Value Chain Analysis of Pineapple: Evidence from Gampaha District of Sri Lanka

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ABSTRACT

Pineapple has been identified as a sector with high potential in the world with an increasing demand. In Sri Lanka, the fruit is grown for the local market as well as for the export market, hence development of the sector promises lavish returns. The study aims at identifying challenges, opportunities and entry points in the pineapple sector with reference to the Gampaha district to provide the basis for identification of critical areas for interventions by performing a Value Chain Analysis. The channel mapping methodology was used to analyse the value chain. Quantitative analysis such as gross margins, market margins and value addition percentage were calculated. The study found that during the first year of cultivation, planting was the highest cost component while it was plant maintenance in the second year. It also revealed that considering the total cost for labour, machinery and input, the input cost was the highest cost component (71%), followed by labour cost (24%). Analysis of marketing cost and margins of each value chain actors shows that the highest net margin was reported for retailers (14-20%) whereas farmers' net margin was 9-13%. Gross margin between producer and retailer was very high for pineapple. Considering the value addition of pineapple, raw material cost is the highest cost component for dehydrated pineapple (76%) and canned products (39%) respectively. Processing and exporting companies grapple with insufficient raw material supply, lack of credit facilities, high labour cost, high price of quality packing material and especially high purchasing price of fresh fruits. Many challenges can be addressed directly by the private sector in partnership with the state.

KEYWORDS: Cost and returns, Marketing margins, Value chain analysis

Introduction

Value Chain Analysis (VCA) has gained considerable importance in recent years as assessing key sources of cost efficiency or the lack of it along the value-chain of the commodity in order to come up with appropriate policy interventions aimed at raising overall value-chain efficiency. The United Nations Industrial Development Organization (UNIDO, 2009) describes a value chain as the entire range of activities that are undertaken to bring a product from the initial input-supply stage, through the various phases of processing, to its final market destination, including its disposal after use.

For instance, agro-food value chains encompass activities that take place at the farm or rural level, including input supply, and continue through handling, processing, storage, packaging and distribution. As products move successively through various stages, transactions take place between multiple chain stakeholders, money changes hands, information is exchanged and value is progressively added. Hence a value chain is a system of interdependent activities.

The concept of value chain provides a useful framework to understand the production, transformation and distribution of a commodity or group of commodities. With its emphasis on the coordination of the various stages of a value chain, VCA attempts to unravel the organization and performance of a commodity system (Anandajayasekaram and Berhanu, 2009).

Fruits, fresh and processed, have been identified as a sector with high potential in the world due to the increasing demand from end consumers and for value added products. Performing value chain analysis on fruits and vegetables, an important sector in the agriculture industry, augurs well for the economy as it carries promising economic returns at home and abroad. As far as the processing industry and exports are concerned very limited quantity of crops had gained this opportunity. While some of them have undergo processing, others are supplied to the local market and for export market. In this context, pineapple both in fresh or processed form is a desirable sector that needs much attention for its high market potential with soaring demand from the local and export markets. In 2017, around 4,783 ha of pineapple extent was cultivated in the country with a production of 42,229mt. Out of the total production only 2.85% (1,206mt) were exported as fresh and dried and 300mt used for local processing (TAMAP Report, 2019).

Therefore, it is important to analyse this sector to improve the local production by identifying challenges existing in the pineapple sector. Hence this paper attempts to analyse the pineapple value chain to provide the basis for identification of critical areas for interventions. The central objective of this study is to carry out a detailed value chain analysis of pineapple with special objectives as follows; (1) to examine the existing practices of supply chain of pineapple and its value-added products, (2) to analyse economic performance (margins, cost, returns and efficiency) of different actors along the supply chain through mapping the value chain, (3) to identify constraints/bottlenecks and opportunities.

Methodology

Pineapple is a broad sector that consists of many sub sectors. Therefore, two major sub sectors were selected as (1) fresh fruits for local market and export market and (2) processed fruits for both local and export market.

Sample for this study was drawn from all actors involved in the pineapple value chain as given in the Table 1. According to district-wise cultivation data, the highest extent and production was recorded in Gampaha district and most of the processors and exporters are located.

Within the district, three Divisional Secretariat (DS) divisions with the highest cultivated extent were selected and from each DS division, 25 farmers were selected randomly for the survey. Leading collectors, processors and exporters were selected purposively those who are in Gampaha district.

