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Value Chain Analysis of Banana in 'Tekeze' River Basin, North Ethiopia

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Abstract
This paper aims to describe the functions and power relationship of the value chain actors, and to analyze their profit share in the chain for the commodity. In this study both qualitative and quantitative data types were collected from primary and secondary sources to get detailed and diverse information. Representative samples from the different actors in the chain were randomly selected and interviewed. The value chain map was first constructed to indicate the sequence of activities, the key actors and their relationships involved in the chain. The common marketing channels which show the product flow were identified. Marketing costs, margins and value share of the different marketing participants was examined using the chain performance indicators. In this study, mapping of the major actors participating in the chain and the product flow was well developed. Three common marketing channels of banana were identified in the study areas. Marketing costs and margins were analyzed to determine the profit shares of the actors and value addition by intermediaries along the chain.
Keywords: market chain, marketing margin, mapping value chain, profit share, marketing cost

1. Introduction

Banana production, among the fruit production, is a staple food for some countries of the world and is a potential source of energy and protein, vitamins and minerals (Raemaekers, 2001). Besides uses as animal feed, ornamental plant, cash crop or source of income and to conserve the environment. According to the CSA (2012), More than 61 thousand hectares of land is under fruit crops in Ethiopia. Out of this, banana is cultivated on around 36 thousand hectares of land contributing more than 58% of the total area under fruit crops. However, average productivity of banana in the year 2011/12 was not more than 81.2 quintal per hectare which is far below the potential.

The study areas are among the naturally endowed Districts in terms of capacity to grow different fruit crops. Banana production in the study areas is mainly with irrigation where uneven supply of harvested products is the main characteristics. The expansion of irrigation sourced from 'Tekeze' river enhances production of fruit crops particularly banana, but productivity is estimated to be low. Even though the study areas have an abundance production potential and market access, the region had never reaped the opportunity, as it would suppose to be.

The nature of the product on the one hand and the lack of organized market system on the other have resulted in low producers' price. In addition, there are production and marketing problems challenging banana production in the study areas (OoARD, 2014). As a result, the producers are not getting the required economic benefit from growing banana and the consumers are not satisfied from what they consume. This therefore demands a holistic study of the system in the form of value chain analysis.

Kaplinsky and Morris (2001) defines the value chain as 'the full range of activities which are required to bring a product or service from conception, through the intermediary phases of production, delivery to final consumers, and final disposal after use.' An agricultural value chain can, therefore, be considered as an economic unit of analysis of a particular commodity (e.g. banana) or group of commodities that encompasses a meaningful grouping of economic activities that are linked vertically by market relationships. The emphasis is on the relationships between networks of input suppliers, producers, traders, processors and distributors (UNCTAD, 2000).

The value chain concept entails the addition of value as the product progresses from input suppliers to producers and to consumers. A value chain, therefore, incorporates productive transformation and value addition at each stage of the value chain. At each stage in the value chain, the product changes hands through chain actors, transaction costs are incurred, and generally some form of value is added. Value addition results from diverse

activities including bulking, cleaning, grading and packaging, transporting, storing and processing (Kaplinisky and Morris, 2001).

Banana is economically and nutritionally important commodity. However, in the study areas, value chain study which is strongly advocated as a possible intervention strategy to increase producers' competitive position and better integration among actors so as to increase the economic benefits of actors from the products and services they rendered have not yet been conducted and documented properly. To this effect, the value chain analysis of banana was conducted to describe value chain actors, functions and power relationship between the actors; to evaluate the profit share of actors participating in the chain; to identify the opportunities and constraints in production and marketing of banana.

2. Methodology

Description of the study areas

This research was conducted in two Districts of Northern Ethiopia namely; Asgede-Tsimbela and Tahtay Adyabo. These Districts are geographically located in $13^0$58'35.6" to $14^0$59'38" N and $38^0$04'30" to $38^0$14'31" east. Elevation of the production areas is 664 meters above sea level. The source of irrigation for banana production is 'Tekeze' river which is bordered on the North by Eritrea.

