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APPLE MANGO VALUE CHAIN IN NORTHERN ETHIOPIA: CASE STUDY OF MEREB-LEKE DISTRICT

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ABSTRACT

This study, conducted in Mereb-Leke district of Tigray, Northern Ethiopia, had as objective to analye the value chain of mango (Mangifera indica) in the area. Though both apple mango and normal mango are produced in the study area the emphasis of this study was on apple mango. Multi-stage sampling technique was employed to select mango producers. In the first stage, the study district was purposively selected from the districts of northern Ethiopia based on its apple mango production performance. In the second stage, four peasant associations were selected purposively from the total peasant associations of the district based on their mongo production potential. In the final stage, 126 mango producers were randomly selected from the selected peasant associations based on the size of each association through the application of simple random sampling technique. In addition to mango producers five wholesalers and five retailers were included from different mango markets. The collected data were analyzed using simple descriptive statistics and calculation of margins. The finding of the study showed that the value chain actors of apple mango were; input supplies, producers, wholesalers, retailers and consumers. Unlike other products in apple mango producers are not included along the value chain; this is because of its cost to use it for juice. Juice house prefers normal mango to apple mango because of its profitability. From the analysis of costs and margins the value added by farmers, wholesalers and retailers was 1583.65, 330.5 and 497 birr/qt, respectively. The major problems along the mango value chain include; shortage of timely input supply, high cost of inputs, diseases of mango plant, shortage of market information, shortage of transportation facility and road infrastructure, farmers' lack of management skill, lack of organized market linkage and presence of illegal traders.

Key words: Apple mango, chain mapping, Mereb-leke, value chain

INTRODUCTION

African economies are increasingly confronted with changing food and commodity markets, due to globalization, economic liberalization and urbanization (Hoeffler, 2005). As a result, consumer preferences change. This constitutes new opportunities and challenges to small-scale producers, traders and processors along the agricultural value chains. To address this situation, development agencies, donors and NGOs are placing more emphasis on enabling farmers to increase their level of competitiveness, to produce for an identified market, rather than trying to sell what they have already produced and also seeking new market opportunities that offer higher levels of income. Such goals can be achieved through better economic coordination and institutional linkages (Bezabih and Mengistu, 2011).

Value chain describes the full range of activities required to bring a product or service through the different phases of production, including physical transformation, the input of various producer services, and response to consumer demand. The value chain perspective provides an important means of understanding the business-business relationships, mechanisms for increasing efficiency, and ways to enable business to increase productivity and add value. It resides at the core of high-impact and sustainable initiatives focused on improving productivity, competitiveness, entrepreneurship and small-scale enterprises (SME) growth (World Bank, 2008). In general, adding value is the process of changing or transforming a product from its original state to a more valuable state. A broad definition of value

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added is to economically add value to a product by changing its current place, time and from one set of characteristics to other characteristics that are more preferred in the marketplace. A narrower definition would be to economically add value to an agricultural product by processing it into a product desired by customers (Mike, 2009).

Agriculture in Ethiopia is predominantly subsistent and this is particularly true for the major food crops grown in the country. The major food crops grown in Ethiopia include cereals, pulses, oilseeds, vegetables, root crops, fruit crops, stimulant crops and sugar cane (CSA, 2012). Many parts of the country are suitable for growing temperate, sub-tropical or tropical fruits (Joosten, 2007). About 61,972.60 hectares of land are under fruit crops in Ethiopia. Bananas occupy about 58.11% of the fruit crop land followed by mangoes that occupyabout 14.21% of the area. More than 4,793,360.64 quintals of fruits are produced annually in the country. Bananas, papayas, mangoes and oranges took up 63.11%, 8.07%, 14.55% and 7.46% of the fruit production in Ethiopia, respectively (CSA, 2013). Mango production in Ethiopia fluctuates because of occurrence of diseases, lack of proper management and poor weather conditions (CSA, 2009).

The fruit sector in Ethiopia has high value products as compared to other crops and promises high returns on relatively small investments. However, the investments on production and processing are small (Timoteos and Tigist, 2012). The study by James et al. (2008) indicated that the study of fruit value chainin Ethiopia is quite rudimentary with mainly subsistence level cultivation, harvesting and post-handling techniques which limit the quality of the fruit. Upstream, there are also issues with most grading and packaging being undertaken following a long road journey to the capital, undermining not only the quality of fruit, but also the potential value generated at the farmer level.

