A Study of Value Chain Map & Economics of Papaya in Karnataka State

ABSTRACT

The present study has attempted a detailed analysis of papaya fruit by studying its value chain map, establishment cost, cost and returns were important researchable issue for the said crop in kalaburagi district in Karnataka State. The findings reveal that, in value chain, farmers, pre-contactors, distributors, wholesalers and retailers will perform muti-task function in the system. Each of these stakeholders appends value during the movement of produce from one person to other in the consumption pattern system. The findings related to cost and returns, the year-wise analysis indicated that in the first year, the total cost for establishment was found to be Rs. 85225 in Papaya plantation followed by second year Rs.65432. The average of two years will be to the tune of Rs.65432 per acre. The per acre establishment cost accounted to Rs. 85225 of which the material cost constituted 78.37 percent to the total cost of establishment followed by human labour (19.64 per cent). The per acre cost of cultivation of Papaya was worked out to be Rs.65432, out of which the total variable cost share was Rs.45643 (69.75 percent) and total fixed cost was found to be Rs.19789 (30.25 per cent) to the total cost. total average cost for two years incurred in cultivation was found to be Rs.105328 and farmers obtain average net income of Rs.218247 per acre and the findings also revealed that the farmers the return on per rupee invested at total cost amounted to Rs.2.26 and 1.90 during first and second year respectively.

Key words: Value Chain map, Papaya, Cost & Returns, Papin

Introduction

The value chain consists of series of actions required to bring a product to final consumers passing through the different phases of production, processing and delivery. Agriculture Value Chain (AVC) can also be defined as a market-focused collaboration among different stakeholders who produce and market value-added products.

Value chain analysis is vital to an understanding of markets, their relationships, the participation of different actors, and the critical constraints that limit the growth of agricultural production and consequently the competitiveness of farmers specially smallholder farmers. Small farmers currently receive only a small fraction of the ultimate value of their output, even if, in theory, risk and rewards should be shared down the chain (Kaplinsky and Morris, 2001). Since, Quality begins from the farm level, In order to achieve products that are of international standards, increased productivity, and are also friendly to human health and environment, farmers should be educated on good agricultural practices (Miller, *et al.*, 2010). Trainings can be conducted on proper cultivation practices including integrated approach. Transfer of Technology should be given to local resource person who will provide trainings to the farmers. Access to markets and distribution of risks and gains along different steps of agriculture value chains varies also according to the gender of producers, processors, market agents and according to the economies of scale (Pandey, M. and Tewari, D. 2010). Traditional marketing channels with adhoc sales are being gradually replaced by coordinated links among farmers, processors, retailers and others. In this context, the question is not whether, but how to include the different actors in the value chains, including women, applying a balanced approach that takes into account both competitiveness and equity issues (Anjani Kumar, 2011). The result, combining the strengths of value chain analysis with the needs of poor value chain farmers, should be a market-based, commercially viable and sustainable solution that, in the long term, will equally benefit all the various actors of the chain.

Value chains are mapped and analyzed using value chain analysis (VCA) which includes qualitative and/or quantitative tools. There are no fixed rules on which research approach is better but there are strong grounds for recommending that a qualitative approach is used first, and then followed by quantitative approach according to time and resources availability (Warsanga, W. 2014). In conceptual, a value chain analysis that takes into account the policy environment and provision of livelihood services is a very powerful tool for analysing how existing chains are structured and operate. VCA also helps in knowing the farm level decision impact on utilizing crop genetic resources.

value chain analysis was defined as the assessment of the value chain of banana to ascertain how much and at which stage what was additional value added to the goods and services, in order to

commence pre and post farm activities in very effective, efficient, and cost-effective in the process of value chain approach. Miller and Jones (2010), conveyed that the concept of agricultural value chain integrated with different range of activities and participants involved in movement of agricultural produce from input suppliers to farmers' fields, and then finally, to consumers.

Diversification in agriculture favouring Agriculture Value Chain seems to be as a means to ensure food & nutrition security as well as higher profitability. Generally, staple foods are not high value commodities, because the necessity of their consumption leads to demand and supply equilibrium at a relatively low price. The value status of a commodity depends much on demand and supply. As drivers of Value Chain, while in demand side urbanization and income levels are important, in the supply side relative profitability and infrastructures are more important.

The aim of value chain analysis is to identify Strength, Weakness, Opportunity and Threats (SWOT) for value chain development. Under the "Agriculture Value Chain project", we have selected where there is a scope for expansion of sweet organs for the benefit of small holder farmers and also poor consumers (Singh, N. and K. S. Bhimraj, 2016). According to this view, AVC project also focus on value added activities and try to promote their commercialization with adequate technical, financial and infrastructure support.