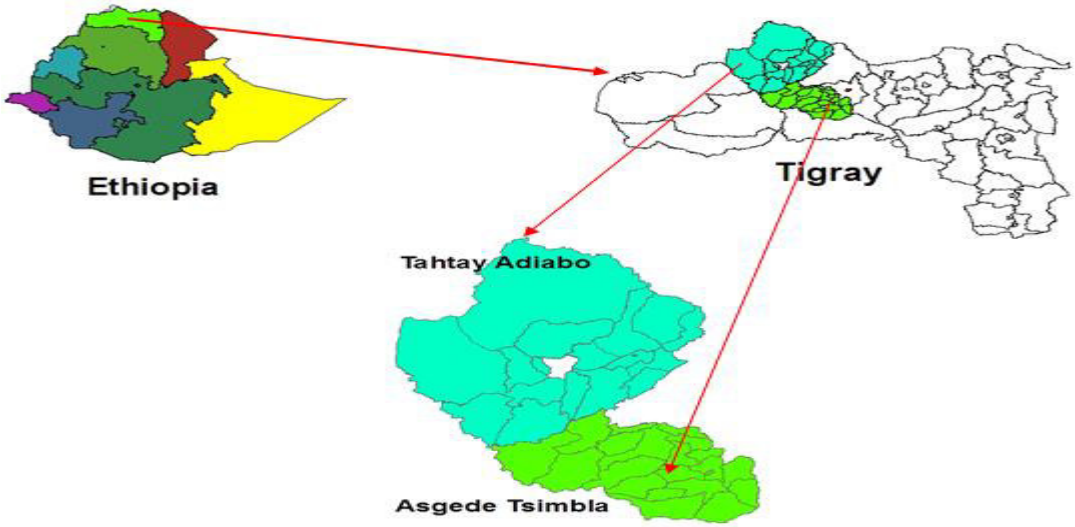

Figure-1 Location map the study areas

The dominant farming system is mixed crop-livestock production. According to the NMA (2015), the annual mean temperature of the study area ranges from 25.48-27.96^{O}C with the minimum temperature is 21.9^{0}C and the maximum is 35^{0}C. The highest mean maximum temperature is recorded between March and May, and the lowest occurs from June to February with the exception of October. The rain fall pattern of the study areas is mono modal type with an average annual rainfall ranging from 513.5-910.5 mm.

Research Design

In this study both qualitative and quantitative data types were collected from primary and secondary sources to get detailed and diverse information. Representative samples from producers (farmers, investors and cooperatives), traders (retailers, and wholesalers) and consumers of banana were randomly selected and interviewed using semi-structured questionnaires.

The study areas were selected purposively since the areas are the highest banana producers in Tigray Regional State and have covered the whole market area of this region. Initially actors who are involved in the value chain were identified using review of related literature and interview of some key informants.

According to Mendoza (1995) there is no hard-and-fast rule to help one determine the number of interviewees required for each value chain actors. In some studies of value chain, as many as 30% of all traders and wholesalers, between 5% and 8% of producers, 5% of retailers and less than 1% of consumers were surveyed. Moreover, the sample size will depend on the number of producers, traders and also factors such as degree of homogeneity of diversity of producers, traders and consumers.

For the primary data collection, 80 producers, 30 traders (8whole sellers and 22 retailers) and 40 banana consumers were randomly selected from each banana production areas for individual interview through questioner. Secondary data was collected from Asgede Tsimbila and Tahtay Adyabo Office of Agriculture and Rural developments.

Both the qualitative and quantitative data were analyzed using SPSS V-16. Some of the qualitative data were analyzed with chain mapping to identify the actors and their function and for mapping patterns of

interaction between actors.