Table 1: Sample of the Survey

Actor	District	DS Division	Sample (Number)
Farmers	Gampaha	Attanagalla	25
		Dompe	25
		Minuwangoda	25
Collectors	Gampaha		10
Processors	Gampaha		5
Exporters	Gampaha, Colombo		5

In this study both primary and secondary data were collected. Key informant interviews were conducted using semi-structured questionnaires for collectors, processors and exporters. Structured questionnaire survey was conducted for farmers. Secondary data and information were collected from the Department of Agriculture (DOA), Department of Census and Statistics, Department of Customs published and unpublished reports and websites.

Value chain mapping is an important analysis and the integral part of the VC studies and the value chain mapping was carried on key prioritise product lines. i.e. for fresh and processed pineapple. According to the FAO guidelines, value chains can be mapped and analysed using value chain analysis (VCA) which can include qualitative and/or quantitative tools. Mapping a value chain facilitates a clear understanding of the sequence of activities and the key actors and relationships involved in the value chain. This process highlights the underlying patterns of inputs, constraints and competitive advantages that a producer comes across. It also traces the path of all value-adding and non-value adding activities associated with the production of a commodity and estimated approximate costs involved at each stage.

In terms of economic analysis, the methodology focused on looking at gross margins. This analysis entails the measuring of economic factors (marketing cost, margins, added value etc.). The purpose of the economic analysis of a value chain at market prices is to appraise revenues, costs and margins (value added and net benefits) of each activity, each agent, segments of the value chain and the whole value chain, on the basis of prices actually paid and received by economic agents.

Quantitative analysis such as gross margins, market margins and value addition percentage were calculated to find out the inefficiencies in each VC actors.

Marketing Margin of Actors

Absolute margin of the i^{th} actor (A_{mi})

$$A_{mi} = P_{Ri} - (P_{Pi} + C_{mi}) \quad [1]$$

Percentage margin of the i^{th} actor (P_{mi})

$$P_{mi} = \frac{P_{Ri} - (P_{Pi} + C_{mi})}{P_{Ri}} \times 100 \quad [2]$$

Where,
P_{Ri} = Total value of receipt per unit table (sale price)
P_{Pi} = Purchase value of goods per unit (purchase price)
C_{mi} = Cost incurred on marketing per unit

Total Cost of Marketing

$$C = CF + C_{m1} + C_{m2} + C_{m3} + \cdots + C_{mn} \quad [3]$$

C = Total cost of marketing of the commodity
CF = Cost paid by the producer from the time the produce leaves the farm he sells it
C_{mi} = Cost incurred by the i^{th} actor in the process of buying and selling the product

The total marketing cost includes the cost involved in moving the product from the point of production to the point of consumption. i.e., the cost of performing various marketing functions and the profits of various market functionaries involved in moving the produce from the point of production till it reaches the ultimate consumer. Marketing costs and margins incurred by the cultivator, trader and processor were worked out.

Strengths, Weaknesses, Opportunities and Threats (SWOT) assessment tool was applied to identify and evaluate the controllable and non-controllable factors that future interventions ought to address to improve the entire pineapple value chain.

Results and Discussion

Analysis of Supply and Demand of Pineapple in Sri Lanka

In Sri Lanka, pineapple is predominantly grown in the Kurunegala and Gampaha districts. The two types of pineapples grown in Sri Lanka are Mauritius and Kew. About 80 percent of this production is mainly Mauritius type from Gampaha and Kurunegala and the rest is mainly Kew type from the Badulla and Moneragala districts. There is either little or no irrigation for pineapple farming in Gampaha district and therefore farmers depend fully on rainfall. According to industry reports, Sri Lankan pineapples are known to have a distinct taste and are in high demand in both domestic and export markets.

Pineapples were initially grown in home gardens. Now it is mainly grown by smallholders (less than 10 acres) and a few large-scale farmers. Pineapples are normally intercropped with mature coconut trees. The majority of pineapples are grown on leased coconut or bare lands. However due to unavailability of larger plots of land for leasing, pineapple cultivation is often fragmented.

As reflected in the Figure 1, pineapple cultivation extent varied between 4,778 ha (2007) to 4,783 ha (2017) during the period of 2007-2017. In 2011 the highest extent of cultivation was reported for pineapple and it was 21 percent increase, compared to 2010. However, the last five years has shown a gradual decrease. Pineapple production was recorded as 42,229 mt in 2017. There is a declining trend in the production of pineapple over the last few years and the extent remained largely at constant level.

