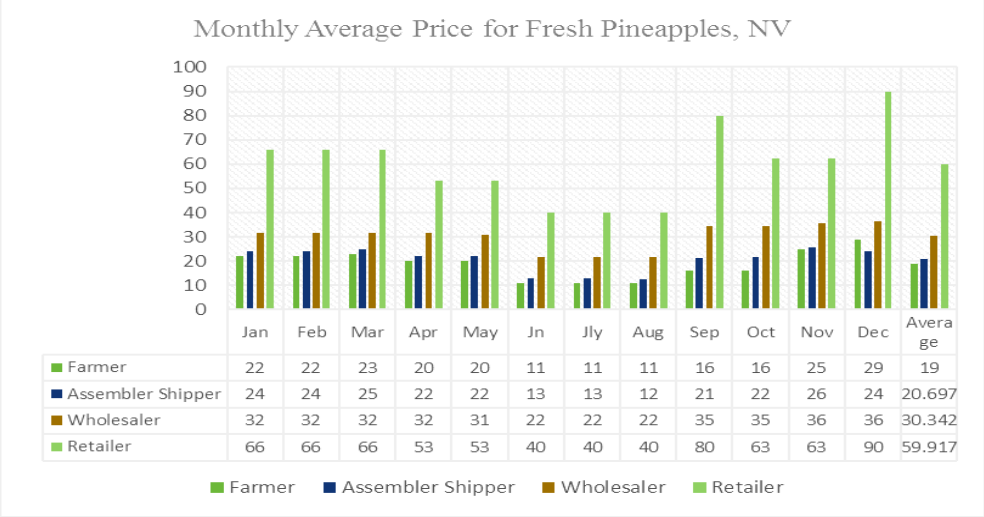

Figure 3. Fresh Pineapple Monthly Average Price per Key Player

Figures 4 to 5 further describes this section. Farmers (VC1) gained as high as 68% value, followed by the retailers VC (VC4) which is 50%, processors (VC5) with 29%, wholesalers (VC3) having 17% and the assembler-shippers (VC 2) gaining the least which was 10% .

