

AN ANALYSIS OF THE MANGO FRUIT VALUE CHAIN IN EMBU

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A THESIS SUBMITTED IN PARTIAL FULFILMENT OF THE
REQUIREMENTS FOR AWARD OF THE DEGREE OF MASTER
OF SCIENCE IN AGRICULTURAL AND APPLIED ECONOMICS
OF THE UNIVERSITY OF NAIROBI

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DECLARATION

This thesis is my original work and has not been presented for a degree in any other University or for any other award.

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DEDICATION

To my late husband, Dr Godfrey Alati Olukoye who encouraged me to pursue the masters degree, to my son Gerry Alati Olukoye and daughter Gertrude Amisi Olukoye for their patience and encouragement as I pursued my studies.

ACKNOWLEDGEMENTS

I acknowledge the dedicated support from my supervisors, Dr. C.O. Gor and Dr. Richard M. Mulwa for their valuable suggestions, constructive criticisms and strong support during all stages of my work.

I would also like to thank the Permanent Secretary, Ministry of Agriculture, through the Director, Department of Agribusiness and Market Development for the award of the scholarship and ensuring that funds were available promptly for the entire study period. Many thanks to the Collaborative Masters in Agricultural and Applied Economics (CMAAE) programme coordinator for the extra funding to undertake the field work and final thesis preparation. I am also extremely grateful to the staff of Agribusiness department for their positive support during the entire study period.

I am grateful to the District Agricultural Officer, Embu East Mr. Wanjao, District Horticultural Crops development Officer, Mr Johnson Kanthiri for assisting in the logistics Mr Nathan Gatumo, Mr Moses N Njagi, Rosemary Francis and Rosemary Kamaru, Frontline Extension Officer, who assisted with field data collection. I am indebted to Samuel Njuguna for his assistance during data analysis. Many thanks to my larger family, Mr Osen Josiah and Mrs Dymphina Osen, brothers Collins and Joash, sister Caroline and her husband Dr B.K. Nassiuma for their encouragement, friends; Patricia and Mweninguwe, 2008/2009 CMAAE class, members of staff department of Agricultural Economics, University of Nairobi for their prayers and moral support throughout the study period. Special thanks to the farmers in Embu East, middlemen and primary processors for their willingness and readiness to share with me their wealth of experience while handling mangoes. God bless you all.

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ABBREVIATIONS AND ACRONYMS

AFC:	Agricultural Finance Corporation
ASCA:	Accumulating Savings and Credit Association
CMAAE:	Collaborative Masters in Agricultural and Applied Economics
DAO:	District Agricultural Officer
DHCDO	District Horticultural Crops Development Officer
DHRRA'S	Asian Partnership for the Development of Human Resource in Rural Asia
DP	Depreciation
E.A	East Africa
FAO	Food and Agriculture Organization
FMHB	Farm Management Handbook of Kenya
FEO	Frontline Extension Officers
GI	Gross Income
GTZ	Deutsche Gesellschaft Technische Zusammenarbeit
GVA	Gross Value Added
Ha	Hectares
ICARDA	International Center for Agricultural Research in the Dry Areas
IFAD	International Fund for Agriculture Development
IDRC	International Development Research Centre
KeBS	Kenya Bureau of Standards
KWFT	Kenya Women Finance Trust
LH	Lower Highland Zones
Ltd	Limited

m	metre
mm	Millimetres
MFI	Micro Finance Institution
MoA	Ministry of Agriculture
MT	Metric tons
NI	Net Income
NVA	Net Value Added
PS	Permanent Secretary
PSDA	Private Sectors Development in Agriculture
ROSCA	Rotating Savings and Credit Association
SACCO	Savings and Credit Cooperative
SACDEP	Sustainable Agriculture Community Development Programme
SCP	Structure-Conduct-Performance
SMEs	Small and Medium Enterprises
UH	Upper Highland Zones
UM	Upper Midland Zones
US \$	United States dollar
UoN	University of Nairobi
VCA	Value Chain Analysis

ABSTRACT

Value chain describes the activities which are required to bring a product or service from conception, through the different phases of production, delivery to final consumers, and final disposal after use. It is thus a conceptual tool that enhances an understanding of the factors that impact on the long term profitability of a business. Value chain analyses are conducted through a combination of qualitative and quantitative methods and have become important in the recent times due to increased competition and need for efficiency in production and marketing. This study focuses on the mango enterprise in Embu. Eastern province is the leading producer with Embu being among the highest mango producers in the province. This study aims at evaluating the expected incomes, equity and welfare at the small scale producer's level. The objective of this study was to evaluate the margins and added value of mango by producers, traders and farmer groups doing processing and then examine institutional factors that affect mango fruit value chain in Embu district.