Though there are indications of the expansion of agro-industries that are involved in value addition and expansion of markets for agricultural products, value addition by Ethiopian farmers for major agricultural commodities is limited to transportation (Dawit, 2005). Marketing of fruit products in Ethiopia is currently facing tremendous challenges such as poor quality and safety practices in the production, marketing and processing, and absence of formal rules, grades and standards in the production and marketing of the products.

Ethiopian farmer faces serious problem in marketing of the farm produce. This is due to lack of know-how about marketing system, unavailability of market information, shortage of supply of quality seed, inappropriate post-harvest management and low bargaining power of farmers (Gebremeskel et al., 1998). Even if attempts are made by the government to improve the marketing skill and bargaining power of farmers through establishment of cooperatives and promotionof other group action approaches, the bargaining power is still in the hands of the traders (Dawit, 2005). Therefore, the objectives of this study were: (i) to describe the value chain and identify the major actors and their functions, (ii) to identify the value addition share of actors in apple mango value chain, and (iii) to identify the constraints and opportunities along the fruit value chain of the study area.

MATERIALS AND METHODS

Description of the Study Area

This study was conducted in Mereb-Leke District of Tigray, Northern Ethiopia. The study area is one of the districts in the Tigray Regional State of Ethiopia. It is part of the Central Zone, bordered on the south by La'ilayMaychew, on the southwest by TahtayMaychew, on the west by the North Western Zone, on the north by the Mereb River (which separates it from Eritrea), on the east by Enticho, and on the southeast by Adwa. The administrative centre of the study area is Rama town. From the District Office of Agriculture, we obtained information on the current total population of the district to be 141517; of which 49.67% are males and the remaining 50.33% are females. The average annual temperature and rainfall of the district is 32^{o}C and 600 mm respectively. The total area coverage of the study area is 128,594.81 ha, out of which 10,793 ha is covered by forest, 42339.88 ha is grazing land, 30283 ha is cultivated land, 877.61 ha is allocated for agro-forestry practice, 34901 ha is under area closure and the remaining 1700.32 ha is allocated for construction of residential buildings. The major crops grown in the study area are maize, barley, sorghum, finger millet, and fruit. It is well known in the production of apple mango. In addition to apple mango other fruits like normal mango, papaya and orange are produced by farmers in the study area.

Data Collection and Sources of Data

In order to address the objectives of the study, qualitative and quantitative data were collected from both primary and secondary sources. Primary data were collected from fruit producers, traders (wholesalers and retailer) and from different supportive organizations. Secondary data were collected from the district agricultural and rural development offices, district agricultural marketing offices and district cooperative office. Structured questionnaire was used to sample respondents (fruit produces and traders).

Sampling Techniques and Analysis

In this study multi-stage sampling technique was employed to select the mango producers. In the

first stage, the study district was purposively selected from the districts of northern Ethiopia based on its apple mango production performance. In the second stage, four peasant associations were selected purposively from 23 peasant associations in the district based on their mango production potential. In the final stage 126 mango producers were randomly selected from the selected peasant associations with the number from each association depending on the size of the association. In addition to mango producers, 12 respondents (comprising 2, 1 and 2 wholesalers from Mekelle city, Axum and Rama town, respectively and 5 and 2 retailers from Mekelle city and Axum, respectively) were also selected from the other value chain actors from the different destinations of apple mango produced in Rama. These respondents were interviewed based on their respective functions in the chain. The data were analyzed using simple descriptive statistics and the value chain framework to reveal constraints within the chain that prevent or limit the exploitation of end market opportunities. Marketing margin at each stage was calculated to estimate the value added by actors along the value chain of apple mango.

RESULTS AND DISCUSSION

Value Chain Governance of Apple Mango

Price determination is the main issue in marketing system of any product. Most of the time price of agricultural products is determined by buyers rather than producers and farmers are price taker for their own product (Dawit, 2005). Hence the bargaining power is in the hands of traders and they derive more benefits compared with farmers. But in the study area 69.85% of respondent revealed that the price is determined through the interaction of demand and supply, 26.98% of sample farmers set the price of their product by themselves (see Table 1). The figure 69.85% indicates that both farmers and buyers of mango of the study area are price taker. This is because of high demand for the product and farmers have different alternative markets nearby to sale their product.

Table 1: Pricing system of apple mango

Factors governing price of mango	Frequency	Percentage
Season of the year	36	28.571
Quality of the product	46	36.508
Distance from market	8	6.349
Season of the year and quality of the product	36	28.571
Price determination		
Producers	34	26.984
The market itself	88	69.841
Purchaser	4	3.174

Source: Own computational result from field survey

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The main factors that govern price of mango in the study area were season of the year, quality of the product and distance from market (see Table1). Regarding season of the year the price of mango varies from time to time. In the peak harvesting season, mostly May to June, the supply of mongo in the market increases from different part of the country hence; price of mango decreases. But during the off harvesting time like in January and February supply decreases and its price increases.