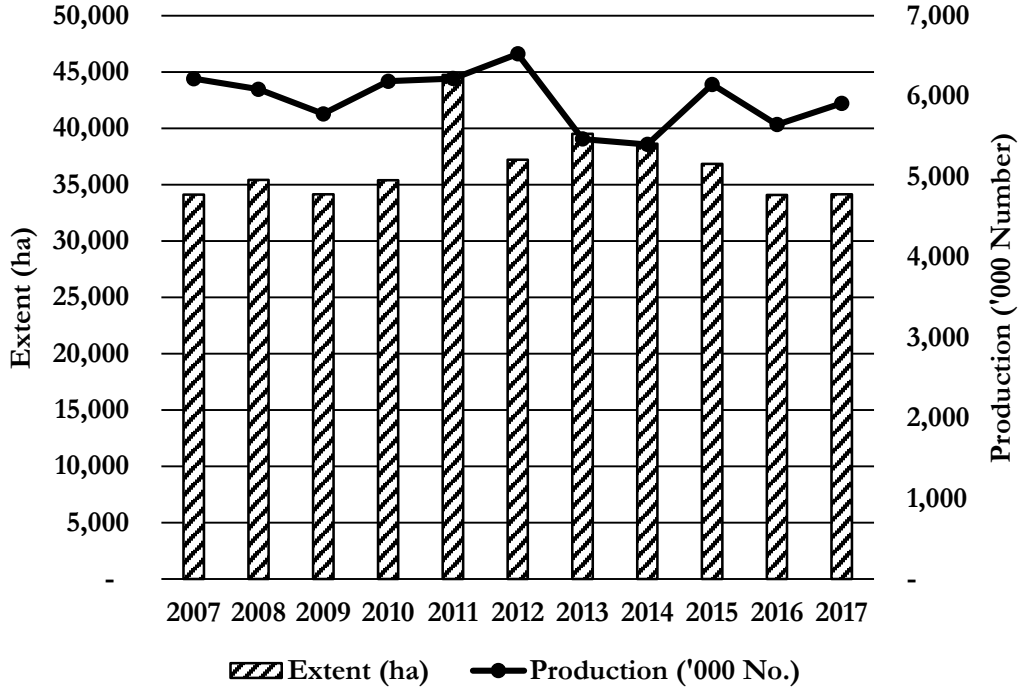

Figure 1: Average Production and Average Extent of Pineapple (2007 to 2017)

Source: Department of Census and Statistics

Pineapple is the third largest export demand agricultural product following tea and coconut but Sri Lanka experiences a huge mismatch between the demand and supply mainly due to scarcity of pineapple suckers (plants). There are only around 3,000 medium pineapple growers and 8,000 small scale growers in Sri Lanka. Their production is not sufficient to meet the local demand while there is a growing export market for Sri Lanka's pineapples from the Middle East and Europe.

According to the data on different pineapple products during the period 2000-2017 (Figure 2), exports of fresh pineapple have shown a declining trend over the years, while the exports of processed/value added products have shown a fluctuating trend. Of the total exports recorded in 2017, fresh pineapple accounted for 61 percent, followed by prepared (26%) and dried (12%) types.