Qualitative and quantitative analysis was undertaken in this study to generate insights into the limitations and opportunities of the mango value chain which can be used to establish the critical control points. Data was collected through personal interviews and focused group discussions using pre-tested interview guides and group discussion guides. FAO, VCA software was used to compute the benefits and added value by the different agents in Embu. Descriptive analysis was used to determine factors that influence participation in the value chain.

The study findings show that farmers gain less and have the lowest figure for added value as compared to traders and the processors. The results indicate that traders were the

main beneficiaries as they deal with high fruit volumes and enjoy the high profits and add more value as compared to the farmers. Farmer groups' undertaking processing lack economies of scale though their performance is better than that of farmers in terms of value added and benefits. Their value added is the highest among all the agents. The study found that the performance of mangoes as an enterprise in Embu district was profitable as demonstrated by the high number of mango farmers and traders in the region during the peak mango season. The findings suggest that group processing should be enhanced in order to increase farmers' processing capacity at the local level.

Suggested policy interventions include, strengthening of extension services support to the farmer and creating demand driven extension services. The government in partnership and collaboration with relevant development partners should set up systems of information acquisition and flow to ensure transparency in the chain. There is need for provision of credit facilities to all the agents. The certification system should be simplified to enable the primary processor to access markets easily. The Councils should improve on the market infrastructure especially during the rainy season to reduce on quality deterioration of the mango fruit.

CHAPTER 1

INTRODUCTION

This chapter gives an overview of the study. It presents the background to the study and the problem the study is trying to address. The objectives of the research have been highlighted. Included also is the justification and significance of the study.

1.1 Background to the Study

Agriculture is the main source of income and livelihood for the Smallholder farmers in Africa (IFAD, 2000). Yet, coupled with poor access to physical markets, the incidences of poverty tend to be high. To choose profitable enterprises, investors need appropriate and reliable information showing comparable economic viability in terms of costs and benefits (Krain *et al*; 2008). Effective management of a farming operation and other activities in the value chains today requires that records be kept to enable managers make informed decisions affecting the profitability of their businesses.

Studies conducted by Agrisystems (E.A) Ltd (2005) indicated that, on average, mango farmers were operating in an environment characterized by high seasonality, low prices, high cost of production, and lack of policy framework and market standards. Major concerns cutting across the sector were lack of proper co-ordination, institutional and policy failures, high cost of inputs, weak operating chain and poor operating environment.

Mango is one of the many fruits, popularly and universally acceptable and enjoyed throughout the world. In fact the only tropical fruit which outranks it is the banana. With nearly US\$ 500 million worth of mangoes exported each year and 40 times that amount consumed in the countries of production, its role in income generation and household food security is evident (Griesbach, 2003).

The mango industry in Kenya has expanded considerably over recent years, not only in size but also in terms of geographical location. This has made the mango fruit become more popular with the local population wherever it is grown. Most of the mangoes produced is consumed within the same production area, or sold in urban markets. The two main market destinations for fresh mangoes are the local and export markets. Exports of fresh mangoes comprise a small proportion of national production.

Eastern province was the leading mango producer of both the local and exotic varieties with an average production of 99,730 metric tonnes per year. (MoA 2007). Some of the local varieties were Ngowe, Dodo, Boribo and Batawi. The exotic varieties include Apple, Kent, Keit, Tommy Atkins, Van Dyke, Haden, Sensation, Sabre, Sabine, Pafin, Maya, Kenston and Gesine. The districts with higher percentage of improved mango varieties were Embu, Mbeere, Meru Central, Makueni, Machakos and Meru South, while Mwingi and Kitui have very small areas cultivated with improved varieties. In Kitui for example, 1,287 hectares were under mango production, but less than 6 percent was cultivated with exotic varieties.