Value Chain Actors and Their Functions along Mango Value Chain

The main actors along value chain of apple mango were input suppliers, producers, wholesalers, retailers and consumers. The function of input supplier is providing different types of production inputs to mango producers. That of producer is to produce mango and sell to the next actor. That of wholesaler is to collect mango from farmers in bulk and then sell to other actors – retailers or consumers. That of retailer is to purchase mango product from farmers directly or from wholesalers then distributes it to the end users.

As indicated in Figure 1, six market chains were identified for apple mango marketing system. From the chain a large portion of the product passes through the IV chain. From the value chain map (Figure 2) we observed that the core value chain actors of the target commodity were input suppliers, producers, wholesalers, retailers and consumers. There were two types of wholesalers namely wholseler1 and wholsaler2. Wholseler1 represents traders who buy the product directly from farmers and sell to retailers and wholesaler2 and are found in Rama town and Mekelle city. Wholsaler2 are traders who buy the product in bulk from wholesaler1 and sell it to retailer and end users found in Axum city.

Actors of Apple Mango Value Chain

In a value chain, the actors include the value chain operators and the operational service providers. Those functionaries who are directly involved in the transactions or directly support the actors involved are the value chain actors. Based on field observations, the various actors in the mango value chain perform the following activities:

Input suppliers: Inputs like seed, fertilizers, planting materials, packing materials, pesticides and motor pumps are the major inputs which are supplied by input suppliers, whereas inputs like compost, animal manure and most of the time labour force are inputs that are managed by the farmers themselves. In the study area input suppliers for mango marketing and production include agricultural office of the district, cooperatives, Relief Society of Tigray, privet business men, credit providers and training providers.

Chain I	Farmer	→	Consumers				
Chain II	Farmer	→	Retailer	→	Consumers		
Chain III	Farmers	→	Wholesalers1	→	Consumers		
Chain IV	Farmers	→	Wholesaler1	→	Retailers	→	Consumer
Chain V	Farmers	→	Wholesaler1	→	Wholesaler2	→	Consumer
Chain VI	Farmers	→	Wholesaler1	→	Wholesaler2	→	Retailer → Consumer