Mapping the value chain and measuring distribution of benefits

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 exercise was carried out in qualitative and quantitative terms through graphs presenting the various actors of the chain, their linkages and all operations of the chain from pre-production (supply of inputs) to consumption. In order to map a diagram that clearly depicts the structure and flow of the value chain, the following questions were settled:

•What are the main activities carried out in the value chain to obtain the final product?
•Who are the operators involved in these activities and what are their roles?
•What are the flow of products, information and knowledge in the value chain?
•How much volume of production is distributed to actors?
•Where does the product (or service) originate from and where does it go?
•How does value change through the value chain?
•What types of relationships and linkages exist among the various chain actors?
•What types of business services are feeding into the chain, including the regulatory and policy framework in which the sector is operating?

After having developed the general conceptual map of the value chain, the next step was to analyze the chain's economic performance. Production costs, margins and price markups, were among the possible measures of chain performance. Descriptive analysis was employed to examine marketing costs, margins and value share of the different marketing participants.

Marketing margin analysis deals with comparison of price at different levels of marketing over the same period of time. It measures the share of the final selling price that is captured by a particular agent in the marketing chain and always related to the final price or the price paid by the end consumer, expressed in percentage (Mendoza, 1995).

No other term associated with agricultural marketing is more misunderstood than the concept of a marketing margin. A big marketing margin may, in fact, result in little or no profit or even a loss for the seller involved. That depends on the marketing costs as well as on the selling and buying price. Because precise marketing costs are frequently difficult to determine in many agricultural marketing chains, the gross and not the net marketing margin is calculated. Thus, the marketing margin should be understood as the gross marketing margin.

The formula to calculate total gross marketing margin (TGMM) is given as:

$$TGMM = \frac{\text{End Buyer price - Farmer's Price}}{\text{End Buyer Price}} \times 100 \quad (1)$$

Gross (profit) margin is the difference between sales revenue and cost price, expressed as percentage of the cost price or as discounted percentage of the sales price. The net (profit) margin is the same as that of gross margin excluding Value Added Tax (GTZ, 2007). It is useful to introduce here the idea of producer participation, farmer's portion or producer's gross margin (GMMp) which is the portion of the price paid by the end consumer that belongs to the farmer as a producer. The producer's margin or share in the consumer price GMM_P was calculated as:

$$GMM_P = \frac{\text{Price paid by End Buyer - Gross Marketing Margin}}{\text{Price Paid by End Buyer}} \times 100 \quad (2)$$

The consumer price share of market intermediaries is calculated as:

$$GMM = \frac{SP - BP}{EBP} \times 100 \quad (3)$$

Where: GMM = Gross Marketing Margin (%)
SP = Selling price at each level
BP = Buying price
EBP = End buyer price

In marketing chain with only one trader between producer and consumer, the net marketing margin (NMM) is the percentage over the final price earned by the intermediary as his net income once his marketing costs are deducted. The percentage of net income that can be classified as pure profit (i.e., return on capital) depends on the extent to which factors such as the middleman`s own, often imputed, salary are included in the calculation of marketing costs.

$$NMM = \frac{\text{Gross Marketing Margin - Marketing Cost}}{\text{Price Paid by End Buyer}} \times 100$$

3. Result

3.1 Socio-economic and demographic characteristics

From the sample producers interviewed only 10.57% in Asgede Tsimbila and 6.9% in Tahtay Adyabo were females. This result reveals that the banana production practice in 'Tekeze' river basin is dominated by male producer farmers this might be due to its harsh condition which is not preferable by females.

Table-1 Demographic characteristics (Sex, marital and educational status)

Variable	Value	Location	
		Asgede Tsimbila (%)	Tahtay Adyabo (%)
Sex	Male	89.43	93.10
	Female	10.57	6.9
Marital status	Single	16.67	00
	Married	83.33	96.55
	Divorced	-	3.45
	Widowed	-	-
Educational Status	Cannot read & write	10.35	8.33
	Can read & write	34.48	38.34
	Primary	34.48	45
	Secondary	20.69	8.33
	Collage/University	-	-

As shown in table-1, out of all the banana producers in the study areas 83.33% in Asgede Tsimbila and 96.55% in Tahtay Adyabo were married. The remaining 16.67% of the banana producers in Asgede Tsimbila were single and 3.45% of the banana producers in Tahtay Adyabo were divorced. Almost 90% and above of the banana producer farmer respondents in both the study areas can read and write.