Value Chain Maps

The value addition in different phases of production can be mapped into a value chain map for easy understand, which depicts inter-linkages between successive stages in the value chain. A simplified value chain map (Qualitative only) can be expressed in figure.1. As markets develop, the value chains will become more complex with more competing channels both for inputs and outputs. A wide range of participants from smallholder farmers to transnational retailers with a wide range of technologies such as small-scale juice vendors to large sugar manufacturing plants will participate in value chains. Understanding the value chain is important as it explores why farmers behaviour with respect to the change in institutional and market infrastructure and demand situations. The value chain maps are helpful in understanding these chain actions throughout the value chain. The market map is an analytical tool that helps in understanding policy issues that affect the functioning of the chain and also the institutions and organizations providing the services (eg: market information, quality standards) that the different chain actors need in order to make better informed decisions.

Methodology

The primary data were collected for the agriculture year 2019-2020 using pre-tested schedule from papaya producers as well as from market intermediaries through personal interview method. In order to full fill the specific objectives of the study, primary data was recorded to arrive on meaningful interpretations on value chain map, establishment, cost of cultivation and cost & returns. Kalaburagi district was purposively selected for the present study. Out of seven taluks in the district, five taluks namely; Kalaburgi, Aland, Afzalpur, Chitapur & Chincholli were selected based on maximum concentration of papaya cultivation. Multi Stage stratified random sampling technique was adopted for the selection of taluks & farmers. From each taluk 2 villages were selected randomly and from each selected village 6 banana & papaya producing farmers were randomly selected. Further, from selected taluk level markets, 4 Wholesalers-cum-commission agent, 3-pre-contractor cum Wholesalers & 3-retailers were selected at random. Thus a total sample size for the present study was 60 papaya growing farmers & 10 market intermediates.

Results and Discussion

1. The value chain map of Papaya in the study area

The value chain of Papaya in kalaburagi district presented in figure.01; the main participants were input suppliers, traders, distributors, wholesaler, retailers and consumers. Each of these stakeholders appends value during the movement of produce from one person to other in the consumption pattern system. In this value chain, farmers, pre-contactors, distributors, wholesalers and retailers will perform muti-task function in the system.

1. Input Suppliers in the Pre-production Stage

Initially in the production process, seeds, fertilizers, pesticides, herbicides and farm implements are the most important inputs followed by management of plantation against disease and pests. The farmers' usage of fertilizers, chemicals and plant protection chemicals depends on sole choice of farmers based on his experience in farming.