Mango is harvested once every year in Eastern Province and hence most of the farmers have in effect diversified to producing other crops, including passion fruits, water melons and banana production, to smooth their income streams throughout the year.

Studies conducted by Krain *et al*; (2008) established that majority of the farmers in Embu had intercropped mangoes with other crops. The main intercrops during the early years of establishment were food crops like maize and beans. During later years the area of intercrops reduced considerably due to the expanding canopy of the mango trees. Maize as a shade-sensitive crop is dropped as an intercrop from the fifth year onwards, unless very wide spacing of above 10m x 10m between mango trees is adopted. Napier grass, however, seems able to cope better with heavy shades than other crops and was often adopted as an intercrop during later years.

At harvest time, there is often an oversupply leading to low prices and significant product losses due to poor post-harvest handling techniques, which affect returns to the farmer and traders. Furthermore there were inadequate storage facilities available at the farm level and even in the main markets, and this forced farmers to sell their produce immediately after harvest at lower prices or alternatively leave the fruits to rot in the farms.

Marketing was dominated by middlemen. Brokers were the most dominant players and they act on behalf of traders who reside within and outside the district. Exporters and processors deal with specific farmers who have quality fruits. There were traders

coming from neighbouring regional markets e.g. Nyeri, Karatina and Embu town and national markets e.g. Nairobi and Mombasa.

No collective bargaining on the price takes place, and each farmer interacts individually with the trader and other buyers, often receiving prices well below the market prices at that particular time. This scenario is especially common with farmers who are in the interior areas which were inaccessible and has poor infrastructure. Bad road conditions that serve these production areas, disorganized collection, grading and packing facilities further contributed to post-harvest losses and perishability leading to low selling prices (FAO 2003).

1.2 Statement of the Problem

Promotion of private sector development in Agriculture (PSDA) under GTZ (German Technical Corporation) has been conducting trainings and developing value chains in mangoes, Irish potatoes and passion fruits. A lot of investment has been put in developing the value chain of mango fruit in Embu by PSDA yet no study has been done to establish the extent of chain integration and the benefits that accrue to each agent. This study was set to establishing the level of integration of this value chain and the benefits accrued by each agent.

The motivation to conduct the study was based on the fact that most extension work is meant to transfer knowledge from research institutions to farmers. More often, analysis is done to determine the adoption levels and improvement in household farm

income levels. Quantitative analysis to determine the benefits accrued by farmers' participation in activities such as farmer groups and value chains is normally ignored on assumption that farmers will definitely benefit.

Moreover, collective action has been recommended by many authors as the best approach to marketing, especially for agricultural commodities. The study sought to establish why some farmers still did not participate in collective action groups, were there are significant differences in benefits to warrant participation or non participation in collective action group or if there are other institutional issues that need to be tackled before farmers engage in group activities. Therefore the economic research problem in this study was to evaluate the expected incomes, equity and welfare especially at the level of small producers. Qualitative and quantitative analysis were undertaken in the study to generate insight into the limitations and opportunities of the chain which can be used to establish the critical control points in the value chain.

1.3 The Objectives of the study

The purpose of this study is to evaluate the different margins and value additions of farmers, middlemen and processors of mangoes in Embu district.

Specific Objectives

1. To evaluate the different margin shares and added value of mango producers, middlemen and primary processors.

2. To assess institutional factors that influences the integration of mango fruit value chain.

1.4 Research Questions

1. How is the mango value chain organised in Embu?
 - i. Who are the agents in the mango value chain?
 - ii. What is the margin share and added value for each of the agents in the mango value chain?
 - iii. How does extension service and credit provision affect the farmers' net benefit and value added shares?
 - iv. What are the roles of the different stakeholders in the mango value chain?
 - v. What constraints exist to the agents within value chains?

2. What is the role of institutions in mango value chain?
 - i. Which institutional factors influence the operations of the mango value chain?
 - ii. How do these institutions influence the integration of the mango value chain?

1.5 Justification for the study

The primary significance of the study is to all the actors in the mango value chain; farmers, traders and the collective action groups. The farmers' productivity, and fruit

quality, has to improve. Collective action groups have to see the need to improve on processing efficiency, while traders will have good quality fruit for the consumer. The actors will, therefore, see the need to invest in the chain activities. Analysis of the whole value chain and identification of the challenges and opportunities will benefit PSDA, policy makers, implementers and chain supporters in indicating the area of advantage for what should be done to improve on the chain integration.