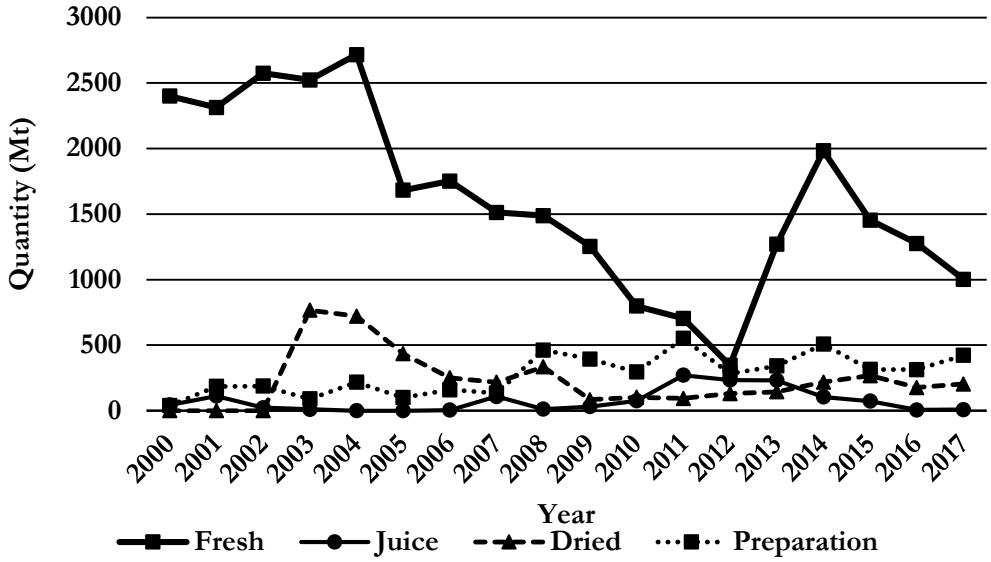

Figure 2: Export Quantity of Fresh, Dried, Juice and Prepared/Preserved Products from Sri Lanka (2000-2017)

Source: Department of Customs

Functional Analysis

Agronomic Practices and Cost of Production

Pineapples are grown from suckers and the recommended way is to use the suckers produced from branches. Pineapple plant will produce branch suckers in the second year following its first harvest. A relatively significant income can be obtained by selling quality branch suckers. On average farmers plant about 12,500 suckers in a hectare. In contrast, India and Taiwan use an average of 37,000 plants/ha (15,000 plants/acre) as a mono-cultivation. Usually a spacing of 1 x 2 meter is followed, but is based on the method of inter-cropping system. The first commercial harvest from a pineapple plantation falls in the beginning of the second year. Commercial scale farmers obtain three harvests from a pineapple plantation. In the first harvest, the size of the fruit is larger compared to the rest of the years.

The cost of production of pineapple in Sri Lanka can be divided into four distinct areas as follows; 1. Land preparation 2. Planting 3. Plant maintenance and 4. Harvesting.

Land preparation includes clearing, ploughing and harrowing which cost about Rs. 13,000/acre in Gampaha. Most farmers construct a fence to protect the farm from animals and thieves. Sometimes when the lands are leased out fences already exist. That would save the cost for fencing which is around Rs. 80,000/acre.

Planting materials cost is around Rs.18.00-20.00/sucker in Gampaha. About 6000 suckers are needed per acre of cultivation and hence, the cost for plants is Rs. 120,000/acre. The total labour cost for planting is Rs. 27,500/-/acre. The labour requirement for planting is 18 man-days.

Hence, the planting cost is the highest cost involved in pineapple cultivation which is recorded as Rs. 147,000/acre. Farmers practice pre-treatment of suckers before planting, which costs around Rs. 6,900/acre.

Pineapple fertilizer mixture is mainly used in the farms. Most farmers themselves mix the fertilizer. They use 10 bags of pineapple fertilizers (50kg size) per acre which costs Rs. 1,150/- per bag. Therefore, the total cost of fertilizer is Rs. 23,000/acre. Most of the farmers apply fertilizers two to three times a year. The other important activity is hormone application. The farmers mainly use ethral, which is more effective than plofenex. Farmers apply about 30ml of hormone mixture for a plant and they consider the size of the plant based on the number of leaves when applying hormone. They can schedule the harvesting time based on the market price and demand by controlling the time of hormone application. The cost for hormone is reported as Rs.480/acre.

Farmers adopt different methods of weeding. Most of the farmers do manual weeding twice a year and chemical weeding during the rainy seasons twice a year. This study for the estimation of the cost of production, considered the second method as most of the farmers follow it. They use a kilo of diuron per acre at one time where the total cost for weedicide is around Rs. 4,000 per year. According to farmers, for manual weeding alone a farmer has to spend Rs. 9,000 per acre.

Farmers apply profenofos pesticide to control pest and diseases in pineapple cultivation and normally apply once a year which costs around Rs. 2,000/- per acre. The labour cost for all the crop maintenance activities were recorded as Rs. 30,000 per acre. Hence, the total cost involved for crop maintenance was recorded as Rs. 66,580/- in Gampaha.