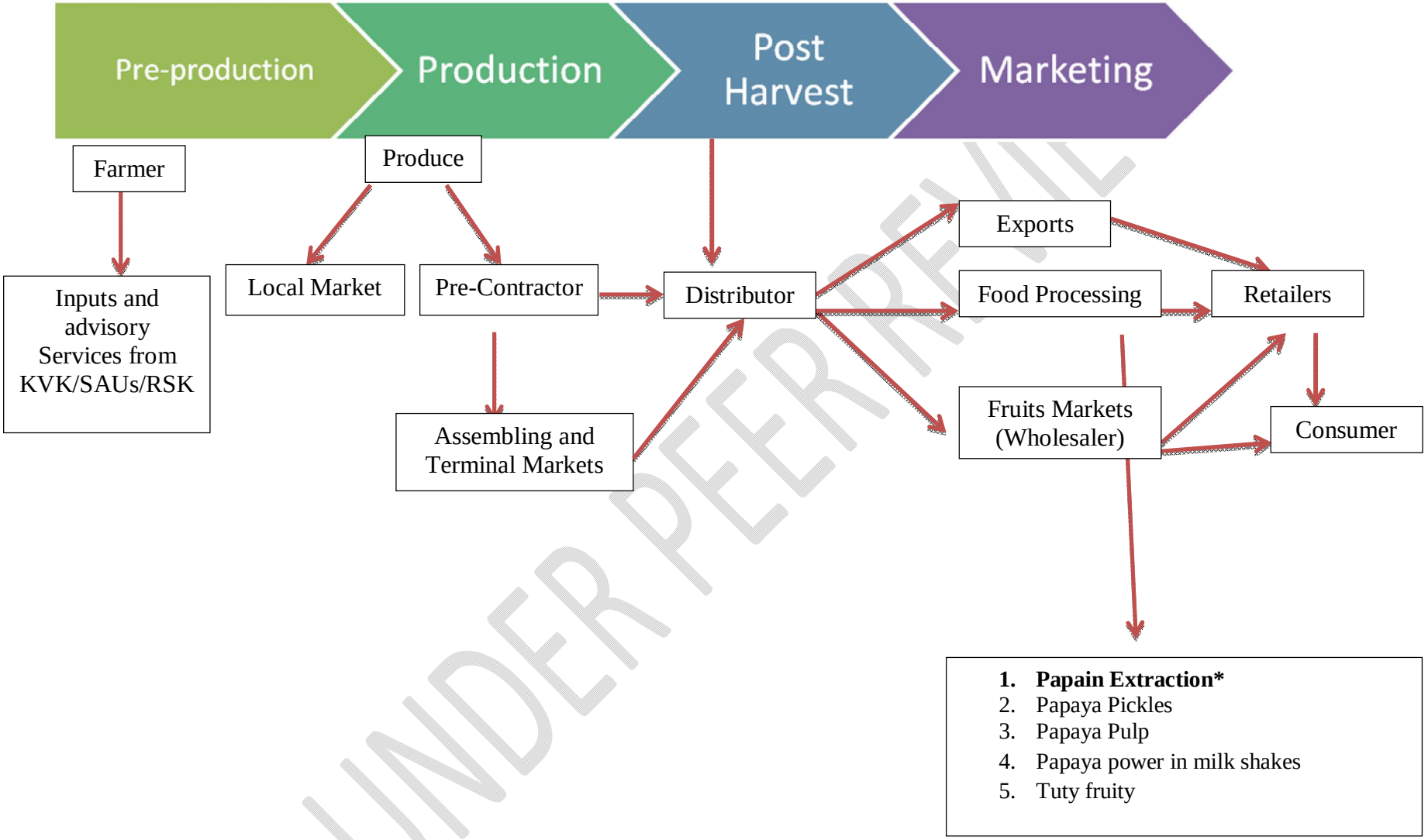
2. **Pre-Contractor in the Production Stage**

Pre-contractor are the traders involved during production process, who gather information related to papaya from growers (farmers) in village local markets and non-local markets for the purpose of re-selling it to different stakeholders in the value chain such as wholesalers and retailers.

Pre-contractor apart from providing financial resources, they also provide information related to local knowledge hubs & other shared information on production efficient and even marketing of bulk produce from the nearby areas. Pre-contractor also engaged in collecting the banana produce from different areas and plays pivotal role in marketing of produce to local and non local distributors of produce participated from different distant markets in the study areas. The trading activities of collectors include buying and assembling, repacking, sorting, transporting and selling to terminal markets, food processing units, wholesalers and retailers markets. The pre-contractor obtains a profit of on an average of Rs.4/kg if the produce is moved to distribution and in

case of local markets it was Rs.8/kg in the study area where the produce is obtained from farmer's field.

Figure .01 Papaya Value Chain Analyses



Source: Authors Calculations

3. **Distributors in the Post Harvest Stage**

Distributors are mainly involved in selling and buying papaya produce collected from different places from the producers especially in huge volumes rather than small quantities from producers and supply these produce to exports, food processing units and Wholesale markets. The distributors charge an average price of Rs.5/kg in the study area after deducting their investments from the previous actor in the chain.

4. **Wholesalers in the Post Harvest Stage**

The finding reveals that, the wholesaler's plays important role in gathering the produce from nearby areas for marketing of papaya produce in the study area. Apart from collecting the produce, they have better access for transportation, storage of produce and even communications among stakeholders when compared to other players in the value chain map. These wholesalers fix an average price of Rs.3/kg in the study area after deducting their investments from the previous actor in the chain.

5. **Retailers in the Post Harvest Stage**

The results conveys that, retailers are prime players among value chain which perform the activities such as buying from wholesalers, transportation for its different shops, trade announcements and selling produce to ultimate consumers especially for urban consumers.

Retailers are the final linkage connected between producers and consumers. In rare case they directly buy produce from the growers if the farms are nearby to them. In the study area, the retailers fix an average price of Rs.5/kg in the study area in the study area after deducting their investments from the previous actor in the chain. These retailers offer the produce according to consumer's requirement based on purchasing power and availability of produce in their shops.