Table-2 Socio-economic and demographic characteristics of producers

Variable	Location			
	Asgede Tsimbila		Tahtay Adyabo (%)	
	Mean	Std. deviatin	Mean	Std. deviatin
Age	45	7.9	45.25	12.01
Area under banana production(ha)	1.12	0.65	1.34	0.6
Amount produced per year (quintal/ha)	468.75	14.75	505.33	26.55
Amount sold per year (quintal)	468.75	14.75	505.33	26.55

The overall mean age of banana producer farmers interviewed was almost similar which were 45 year and 45.25 in AsgedeTsimbila and Tahtay Adyabo study areas respectively. The mean value of area cultivated by banana and amount produced were found to be different across the locations (Table- 2). However, in both locations the entire banana produced were sold to the market.

Table-3 Socio-economic and demographic characteristics of traders

Variables		Location			
		Asgede Tsimbila		Tahtay Adyabo	
		Retailers	Wholesalers	Retailers	Wholesalers
age of respondents	Mean	36	35.5	47.67	42
	Std. deviation	7.83	3.54	11.68	8.49
Sex (%)	Male	100	-	100%	-
	female	-	100	-	100
Marital status (%)	Single	12.42	-	24.6	
	Married	77.26	100	75.4	100
	Divorced	10.32	-	-	-
	Widowed	-	-	-	-
Educational status (%)	Cannot read & write	40.85	-	31.28	-
	Can read & write	18.31	-	42.64	-
	Primary	25.37	47.25	16.3	62.74
	High school & above	15.47	52.75	9.78	37.26

The demographic result of this survey study (table-3) revealed that all the banana wholesalers are male in both the study areas indicating no participation of females in whole sale activities. In contrast, banana retailers are all

female which shows absence of male retailers.

Out of the sample respondents mean age of retailers and wholsalers in Asgede Tsimbila was recorded to be 36and 35.5, respectively. On the other hand, average age of retailers and wholesalers sample respondents in Tahtay Adyabo was 47.67 and 42, respectively. Regarding the educational status, wholesalers in both the study areas are relatively educated than the retailers. This may indicate that, since whole sales needs higher capital and relatively higher management skills.

3.2 Mapping the chain

The first stage to adopt value chain management principles is mapping the chain. The purpose behind mapping the chain is to identify the path taken by the product as they are processed and delivered as a final product to a specific market for consumers. Figure 2 presents map of banana value chain in both the study areas. This map shows different stages of banana value chain, the actors and their functions, volume of product flow through different stages and information flow from consumers to the producer farmers regarding the quality of the product they prefer to buy through different actors (operators and supporters) that help to improve performance of the chain.

In this study, input suppliers, producers, cooperatives, whole sellers, retailers (who distribute products to consumers in small quantity), and consumers were identified as the major actors participating in banana value chain. The main functions of these actors include input supply, production, collecting and transporting, and marketing of banana.