The next important activity is harvesting. With two man-days of manual labour 4,000-5,000 fruits could be harvested. Skilled labour is required for harvesting. After the first harvest, a significant proportion of farmers maintain two suckers in a cluster and thereby expect to harvest nearly 8,000-10,000 fruits from 6000 clusters.

A significant proportion of farmers, specially the large-scale farmers, rent or lease out the land for cultivation. The terms of the lease could vary according to the conditions of the land. Some farmers pay Rs. 15,000/- per acre per year and they have to look after the coconut plants while receiving the income from coconut trees. If so, expenditure on land rent would be compensated by the income from coconut. However, in some other cases, the farmers have to plant the coconut trees and maintain them. That incurs another cost for the farmers.

According to the four main distinct areas of the cost of production for pineapple as explained in the Table 3, planting is the highest cost component (44%) of the value chain for fresh pineapple during the 1st year of cultivation due to high cost for suckers. After the 2nd year of crop production plant maintenance cost is the highest cost component (67%) (Table 3). Considering the total cost for labour, machinery and input, the input cost is the highest cost component for pineapple which was recorded as 71 percent, followed by the labour cost (24%).

Table 2: Cost of Production of Pineapple in Gampaha District (Rs/Acre) -1st Year of Cultivation

Operation	Total Cost (Rs.)	Rs./kg	As a Percentage of Total Cost
Fixed Cost			
Land Rent	15,000	2.08	4.48
Fencing and Land preparation	93,000	12.91	27.86
Planting materials	120,000	16.67	35.98
Pre-treatment	6,900	0.96	2.07
Sub-total	**234,900**	32.62	70.41
Variable Cost			
Fertilizer	23,000	3.19	6.89
Hormone	480	0.07	0.14
Pesticide	2,200	0.31	0.66
Weed control	4,000	0.56	1.20
Sub-total	**29,680**	4.12	8.89
Labour Cost			
Planting	27,000	3.75	8.09
Maintenance	30,000	4.17	9.00
Harvesting	12,000	1.67	3.60
Sub Total	**69,000**	9.58	20.68
Total Cost	**333,580**	**46.33**	**100.00**
Yield	**7,200 kg**		
Farm-gate price		**60.00-70.00**	

Source: HARTI Survey Data (February, 2019)

Table 3: Cost of Production of Pineapple in Gampaha District (Rs/Acre) -2nd Year of Cost of Production

Operation	Total Cost (Rs.)	Rs./kg	As a Percentage of Total Cost
Variable Cost			
Fertilizer	23,000	2.30	30.10
Hormone	720	0.07	0.94
Pesticide	2,200	0.22	2.88
Weed control	4,000	0.40	5.23
Labour Cost			
Plant maintenance	28,500	2.85	37.29
Harvesting	18,000	2.50	32.71
Total Cost	**76,420**	**7.64**	**109.16**

Source: HARTI Survey Data (February, 2019)

Value Chain Actors and Key Stakeholders

Value chain actors of pineapple are small and large-scale farmers, collectors, wholesalers, retailers, processors, exporters and institutional buyers. Figure 3 illustrates the stages, actors, supporters and enablers of the pineapple value chain, which are involved in acquiring farm inputs required for production, transporting produce from the farm to various market destinations, processing and trading to reach the consumers. It is a network of horizontal and vertically integrated value chain actors that are jointly aimed towards providing products to a market.