2. Value chain of papaya Important outcome of the study

The processed items of papaya can be used as raw material in preparation of different food processing industries products presented in figure.02. Hence the study conveys that, the importance of food processing in papaya is very low in kalaburagi district. The processed items such as papain extraction, papaya pickles, papaya pulp, papaya powder used in milk shakes and tuty fruity. These kind of processed items will give opportunities for employment will be high

and even state can generate good revenue by establishing small scale processing plants, which will help the farmers to earn extra income apart from selling main produce in the markets.

The Papain is the dried latex obtained from fruits; it is important ingredient for food processing industries. Papain is also used in medicine preparation industries such as pharmaceutical industries especially for skin treatment. The value chain in papaya and banana was found to be in fewer proportions in the study area. In case of Papaya, the main value chain process was derived from extraction of papin and in case of banana was use of banana pseudo-stem as compost manure in the farm fields. The findings revealed that, the farmers invest only trays and other miscellaneous during the extraction of latex from the fruits of papaya. The farmer invest only Cost for purchasing the Aluminium trays, i.e 600 plants each Rs.30 tray =Rs.18000 trays cost, the selected plant fruits operated for slit with sharp blades, this slit is done along the ridges of fruit, after few days the Papain collected and its approximate quantity is around 550kg/ acre, the extracted produce is Sold at the rate of Rs.78/kg, since it was collected from Rs.550*78 = Rs.42900, additional income and deducting farmers investment. However, from the produce alone on an average net income per acre farmers receive about Rs.218247 will get as income and from value addition it will be Rs.42900/acre. The value addition increases the income of about 19% to the total income.

3. Establishment cost of Papaya orchard in Kalaburagi

The establishment of Papaya (table.01) orchard needs better management at least 1.8 to 2 years and the establishment cost includes the material, variable and fixed costs based on agro-ecological climatic conditions. Primarily the material costs included the costs on items like seedlings and transplantations, manures and fertilizers, Plant protection chemicals, staking rolls *etc.* Further, the next most important input is labour, Labour cost comprised of expenses on operations such as land preparation, opening of pits, planting and gap filling, application manures and fertilizer, weeding, fencing, spraying of chemicals and plant protection chemicals and also for watch & ward of orchard *etc.* On the other end, fixed cost includes depreciation, rental value of land, land revenue, managerial cost and risk premium interests on fixed capital.

The details of the results on establishment cost of Papaya orchard per acre for the year 2019 are presented in the Table.01. The year-wise analysis indicated that in the first year, the total cost for establishment was found to be Rs. 85225 in Papaya plantation followed by second year Rs.65432. The average of two years will be to the tune of Rs.65432 per acre. The per acre establishment cost accounted to Rs. 85225 of which the material cost constituted 78.37 percent to the total cost of establishment followed by human labour (19.64 per cent). However the total labour input cost was Rs.16745. Among material cost for establishment, the highest was found in case of Farm yard Manure, planting material and plant protection chemicals were major items found during establishment. The total fixed cost for establishment was found to be Rs.14434 and total variable cost was Rs.66791.

4. Cost of Cultivation of Papaya in Kalaburagi

The information on the findings of cost of cultivation for Papayaorchard per acre for the year 2019 is presented in the Table.02. However, among variable cost the major items were found to be in case of FYM accounted for Rs.10667 (20.89 per cent) to the total variable cost followed by fertilizers (15.04 per cent) and plant protection chemicals (06 per cent). The remaining items such as irrigation and other resource transportation were found to be less than 5 per cent the total material cost (A). In case of fixed cost, it was observed that, though total fixed cost was only 30.25 per cent to total cost Rs.65432, the managerial cost was found to be 10.68 per cent (Rs.2164 per acre) and rental value of land 60 per cent (Rs.8000) and third item was risk premium accounted for Rs.865 (4.35 per cent) to the total fixed cost.

5. Cost and Returns of Papaya in Kalaburagi

The cost and returns of Papaya are presented in the Table.03. The results reveal that, the average yield was found to be 34.55 ton per acre followed by increase in second year; it has slightly increased to 4.89 ton per acre. In case of pricing mechanism, the price was offered by the pre-harvest contractor, who buys all the produce of the farmers in the farmers field itself by arranging their own transport and labours for loading. In this case the price per ton was Rs.9000 during first year and in the second year, it was Rs.8500 per acre. However the average gross income for two years was found to be Rs.323575 and the total average cost for two years incurred in cultivation was found to be Rs.105328 and farmers obtain average net income of

Rs.218247 per acre and the findings also revealed that the farmers the return on per rupee invested at total cost amounted to Rs.2.26 and 1.90 during first and second year respectively.