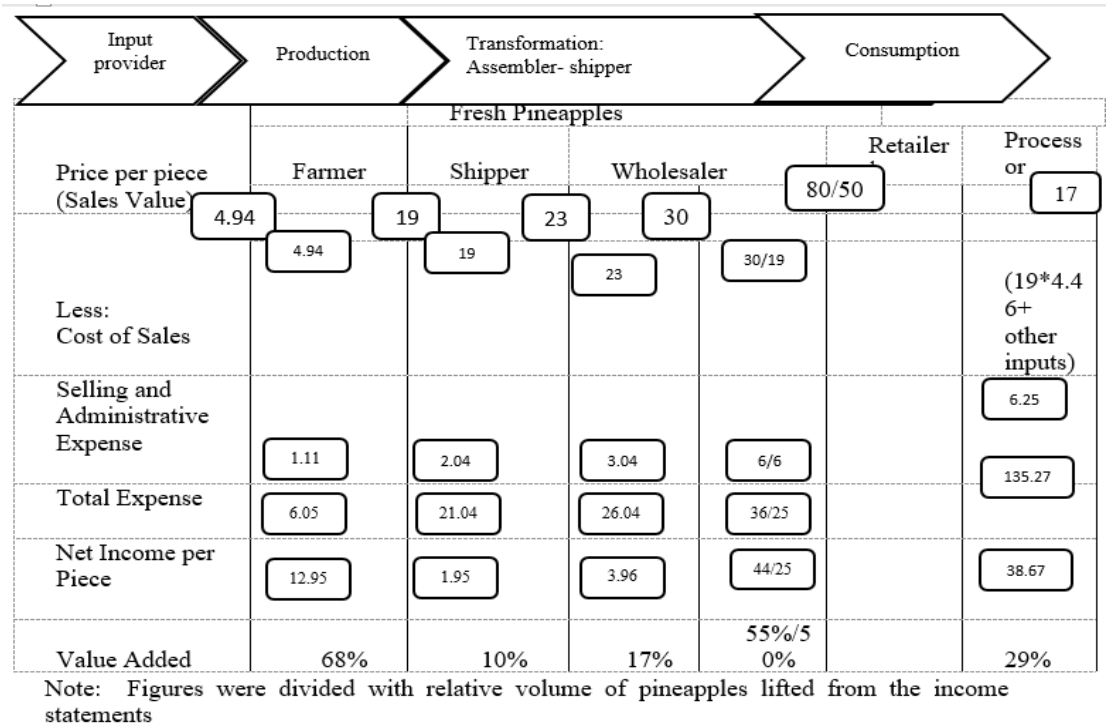

Figure 4. Price and Cost Structure, Nueva Vizcaya Pineapple Value Chain

A piece of fresh pineapple costs approximately P 5.00 and P1.00 for cost of sales and selling and administrative expenses respectively. It took a farmer to incur a total

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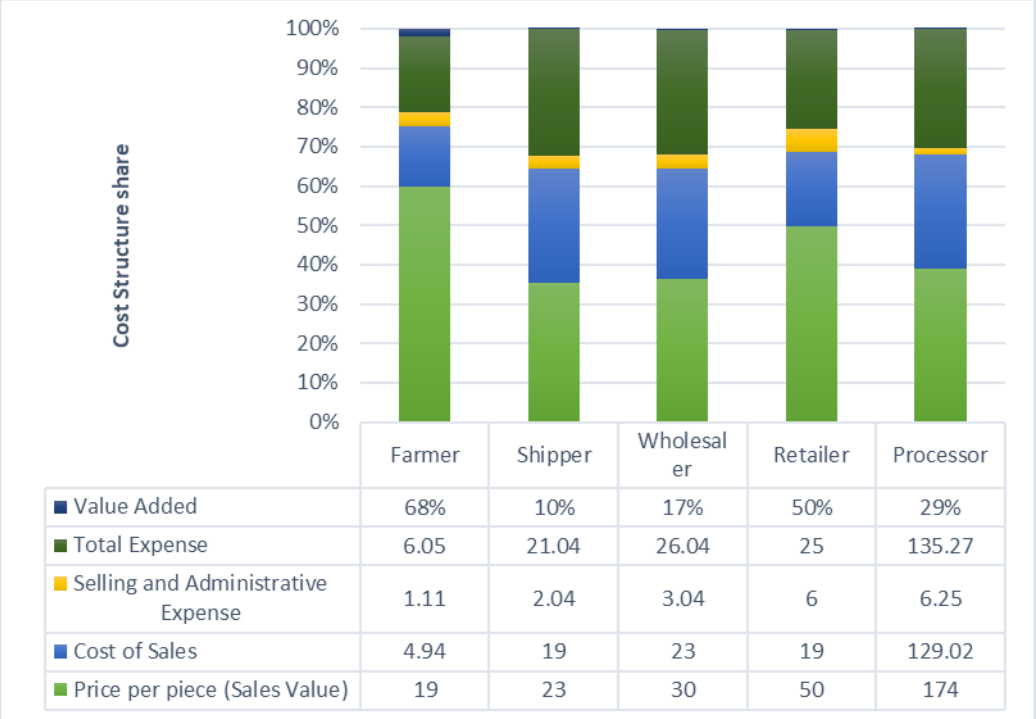
expense per piece of P6.00. Each farmer gained as much as P13 per piece at P19.00 price. Assembler- shippers incurred P21.00 cost, which covered the cost of fresh pineapple and trading transactions. Wholesalers then bought each at an average price of P23.00 where assembler shippers gained approximately P2.00 per piece of pineapple. Selling at P30 per piece, wholesalers recovered the P26.00 cost that gave them approximately P4.00 net income. Finally, the retail chain could sell at P80 and at P50 to consumers lean and peak seasons respectively. For each piece of pineapple, retailers gained as much as P44 and P25 per piece that recovered its respective expenses such as P36 and P25. The Processor VC gets its pineapples at a farm gate price of P19. Each piece was transformed into 4.46 bottles of vinegar plus other inputs that incurred P135.27 total expenses. A selling price of P174 is assumed per big pineapple since each equates 4.46 bottles, where each bottle sells at P39. A net income of P39 was achieved by processors per piece.