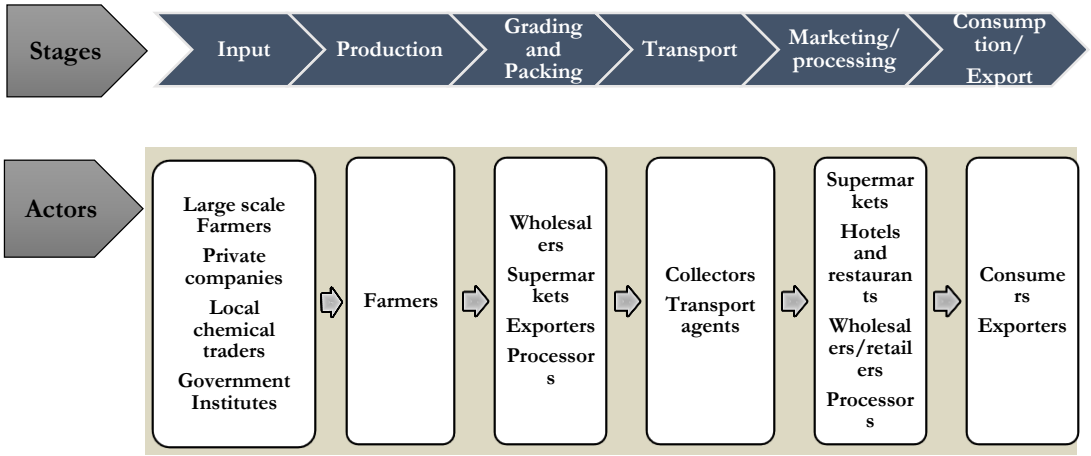

Figure 3: Value Chain Map for Pineapple

Source: HARTI Survey Information

Marketing Channels and Product Flows

Marketing channels of pineapple are very similar to other agricultural commodities. The major market participants in the pineapple value chain are farmers, collectors, wholesalers, retailers, exporters, processors and institutional buyers. Most of the farmers sell their produce to collectors at the field level and these collectors are responsible for grading, sorting, packaging and transportation of fruits. Collectors provide transport and warehousing for pineapples and then re-sell to either exporters, processors or other collectors/wholesalers who distribute pineapples to other parts of the country. Collectors supply fruits to the wholesalers, processors, supermarkets and other institutional buyers. Sometimes wholesalers also purchase fruits directly from the farmers. Collectors especially those who supply to exporters or processors may have verbal or informal agreements with farmers. It should however be noted that only a small proportion of the surplus is purchased by the processors, which is generally routed through collectors and wholesalers.

Most exporters get their supply from a network of collectors who have farmers supplying to them. The collectors have arrangements with farmers, however there is seldom formal contracts. Collectors may be responsible for delivering pineapples at the required quality in a timely manner to exporters.

The collectors may also provide assistance to farmers in the form of loans. However, in the absence of formal contracts, farmers have no obligation to supply to collectors or exporters when the local price for pineapples is high or when there is fierce outbidding by exporters for pineapples. The result is exporters lacking sufficient supply to export. This situation makes it difficult for exporters to enter into long-term contracts with their foreign buyers.

Another class of buyers having a small share is the institutional buyers comprising mainly hotels, restaurants, hospitals and processors. Their mode of procuring is mainly on contract basis from suppliers or the commission agents.

Only a small share of market surplus is purchased by the processors. They purchase mostly from collectors directly and sometimes buy from farmers, especially small scale processors. The processors who make juices, cordials, jams tend to cater mainly to the local market. Smaller quantities are exported. Dried pineapples and pineapple slices are exported to Europe. Mature or smaller pineapples are mostly utilized by the processors. The processed market purchases the mature/ripe pineapples that can no longer be sold in the fresh form. The bigger pineapples go to the fresh pineapple market whilst the smaller pineapples that get lower prices tend to go the processed market.

When buying, collectors usually pay a per kg price based on different grades. Every farmer produces at least two grades: larger ones and smaller ones. Some collectors categorize pineapples into four grades while some only work with three grades. These grades are based predominantly on the size of the fruit. However, the maturity stage, is also important. For example, when sold to exporters, collectors buy matured green colour fruit allowing a time fully ripe. They buy 10-15 percent yellow colour fruit when purchasing for the local market, allowing fruit to reach the final consumer within a week.

In recent times dehydrated and other value added pineapple products are becoming a booming industry. This was mainly started by the large scale collectors in the Western province, predominantly in the Gampaha district. The product range varies and accommodates dehydrated pineapples, pineapple jams, pineapple drinks and canned pineapples with preservatives. Some of these organizations are specialized in organic certifications systems where they obtain USDA and EU organic certificates from the Certification body operated in Sri Lanka, known as "Control Union". Furthermore, several larger processors are involved in pineapple value addition as well, such as MD group, Lanka Canneries and KIST (Cargills group).

Economic Analysis

Gross Margin Analysis

Gross Margins (GM) provides a simple method for comparing the performance of enterprises sharing similar requirements for capital and labour. Additionally, it allows e.g. on farm level, to calculate the revenues and costs per acres and therefore enables a comparison between different crops. In strict terms the GM analysis deals only with the overall revenues and the variable costs. Costs such as land preparation and fencing are considered as fixed costs.