Figure 1: Market chain of apple mango

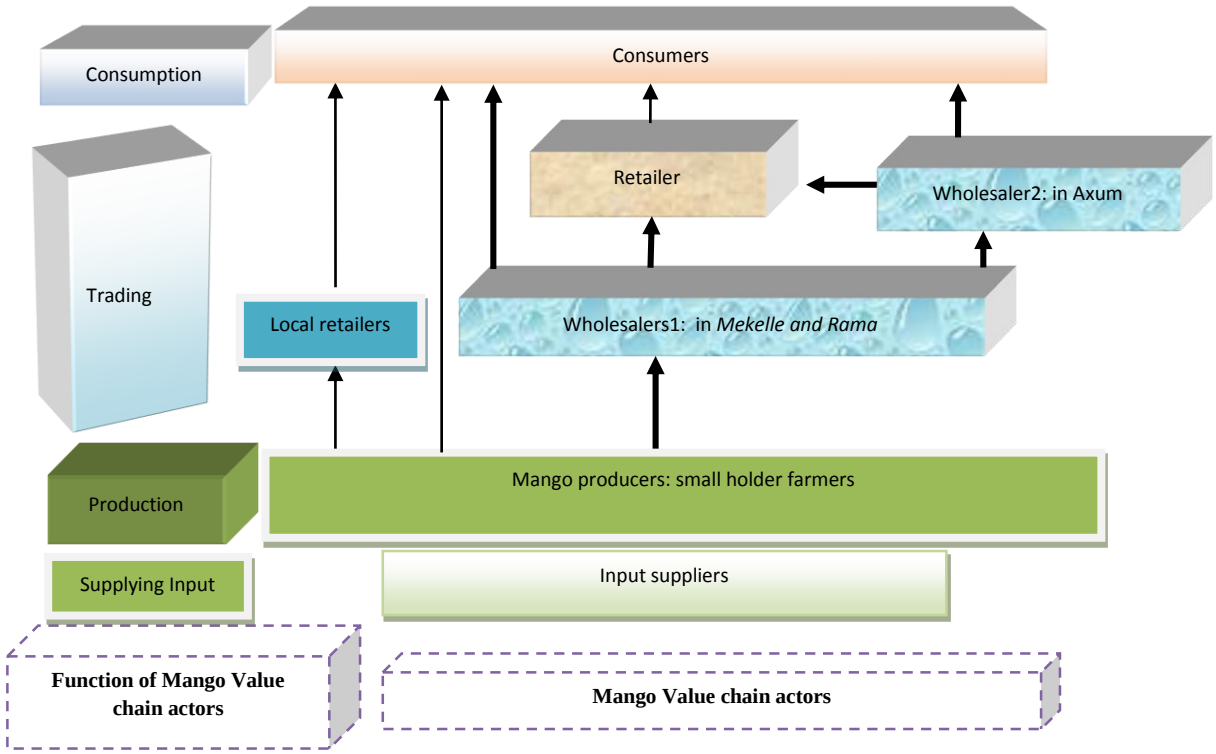

Figure 2: Value chain map of apple mango

Farmers: In this study, the term 'farmer' refers to a person or his family members who grow and sell mango product. The main function of producer is producing mango and sale it to other value chain actors. Almost all farmers sell their product to the wholesalers found in Rama and Mekelle.

Wholesalers: Wholesalers are defined as those who buy the apple mango product in bulk and sell to retailers or to consumers. They are mostly located in Rama town and Mekelle and their number is very limited, implying they enjoy monopoly in selling the product.

Retailers: Retailers are traders who buy mango from the producers or from wholesalers and sell the product in smaller quantities to the end consumers of the product. Almost all Mango retailers of apple mango are found in different market places outside Rama market. Most of them are found in Mekelle city because large quantity of the product is marketed in Mekelle.

Supportive actor: Value chain supporters or enablers provide support services and represent the common interest of the value chain operators. They are outsiders to the regular business process and restrict themselves to temporarily facilitating a chain upgrading strategy. Typical facilitation tasks include creating awareness, facilitating joint strategy building and action and the coordination of support activities (training, credit, input supply, etc.). The main supporters of mango value chain in the study area include district office of agricultural and rural development, NGO, Dedebit micro finance institution and relief society of Tigray.

Estimating Cost and Margin of Mango Production and Marketing

The major cost items involved in mango production of the study area include cost of hired labour, fertilizer, pesticide and fuel for irrigation. The costs/qt of mango varies across households depending on the number of days taken up by for pre-harvest activities, number of hired labour, and

Table 2: Costs and margins of apple mango along the value chain

Items	Producer	Wholesalers	Retailers	
Production cost (birr/qt)	187.5	-	-	
Purchase cost (birr/qt)	-	1800	2250	
Marketing cost (birr/qt)	26.85	119.586	103	
Total cost (birr/qt)	214.35	1919.5	2353	
Sales price (birr/qt)	1800 (18 birr/kg)	2250 (22.5/kg)	2850 (28.5/kg)	
Margin/value added	1583.65	330.5	497	2411.15
Percent value added	65.68	13.71	20.61	100

Source: Computed from the field survey data

sources of irrigation water. Since the production methods used by the households are mainly traditional, most of the pre-harvest and post-harvest activities were done using manual labour. In addition to the production cost, the farmers incur marketing costs. Marketing costs of mango include loading-unloading cost, transportation cost, packaging cost, storage cost, tax if any and other payments for marketing functions.

Gross Margins to Actors

Cost and price information are used to construct marketing cost and margin. The total gross marketing margin (TGMM) is always related to the final price paid by the end buyer and is expressed as percentage (Mendoza, 1995). Gross margin, variable costs minus gross revenue, is a good estimator of economic returns from mango production. It is not, however, a measure of farm profit as it does not take into account fixed costs.

Table 2 shows the values added by each actor along the value chain of apple mango. The total value added till it reaches the final consumer was 2411.15 birr/qt. Of this value 65.68% was added by farmers; 13.7 and 20.61%by wholesalers and retailers, respectively. The value added by farmer is very large compared to that by wholesalers and retailers (Table 2). Farmer gets 1583.65 birr from one quintal of apple mango which is 65.68% of the total values added along the mango value chain. It is the farmers' gross profit, i.e., mean total value of mango per quintal minus total variable cost per quintal which includes only the explicit costs. Hence this gross profit is a return to all types of resources owned by the farmer which include family labour, land, motor pump for irrigation, compost prepared by himself, animal manure, etc.). The return for wholesaler and retailer is 330.5 and 497 birr/qt, respectively. This is the return for their family labour because its cost is not included in the calculation of marketing cost.