	Farmer	Shipper	Wholesaler	Retailer	Processor
Value Added	68%	10%	17%	50%	29%
Total Expense	6.05	21.04	26.04	25	135.27
Selling and Administrative Expense	1.11	2.04	3.04	6	6.25
Cost of Sales	4.94	19	23	19	129.02
Price per piece (Sales Value)	19	23	30	50	174

Figure 5 **Price and Cost Structure Chart, NV**

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3.2.2 The Enabling Environment

Table 3 shows a summary of the local programs and projects for the pineapple industry. While pineapple is not one of the priority crops in the province, it was observed that agencies initially have given assistance through the following programs:

Table 3

Programs and Projects of Agencies for the Pineapple Industry

Agency	Program and Project Assistance
Department of Science and Technolgy (DOST)	Processing Equipment to Amballo
Department of Agriculture (DA),PLGU,MLGU	Php 1 Million for ASAA; 120,000 pineapple sprouts distributed to Diadi
Provincial Local Government Unit (PLGU)	Construction of main "sitio"roads connecting national roads
Provincial Cooperative Affairs Office (PCAO), Departmentof Trade and Industry (DTI)	Coordinated with FDA to comply with requirements to observed good manufacturing practices. livelihood trainings: • Entrepreneurship and Business Management • Business Planning • Records Management • Leadership and Values Reorientation • Strategic Management • Inventory and Financial Management
Department of Agrarian Reform (DAR) and DENR	Facilitated 1000 certificate of land ownership award (CLOA)

4. IMPLICATIONS OF THE STUDY

Policy reviews along with its implementations can be considered by the "enabling environment" to foster public private partnerships. This can strengthen the pineapple industry in the Nueva Vizcaya. This is similar to the following implications in the study of Supachart Iamratanakul (2019) entitled "A Conceptual Framework of Implementing Business Strategy for the NPD Process":

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> ‘’*First, to successfully manage products, product managers and team members should have a strategic mindset. The NPD process should be managed with formal business strategies. This means that a product strategy should be developed as part of a formal process. This will help deploy business level strategy to operation, a.k.a. product management. What we suggest are 1) NPD process should be selected based on product development strategy. 2) An appropriate product manager should be assigned to the product. 3) Product team should be formed. 4) As part of a product plan, a product strategy should be formally developed and documented. 5) Product strategy should be reviewed regularly as part of formal product management process. The product team should explicitly develop and use product strategy and make sure that it is understood by both the team members and stakeholders. Having product strategy would help product teams react appropriately to product situations, make right trade-off decisions, develop common team spirit and culture”*

In corollary, specific strategies can be considered by the following responsible stakeholders in the Nueva Vizcaya Pineapple Chains: (1) Input Provision: Organize a farmer cooperative to develop possible enterprises, like trading inputs to serve farmers with a system for bulk buying (wholesale) of inputs. This perhaps can be an initial action of an organized cooperative or association; and Conduct varietal trial. Pilot MD2 variety for its suitability and adoption that can be gradually planted replacing Sweet Cayenne; (2) Production: LGUs may create agriculture production policies to strengthen enterprise development for farmers. But first the Municipal LGU must initiate prioritizing pineapple in their list of crops. They may also consider establishment of agribusiness literacy project for the continuous series of trainings for technology adoption under Good Agricultural Practice (GAP); Consider solar powered deep well irrigation as one of the PCIP in the province; (3) Post Harvest: Under this chain, stakeholders may organize and conduct trainings specific for pineapple; (4) Processing: This value chain requires the establishment of complete processing facility that can comply with the FDA facilities and building requirements; (5) The retail and wholesale chain can organize their group and collaborate with government and non- government agencies for the establishment of a pineapple centre can be possible to carry the identity of Nueva Vizcaya pineapples; and for the product features, there is a need to examine the pineapples’ BRIX quality and fiber content; (6) Enabling Environment: a) Financial Institutions may organize a cooperative/association involving the stakeholders for the pineapple industry; b) National Government

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Agencies: DAR/DTI/ Academe can conduct Comprehensive Land Use Plan (CLUP) cascaded from regional down to barangay level. A commodity map for possible business enterprises from the national to local must be revisited. This can be a basis for the preparation of investment plan; c) the Provincial Local Government Unit (PLGU) may consider pineapple in the priorities of the province in the upcoming Investment and Promotions Center; d) the Municipal Agriculture Office and Barangay Local Government Unit should reconsider pineapple as the first priority commodity.

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