Trade Margins along the Value Chain

The total market margin, includes the cost involved in moving the product from the point of the production to the point of consumption. i.e. the cost of performing various marketing functions and the profits of the various market functionaries involved in moving the produce from the initial point of production to the ultimate consumer. For this analysis, the marketing channel which supplies pineapple from Kirindiwela area of the Gampaha district to Colombo retail market was considered.

A market survey was conducted to analyse the marketing costs and margins. Collectors paid Rs.60.00-70.00/kg to farmers in the Gampaha district during the survey period. Hence, the farmers' net margin was recorded as 9 to 13 percent. Collectors collect pineapple from farmers and transport them in lorries. In small lorries 1000-1500kg of pineapple were transported costing Rs. 3,500-4,000 per load from Kirindiwela to Colombo. Loading and unloading costs were recorded as Rs. 2,000 per load. Hence, the net margin for collector in Gampaha was recorded as 5-7 percent. Wholesalers in Colombo received pineapples from the collectors or sometimes they purchased from the collectors in the producing areas. Considering the handling cost, transport cost and cost for wastage the wholesaler's net margin was recorded as four to eight percent for pineapple delivered by collectors in Gampaha area (Figure 4). Retailers' net margin was 14-20 percent for pineapple supplied to Kadawatha market from Gampaha area. Hence, in the value addition of pineapple the highest margin was retained by the retailers.

Dried Pineapples

Drying is the oldest method of food preservation. The preparation stages from fresh to dried fruit are outlined and then described more fully below:

Fruit ⟶ sorting ⟶ washing and peeling ⟶ cutting ⟶ drying
Sorting and packaging ⟶ labelling and storing

Table 4 indicates the flow of cost for dehydrated pineapple and it indicates that raw material input is the highest cost component of the value chain representing 76 percent of the total value of the production of dried pineapples. To produce a kilo of dehydrated pineapples, 20kgs of fresh pineapples are needed. Processing cost is 12 percent of the total value.

Table 4: Cost of Production for Dehydrated Pineapples (1kg)

	Raw Material Cost (Rs.)	Processing Cost (Rs.)	Labour Cost (Rs.)	Packing Cost (Rs.)	Other Overheads (Rs.)	Transport Cost (Rs.)	Total Cost (Rs.)
Unit Value	20kg*80 1,600	250	120	25	75	30	2,100
% of Total	76%	12%	6%	1%	3.6%	1.4%	100%

Source: HARTI Survey Data (February-2019)

Canned Pineapples

Canned and dehydrated products are exported to Europe, England and China. Canned foods can be stored over a long period in airtight containers (metal or glass jars). They are preserved mainly by heat treatment, during which the micro-organisms present in the fruit are significantly reduced in number, or their development so restricted, are prevented from spoiling the product. The process of turning fresh fruit into canned products is described schematically, and is shown in detail below.

Fruit ⟶ Sorting ⟶ Washing and peeling ⟶ cutting ⟶ Filling into jars or cans with syrup ⟶ Vacuum sealing ⟶ Pasteurizing or sterilizing ⟶ Cooling⟶ Labelling and storage

Table 5 indicates the flow of cost for canned pineapple (pineapple pieces in bottles) and it indicates that raw material input is the highest cost component of the value chain representing 39 percent of the total value of the production of canned pineapples. To produce 350g bottle of pineapple about 1.2-1.3kg of fresh pineapple is needed. Processing cost is 17 percent of the total value.

It should however be noted that packaging material such as glass containers, can lids, labelling material and machines are not widely available in the domestic market and the processors/exporters are dependent on imported materials for packaging. This not only increases the cost of the products but also makes the domestic exporters/processors less competitive in the international market.

Table 5: Cost of Production for Canned Pineapples (350g Size)

	Raw Material Cost (Rs.)	Processing Cost (Rs.)	Labour Cost (Rs.)	Packing Cost (Rs.)	Other Overheads (Rs.)	Transport Cost (Rs.)	Total Cost (Rs.)
Unit Value	70	30	20	25	15	20	180
% of Total	39%	17%	11%	14%	8%	11%	100%

Source: HARTI Survey Data (February-2019)

Bottlenecks and Constraints for Strengthening Pineapple Value Chain

In-depth interviews with growers, collectors, processors, exporters and industry experts have revealed a few inherent problems in the industry.

Problems Faced by the Farmers

Main challenges faced by the farmers include; lack of cultivating lands as majority of the farmers in the Gampaha district had been using leased coconut or bare lands for the pineapple cultivation.