Source: Authors Calculation

8. Policy Implications

1. In the study area for papaya, the value addition aspects are very low. Hence the study suggest to educate farmers about value addition of banana by creating Farmer Producer Organisations (FPOs) especially for papin extraction.
2. Majority of the profits are absorbed by pre-harvest contractor, due to non-availability of better market and processing industry in kalaburagi region.

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Table 01: Establishment Cost of Papaya in Kalaburagi District (1st Year) (per acre)

Sl. No.	Particulars	Units	Quantity	Value (Rs.)
I	**Variable cost**			
	Material input			
1	Planting material	No.	555	6660
2	Farm yard manure	Tractor load	4.5	14400
3	Silt	Tractor load	9.0	3150
4	**Chemical fertilizer**			
4a	N	Kg	119	8575
	P	Kg	49	
	K	Kg	44	
	Plant Protection Chemicals	Mandays	29.6	9453
5	Irrigation	Acre inch	12.2	2440
6	Transportation of resources	-	-	3694
A	**Sub total**			**48372**
	Labour input			
1	Land preparation	Machine hours	6.5	4884
2	Pit opening	Mandays	8	2400
3	Planting	Mandays	7	2000

4	Manuring and silt application	Mandays	8	1906
5	Chemical fertilizer application	Mandays	4	969
6	Weeding	Mandays	11	2867
7	Irrigation	Mandays	7	1719
B	**Sub total**			**16745**
C	Interest on working capital @ 10% per annum	-	-	1674
D	**Total variable cost (A+B+C)**			**66791**
II	**Fixed cost**			
1	Depreciation	-	-	269
2	Rental value of land (prevailing rate)	-	-	12000
3	Land revenue	-	-	35
4	Managerial cost @10% of working capital	-	-	1674
5	Amortized drip structure cost	-	-	4456
E	Total fixed cost			14434
F	Total cost (D+E)			85225

Note: Maintenance Period was taken for one Years, Economic Life considered for 2 Years and No. of plants per acre: 555

Source: Authors Calculations.

Table 02: Maintenance cost of Papaya cultivation (II year) (per acre/year)

Sl. No.	Particulars	Units	II year		Average	
			Quantity	Value (Rs.)	Quantity	Value (Rs.)
I	**Variable cost**					
	Material input					
1	Farm yard manure	Tractor load	3.2	10240	3.3	10667
2	Chemical fertilizer					
	N	kg	89.1	5679	89.1	7679
	P	Kg	41.5		41.5	
	K	Kg	35.8		35.8	
3	Plant protection chemicals	-	-	2976	-	2976
4	Irrigation	Acre inch	12.9	2580	12.9	2580
5	Transportation of resources	-	-	359	-	359
A	Sub total			**21834**		**51054**

	Labour input					
1	Manuring	Mandays	4	1820	4	1820
2	Chemical fertilizer application	Mandays	3	2131	3	2131
3	Plant protection chemicals application	Mandays	22.6	5404	22.6	5404
4	Weeding	Mandays	22.4	4897	22.4	4897
5	Inter-cultivation	Machine hours	1.7	1194	1.7	1194
6	Irrigation	Mandays	10.3	2164	10.3	2164
7	Harvesting	Mandays	16.1	4035	16.1	4035
B	Sub total	-	-	21645	-	21645
C	Interest on working capital @10% per annum	-	-	2164	-	2164
D	Total variable cost (A+B+C)			45643		45643
II	**Fixed cost**					
1	Depreciation	-	-	269	-	269
2	Rental value of land (prevailing rate)	-	-	12000	-	12000
3	Land revenue	-	-	35	-	35
4	Managerial cost @10% of working capital	-	-	2164	-	2164
5	Risk premium @ 5% of 80% of working capital	-	-	865	-	865
6	Amortized drip structure cost	-	-	4456	-	4456
E	Total fixed cost			19789		19789
F	Total cost (D+E)			65432		65432

Source: Authors Calculation

Table 3: Cost and Returns of Papaya in Kalaburagi District

Sl.No.	Particulars	**Ist year**	**IInd year**	**Average of two years**
1	Average Yield (ton/acre)	34.55	39.42	36.98
2	Price (Rs/ton) *	9000	8500	8750
3	Gross income (Rs/acre)	310950	335070	323575
4	Total cost of cultivation (Rs/acre)	95225	115432	105328
5	Net income (Rs/acre)	215725	219638	218247
6	Returns per rupee of investment	2.26	1.90	2.08

* Price offered by Pre-harvest contractor