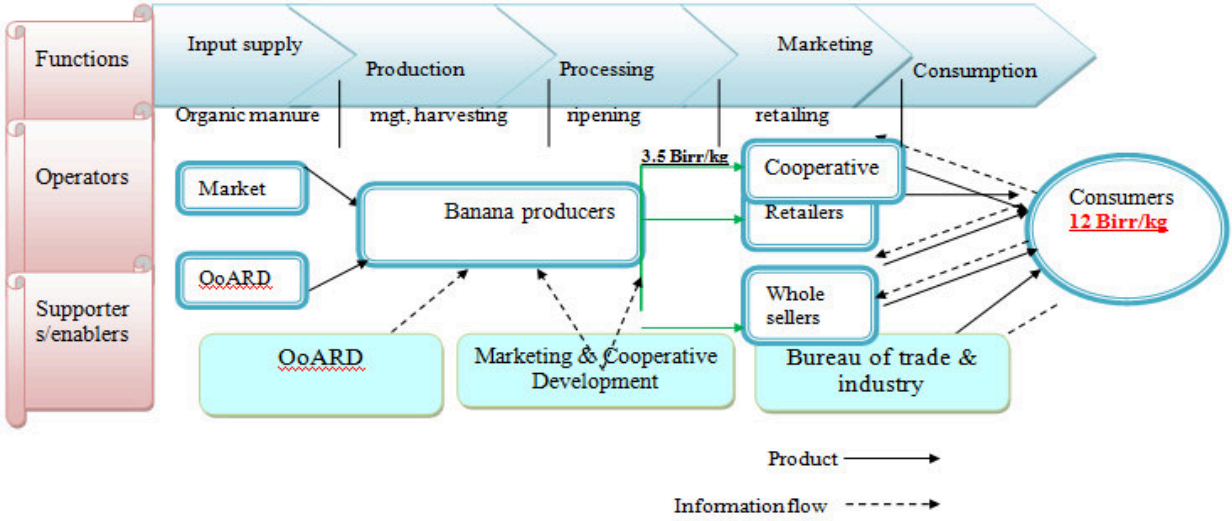

Figure-2 Value chain mapping of banana in the study areas

3 Marketing channel of banana product

As illustrated below, three common marketing channels of banana were identified in the study areas. Regarding the product flow, from the total volume of banana sold by sampled producers only about 10.70% passes directly from producers to consumers which account the least share. The largest share of banana sold was recorded in channel two and three which accounted 44.65% each. Because of higher transaction costs and opportunity costs of time for the producers prefer to sell out their product immediately in the nearby markets. Therefore, wholesalers and cooperatives are involved in accumulating supplies for resale to retailers in urban markets.

Channel I = Producer ⟶ Retailer ⟶ Consumer (10.70)
Channel II = Producer ⟶ Whole seller ⟶ Retailer ⟶ Consumer (44.65%)
Channel III = Producer ⟶ Cooperative ⟶ Retailer ⟶ Consumer (44.65)

According to the field survey, cooperatives had the highest potential for acquiring banana directly from producers in both study areas.

Marketing costs, profit share and marketing margins of banana value chain actors

The important points to be considered in value chain analysis are marketing costs, margin and share of producers as well as intermediaries from consumers' price or end buyers for banana. So as to investigate the shares and margins of several market agents, who are involved in banana value chain main market channels, were followed starting from farm gates of banana producer households up to the end users (consumer).

Price per kg of banana was used for the marketing margin calculations. Results of analysis of marketing costs and margins were used to determine whether or not there were excess profits and serious inefficiencies or

whether or not wide margins are due to technical constraints (such as transportation, asymmetry information/ high transaction cost) and shows value addition by intermediaries along the chain to the product.

Table-4 Marketing costs, Value added and profit share per kg of banana in the study areas

Marketing actors	Marketing measure per kg	Marketing channels		
		I	II	III
Producers	Selling price	7.00	3.5	3.5
	Value added	6.6	3.1	3.1
	GMMp (%)	55	25.83	25.83
	Marketing cost	1.00	1.00	1.00
	Production cost	0.40	0.40	0.40
	NMM	5.6	2.1	2.1
	NMM (%)	46.67	17.50	17.50
Wholesalers	Selling price	-	7.00	-
	Value added	-	3.5	-
	GMMw (%)	-	29.17	-
	Marketing cost	-	1.50	-
	NMM	-	2	-
	NMM (%)	-	16.67	-
Cooperatives	Selling price	-	-	7.00
	Value added	-	-	3.5
	GMMcop (%)	-	-	29.17
	Marketing cost	-	-	1.50
	NMM	-	-	2.00
	NMM (%)	-	-	16.67
Retailers	Selling price	12	12	12
	Value added	5	5	5
	GMMr (%)	41.67	41.67	41.67
	Marketing cost	1.20	1.20	1.20
	NMM	3.80	3.80	3.80
	NMM (%)	31.67	31.67	31.67
	TGMM (%)	41.67	70.83	70.83

Where: GMMp= Gross Marketing Margin for producers, GMMw= Gross Marketing Margin for wholesaler, GMMcop= Gross Marketing Margin for cooperatives, GMMr= Gross Marketing Margin for retailers, NMM and TGMM are Net Marketing Margin and Total Gross Marketing Margin, respectively.