However due to unavailability of larger plots of land for leasing, pineapple cultivation is often fragmented. Lack of planting material/suckers, lack of transparency in grading, high fertilizer price, shortage of labour, high production cost, large scale processers not buying from small scale farmers, lack of credit facilities are some of the other challenges.

SWOT Analysis

Table 6: SWOT Analysis for Pineapple

Strengths	Weaknesses
• Suitable climatic condition • Land availability • Easy market access • Higher farmer preferences • Transport facilities • No irrigation problems • Suitable varieties (Mauritius) • Profitable cultivation • Cropping system (Mono cropping and mix cropping)	• Lack of knowledge and training • Lack of sufficient land area • Lack of their own lands • Poor agronomic practices • Poor packaging and storage- therefore increased wastage • Higher usage of chemical fertilizer - Less usage of organic fertilizer due to lack of sufficient amount of organic fertilizer • Lack of awareness on value added products, super market access, export opportunities
Threats	**Opportunities**
• Lack of labour and higher labour cost • Price fluctuation • Higher fertilizer cost • Unpredictable climatic changes • Lack of experience in cultivation • Not updated on the farm techniques • Higher transport cost • Price is determined by collectors • Pest and disease problems • Lack of sufficient inputs (Electric water motors, Capital, Tubes) • Demand is lower when production is higher • Lack of access to sell their production to private companies	• Higher market price • Loan facilities • Establishment of collecting centre • Higher market demand • Selling opportunities • Updated of market situation • Export facilities and super market facilities(KIST)

Source: HARTI Survey Information,

Problems Faced by the Processors

Some of the problems faced by the processors were identified as; affordability of price as prices of pineapple often fluctuates. Prices are very high during off-season which leads to high cost of production and difficulties to compete with other exporters. Accessibility/availability, lack of sorting and grading practices, high cost of other inputs; such as cost of labour and electricity that affects the profit margins, poor credit facilities as most of the small-scale operators need loans to expand the product coverage and the quality of the production are some other key problems. However, the credit facilities available are limited, lack of packaging materials such as glass containers, lids and other items are not available adequately in the market.

Problems Faced by the Exporters

High cost of good quality packaging material, inadequate supply of raw materials to meet export orders to produce value added products, lack of processing and cold storage facilities, shortage of skilled labour, high prices of fruits during off-season, high freight charges and air space limitations are key problems identified.

Interventions to Improve the Value Chain

The importance of attracting more buyers from Europe, Australia, USA, Middle East was identified. Quality assurance through global certification and standardisation is required. It is important to expand processing for organic pineapple as the demand exist globally for such products, Small sized lands do not fit the modern agriculture. Hence, land consolidation is important for the commercial production of pineapple, Smallholder farmers work in a traditional manner, hence all levels of production, planting and irrigation should incorporate modern practices and techniques to boost production. As skilled and unskilled labour is scarce, mechanization of farming is important. More land allocation is needed for high value fruit crop production. Farmers and new investors can get into pineapple cultivation expanding export potential. Else, only smallholders will continue to cultivate pineapples with limited commercial success with same extent of cultivation and then the export opportunities will shrink further which is not much significant at present. It is important to reduce high production cost and its value chain inefficiency in pineapple cultivation. Implementing farmer organization comprising pineapple farmers is very important to solve the problems of pineapple farmers. Development of an information/database for all stakeholders (processors, exporters, supermarket chains) to be updated on the product ranges can be suggested as timely measure.

Conclusion

Considering the cost of production for pineapple, during the first year of cultivation, planting was the highest cost component (44%) while it was plant maintenance (67%) in the second year. It also revealed that considering the total cost for labour, machinery and input, the input cost was the highest cost component (71%), followed by labour cost (24%).

Analysis of marketing cost and margins of each value chain actors shows that the highest net margin was reported for retailers (14-20%) whereas farmers' net margin was 9-13%. Gross margin between producer and retailer was very high for pineapple. Considering the value addition of pineapple, raw material cost is the highest cost component for dehydrated pineapple (76%) and canned products (39%) respectively. Processing and exporting companies grapple with insufficient raw material supply, lack of credit facilities, high labour cost, high price of quality packing material and especially high purchasing price of fresh fruits. Many challenges can be addressed directly by the private sector in partnership with the state.

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