Apart from this, the extension agents will be shown the need to adopt quantitative analysis as well qualitative analysis to improve on their service delivery to their client as the study will determine the accrued benefits by each agent.

CHAPTER 2

LITERATURE REVIEW

This chapter presents literature review on value chains, value chain analysis and studies conducted on the value chains. It elaborates the different definitions of value chain and how the analysis is done and also highlights studies conducted in value chains. Included in this chapter is institutional set up in the value chain analysis and how it affects the integration of the chain. The research gap is summarised in this chapter.

2.1 Value

Value, according to Concise Oxford Dictionary is the regard that something is held to deserve; importance or worth; the worth of something compared to its price. Consumers, too, attach value to products, resource or services offered by firms. They will offer any price for the products as long as their needs are met.

Consumers' value quality fruits in term of taste and freshness, not shrivelled fruits, ripe fruits (colour, firmness and aroma), clean and low of blemish. Fruits should be produced in a clean production system and marketed in a clean environment. The above attributes can be categorised into attributes of the product such as the flesh colour and taste, the skin colour, size and freshness. Other augmented attributes

include the packaging, labelling and attributes of the way the product is sold i.e. physical environment which includes the market.

Value chain analysis helps identify where and how these attributes are created. Taste and size will be determined by researchers and the way farmers' carry out their husbandry. Freshness and residual effects will be determined by all the chain agents while processors will transform the product in to other products that are convenient to consumers.

2.2 Value chain

Porter (1985) in his article on value chains and competitive advantage, showed that the competitive advantage of a firm stems from many discrete activities that the firm performs in designing, producing, marketing, delivery and support to its product as key components of the value chains. These activities contribute to the relative cost effective position of the firm and hence create a basis for differentiation.

According to Porter(1985), value chain is a basic tool for the analysis of the important activities in an industry and how these activities interact. The implementation of the value chain could enhance the competitive response, provide a source of product differentiation and create an understanding of inter-relationships among the activities.

Through this concept, bottlenecks preventing progress in any business can also be identified. Moreover, value chain concept provides a framework for sector-specific action and identifies strategies to help local enterprises to compete effectively and to

improve on their incomes (Webber *et al.*, 2010). Relevant stakeholders needed in the operations of the value chain can be identified for future program planning. The stakeholders, therefore, need to understand how local enterprises fit into the global economy so as to have good policies and programs (Baker, 2006).

Gloy (2005) states that value chain can be a very useful conceptual tool when trying to understand the factors that impact on the long-term profitability of any business and when developing a successful strategic plan for that business. Effective participation of farmers to value chain approaches and development could enhance their contribution to the rural economic development in African countries (IFAD, 2000).

Value chains can also be described as a sequence of related business activities (functions) from the provision of specific inputs for a particular product to primary production, transformation, and marketing up to consumption. See figure 1.1. (Kaplinsky 2001). He further indicated that value chains provide an explicit structure for linkages among the activities or processes in an industry (Kaplinsky, 2000). A value chain is a sequence and process whereby added value is enhanced and achieved through the recognition of a series of elements or activities some of which are 'primary' and others are 'supportive' (Porter, 1985). Similarly, Hellin (2006) asserted that a value chain is the full range of activities which are required to bring a product or service from conception, through the different phases of production involving a combination of physical transformation and the input of various producer services, delivery to final customers, and final disposal after use.

The increased need for value chain analysis and approaches is geared at achieving efficiencies, control costs, reduce risk in terms of quality, quantity, food safety, and to respond to ever changing consumer demands (Boehlje *et al.*, 1999). However, the fundamental concept of a value chain is to explicitly specify the value creating activities in the production-distribution process and to provide an explicit structure for the linkages among these activities or processes.