Mango Value Chain Constraints and Opportunities

Constraint of mango value chain

Production constraint

Major constraints of the mango production in the area were identified through discussion with mango producers, agricultural office of the district, development agents, wholesalers and retailers. Accordingly, some of the major constraints include shortage of timely input supply, lack of management skill, expensive price of inputs, incidence of diseases that damage their mango, lack of harvesting technology, theft and free grazing of animals were some of the problem faced by mango producers during the production time.

Shortage of input supply: Shortage of inputs like pesticides, motor pump and its fuel were the main problems raised by mango producers. Even if these inputs are supplied to the producer by agriculture and rural development office of the district their supply is limited in amount and not on time. In addition to timely inaccessibility of the inputs its price is very expensive and it is beyond the purchasing power of the farmers; i.e. price of fertilizer, pesticides and motor pump are examples of the most expensive inputs.

Lack of management skill: This problem is related with farmer's lack of knowhow on management practices. Most mango producers do not know how to apply fertilizer, manure, compost and pesticide to their mango. Farmers also suffer from problems like identification of different type of diseases, example cause for removal of mango flower before giving product which was the headaches for almost all farmers and even for the agriculture experts.

Marketing constraint

Marketing problems forwarded by farmers and traders include lack of market information, high competition during peak production period; which lowers price of mango, grading problem, quality problem because of pre-mature harvest of mango, lack of market linkage among value chain actors, price variation, problem of road and transportation and etc. Market information is not available on time for farmers of the study area. Farmers get market information particularly price information from informal sources of information like; their friends, neighbors and traders which is inaccurate; hence farmers do not have price. The linkage among market actors was very week even farmers they do not know their permanent buyers and they do not get any support and advice from the individuals within the value chain. Framers harvest

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their product early before maturity to fulfill their cash demand (cash obligation); hence the quality and testy of the product decrease. Lack of organized marketing linkage was other marketing problem of the study area. There was no well-organized market organization for mango product it results in lack of grading and standardizing of the product, poor quality control, and inadequate and inconsistent supply to the next actors in the chain.

The other marketing problems from the trader side were perishable nature of the product and existence of illegal traders. Illegal traders are traders who buy the product from wholesaler and sell it at road side and they are not licensed. They sell the product at prices less than retailers' price, and this highly affects the pricing system and profit of legal traders particularly the retailers.

Opportunities along Mango Value Chain

Based on the survey result there are lots of opportunities in mango production of the study area. The opportunities refer to the external favorable conditions that are in favor of mango production in the study area. It includes favorable weather conditions for mango production, good strategic location for mango production, access to irrigation water and access to seed. Mango is one of the tropical fruits that can be produced in low land areas and the study area is of the low land areas of Tigray; hence its agro-ecology is suitable for mango production. Marketing opportunity of mango product includes high demand of the product particularly in Mekelle city and access to local market for mango producers.

CONCLUSIONS/RECOMMENDATION

Mango is one cash crop which plays a key role in the economy of the country (Ethiopia), particularly of the study area. Even if mango of the study area is produced by very few farmers at investor level mostly it is produce by small-scale farmers.

The main objective of this study was to analyses the mango value chain in the study area. For this study both qualitative and quantitative types of data were collected from both primary and secondary sources of data. The primary data was collected from sample farmers, traders and through discussion with development agents, key informants and agricultural experts of the district. The secondary data was collected from agricultural office of the district and other supportive organizations of the study area. For this study total of 126 fruit producers were selected by using multi-stage sampling technique. In addition to mango producers; five wholesalers and five retailers were selected from different destinations of the product. The collected data was analyzed through the application of simple descriptive statistics and calculation of market margin.

In this study six mango market chains were identified. The majority of the produce passes to the end consumer through the market chain of producer-wholesaler1-retailer-consumer. From the analysis of costs and margins the value added by farmers, wholesalers and retailers was 1583.65, 330.5 and 497 birr/qt, respectively. The major problems which affect the performance of mango value chain actors were shortage of timely input supply, expensive price of inputs, diseases of mango plant, shortage of market information, shortage of transportation facility and road infrastructure, lack of management skill by farmers, lack of organized market linkage and presence of illegal traders. Hence due attention should be given to solve those problems. Linkage among value chain actors was very poor. It is therefore paramount to develop well organized market linkage among value chain actors of the product. Since the product is perishable, it needs to reach the next actor within a short time; to do so it needs well organized transportation facility.

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