Marketing costs and margins for banana traders: table 4 depicted that the highest and the lowest total gross marketing margin (TGMM) was found to be 70.83% (marketing channel II & III) and 41.67% (channel I), respectively. In line with producer's share of banana retail price the survey results revealed that the maximum and minimum gross producers' share of the banana marketing channels were estimated to be 55% in channel I and 25.83% in channel II and III, respectively. This maximum share was due to the absence of intermediaries between the producers and retailers who could reduce the share of producers, producers sold their produce to retailers then retailers to consumers. Regarding the value added by producers, the minimum were added in channels II and III (3.1 Birr per kg) and maximum value was added in Channel I (6.6 Birr per kg).

Profit share of banana traders: Marketing profit for banana traders has summarized in table 4. Maximum return for banana producer in the study areas was found to be 5.6 Birr per kg of banana (46.67% share of the end user price) from channel I, and minimum return of 2.10 Birr per kg of banana (17.50% of the end buyer price) each from channels II and III. The reason for difference in producers' return/kg of banana across the channels seems to be due to different level of marketing costs and length of the channel.

3.4 Constraints and opportunities of banana value chain in the study areas

Constraints of banana value chain in the study areas

During the field assessment and interview it has been tried to observe different constraints on the different banana value chain actors. To begin with the producers side, some of the constraints faced in banana production and marketing are low productivity and income resulted from inappropriate use of inputs (improved varieties, fertilizers, pesticides), lack agronomic optimum practices, disease and insect pests, harvesting and post harvest handling techniques, and marketing plan.

On the other hand, there are some problems observed in the traders during ripening, transportation and

storage, handling and selling. These were caused due to financial limitations, lack of appropriate storage facilities, and marketing knowhow. The retailers have technical and equipment constraints for maintaining the quality of the fruit until it reaches in the hand of the consumers. Currently retailers are challenged by over ripening and deterioration of banana fruit before selling. Most retailers expose the banana to sunlight because they are selling their product outside along the main roads of urban areas. Even the wholesalers are using the traditional ripening techniques by emitting ethylene gas using locally called 'Butagaz'. This may lead to unplanned and unscheduled delivery of banana fruit to the market which may lead to high losses duet of over ripening.

Opportunities of banana value chain in the study areas

Irrigation sourced from Tekeze River, soil and climatic suitability, and local markets availability in the study areas can be considered as the major opportunities for banana value chain. Further, banana value chains can provide a great employment opportunity in the study areas that can be started with lower capital.

4. Conclusion

Banana value chain analysis of the study areas reveals that the main actors in the chain of both Districts' are Banana producers, cooperative traders, Wholesalers and retailers. Banana producers were working as joint actors and perform two or more functions of the value chain. They produce banana and sell to different intermediaries and consumers.

The market channel of banana shows that the area has three banana marketing channels and the major share of this banana marketing goes to channel II and channel II (44.65% each). This indicates banana producers in the study areas are not getting the required profit share. This is because banana needs some especial care for ripening after harvest and this is becoming more difficult by the producers. Regarding the margins of the chain actors, banana producers in the study areas had maximum gross margin of 55% (5.6 Birr/kg) and minimum of 25.83% (2.1Birr/kg). With regard to intermediates retailer had the highest profit of 41.67 (3.80 Birr/kg) followed by wholesalers and cooperatives which was 2 Birr/kg of banana fruit for each.

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