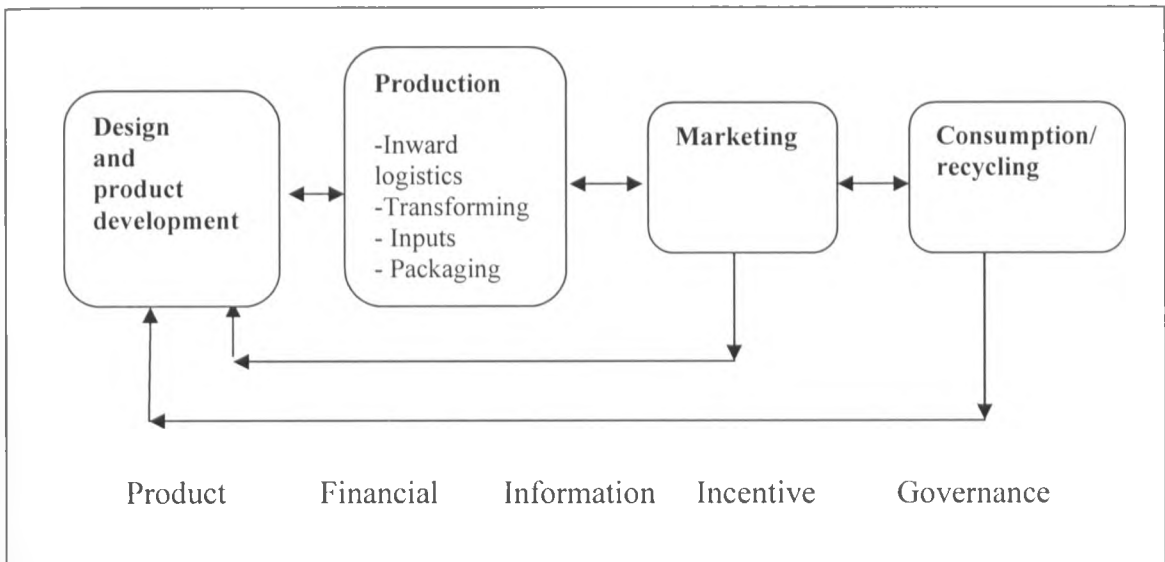


Figure 1.1 : Four links in a simple value chain

Source: Kaplinsky (2001).

The value chain assists in distinguishing the different stages of the process of supply (inbound logistics, operations, outbound logistics, marketing and sales, and after sales service) and the support services (strategic planning, human resource management, technology development and procurement) that a firm marshals to accomplish this task (Porter, 1985).

A similar approach to that of porter was highlighted by McLarty's (2000) as shown in Figure 1.2. The approach sought to provide prescriptive ideas for implementing better

management, decision-making and business development using value chain. This approach helps to trace product flows, value additions at different stages and identifies key actors and their relationships in the chain. The concept also helps to identify enterprises that contribute to production, services and required institutional support and also identifies bottlenecks that prevent progress. Baumann (2007) reiterates that for good policies and programs, there is need to understand how local enterprises fit into the global economy.

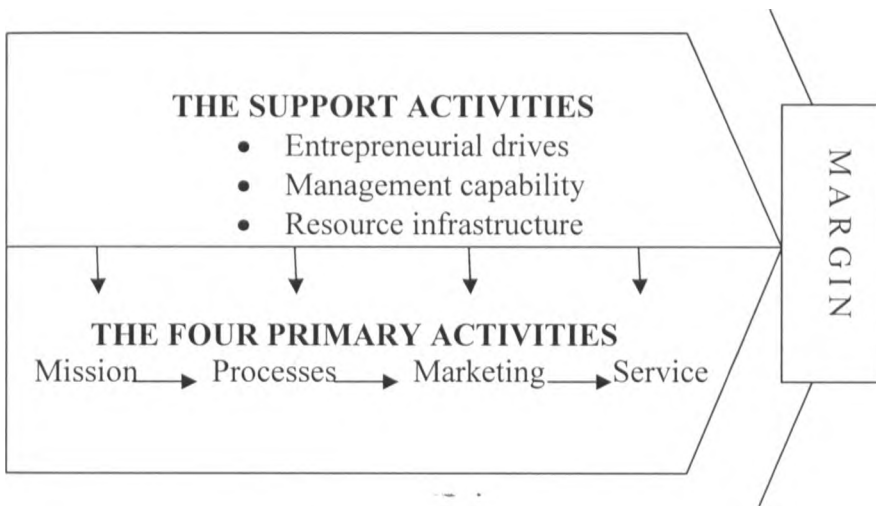


Figure 1.2. The SME value chain
 Source: McLarty Roy (2005).

Later studies by Kaplinsky (2000) incorporate global economy. He indicated that value chain analysis can help to explain the growing disjuncture between the global spread of activities and incomes. Kaplinsky (2004) highlighted the lessons learnt from value chain analysis in spreading the gains from globalization while Kaplinsky (2001) looks at globalization and unequalization and what can be learned from Value Chain Analysis.

2.3 Value chain analysis

Value chain analysis is a method for accounting and presenting the value that is created in a product or service as it is transformed from raw inputs to a final product consumed by end users (World Bank, 2007).

Hergert (1989) found that the framework for value chain analysis requires extensive data. Aspects that need to be considered are the structural issues like cost objectives, budgets and value cost drivers. Linkages and interrelationships must also be looked into as the cost of performing one activity will often be influenced by the way in which other activities are performed. Cathelijne *et al.*, (2007), considered the Structure-Conduct-Performance (SCP) approach which covers functioning structure (products, types of actors), conduct (behavior and interactions among actors) and finally the performance with respect to criteria like efficiency, flexibility, innovation and responsiveness as the basis for value chain analysis.

Value chain analyses are conducted through a combination of qualitative and quantitative methods (Rich *et al.*, 2009). Primary survey, focus group discussions, participatory rapid appraisals (PRAs), informal interviews, and secondary data sourcing all form the basis for the analysis. The information helps understand the linkages and structure of the value chain and serves as the basis for identifying many of the key constraints and policy issues that require further exposition. Previous studies (FAO, 2003; Cathelijne *et al.*, 2007 and Hanemann 2008) used qualitative approach to scan across the value chain of mangoes and its various actors and market

linkages to put across observed dynamics in context and identify opportunities and challenges. Huang *et al.*, (2009), Asian DHRRA'S (2008) used quantitative approaches in their analysis. Similar approaches will be applied in this study.

A study carried out by Rich *et al.*, (2009) indicated that value chain analysis has remained relatively qualitative and case-specific, with limited ability to rank or assess the impact of alternative interventions or to analyze sufficiently the complex market dynamics and feedbacks present in livestock systems. The study offered insights on ways to improve the analytical rigor of the value chain methodology that combines both qualitative and quantitative approaches and commended the use of System Dynamic models which are used to assess the benefits and costs over time and identify potential bottlenecks in the livestock value chain. The study also recommends the Agent-Based Models (ABMs) are useful approaches when modelling systems that are composed of interacting agents, where agents may represent individual farmers, social groupings, or institutions. These models will not be used in the current study as they are basically for livestock enterprises but do highlight applicability of value chain analysis in other enterprises.

Asian DHRRA'S (2008) establish the benefits reaped by the value chain players and the mal practices by some agents. The researchers used the gross margin analysis which does not take into account the overall profitability of the chicken enterprises. The results indicated that farmers' sales margins were small, as the volumes were also small compared to the traders and processors. Moreover they were often cheated on weight by the middlemen. For middlemen, wholesaler and processors, they all gain

better from selling a huge number of chicken. They were unethical in their business like the middlemen manipulate chicken weight by feeding them while processors eject water into dressed chicken. Krain *et al.*, (2008), found that market-oriented mango farming in Embu district is very economic.

Mitiambo while analysing the value chain of flowers in Kenya and Tanzania used simple gross margin to compare the two industries. The gross margin calculations were based on the percent costs of seed production, input supply, post harvest, transport to market and distribution in respect to total revenue. He summarized the above in terms of production, packaging, transport and marketing. Aspects of value added at different stages are not included. The results indicated low level of chain integration for the two value chains but the firms enjoy economies of scale. Distance to the market was of major concern hence high transportation costs. Tu (2008) calculated the gross margins and margin shares of the actors in the orange value chain in Tanga. He never considered the value added at each stage and did not calculate the same for the processors. However it was noted that the retailer had the largest share of the chain's gross margin. The middlemen took 15 percent of the gross margin that is generated by the chain system. Tineke (2003) found that Middlemen who visit their growers, value the quality produced than middlemen who do not hence are able to monitor the production process thus reducing on the rejection rate.

Huang *et al.*, (2009) concluded that processors were less important in terms of volumes they purchase but they do help smallholders to increase income as they deal with off-grade pears. Farmers found it difficult to sell their off-grade pears five years

ago as there was no pear processor nearby. With economies of scale, processors can make great profit for higher value addition which seems to be a double-win for farmers and processors. However, in the long run, the purchase price of off-grade pears had to increase and transaction cost resulting from intermediary decreases. Farmers still need to increase their produce quality and quantity by adopting new technologies.

Value chain analysis can also be used to provide prescriptive ideas for implementing better management of decision-making in a business and also in development of the business itself. McLarty (2005) argued that implementation of SMEs should be seen as an institutionalized practice and not default mechanism which takes place when things go wrong. The paper emphasized the role of procedures and action tasks, which fall not only within the realms of the owner but also on managers. Self-interest should drive the process of implementing SMEs. Mau (2002) used the process chain analysis method in demonstrating allocation of resources also known as Activity-Based - Costing (ABC). Processes should be measurable with predefined input and output and should exist to bring a specific value for the customer/consumer.

Provision of information for the coordination and optimization of activities across firms in a value chain was a major challenge (Dekker, 2003). Dekker study presents a case study on the use of an ABC model by a large UK retail firm and a group of suppliers for supporting their Supply Chain Management (SCM) practices. The study found that costs were managed cooperatively with suppliers by integrating cost data across the supply chain. The data was used to analyze the cost performance of supply

chain activities, both at the individual supplier level and at the supplier network level. This information was used to communicate with suppliers to analyze the causes of this performance and to generate ideas for improvement. The cost model was used to calculate the cost consequences of changing supply chain operations. This information subsequently formed the basis for an investment proposal, which later formed the basis for negotiating with suppliers about supply chain changes and was also used to periodically monitor the development of supply chain costs over time.

Rami' rez (1999) examined some implications of adopting a value co-production framework to describe and understand business opportunity, management, and organizational practices. The framework helps to understand emerging, innovative, value creation practices. Xayavong (2009) constructed a model that first delineated the boundary of the industry and then identifying the chain of value adding stages of the industry. The model also describes the linkages by mapping which farm products are used as intermediate inputs to produce different final products for consumption and export. The structure is broadly divided into two components, farm and non-farm. The non-farm component then is divided into several sectors depending on the number of product transformation stages, analytical requirements and availability of data.

2.4 Institutional set up in the value chain

The role of institutions in economic development cannot be ignored. The value chain concept identifies the required institutional support that would enable the chain to function effectively (Webber *et al.*, 2010). Institutions facilitate coordinated exchange

and resource management, facilitate low cost exchange and encourage trust among the players. These institutions include contracts and enforcement mechanisms, commercial norms and rules, habits and beliefs. They also provide incentives for exchange and resource management hence creating profitable opportunities for investment and exchange. Hence institutional arrangements in value chains can no longer be ignored.

The theory of institutional economics is focused on the question of how alternative sets of social rules (institutional structure, property rights) and economic organizations affect behaviour, allocation of resources and equilibrium outcomes (Kirsten, 2009). He identified three types of institutions: formal economic institutions and rules also known as political dimensions; culture, values and conventions that gives sense to economic actions and defines what is good and bad; finally social networks that gives the position of each economic agent in the network hence influencing economic decision and action of each agent.

Research carried out in Morocco by International Center for Agricultural Research in the Dry Areas (ICARDA) (2007), showed that although roads and other infrastructure are important and can help farmers get their produce to markets, infrastructure alone is not enough. What is important, if farmers and communities are to move away from subsistence farming and climb out of poverty, are the right kind of institutions to help them sell their produce in national and international, as well as local markets,

2.4.1. Collective Action and Transaction Costs

There are several definitions of collective action as quoted in literature. Kirsten *et al.*, (2009) defined it as action taken by a group, involving some degree of collective decision making, in pursuit of members' perceived shared interest. Sandler (1992) defined collective action as arising when people collaborate on a joint action and decision to accomplish an outcome that involves their interests or well being. Jeena (2006) pointed out that a collective action under co management of resources on one hand requires active physical participation of users and on the other hand has to incur various types of managerial and organizational costs for bringing users together. These definitions uniformly imply the objective of meeting a commonly shared goal; in this case creating economies of scale in production and marketing, achieving efficiencies in production for instance through access to cheaper inputs which in effect can lower marketing costs hence achieving or retaining access to certain markets.

Hellin *et al.*, (2007), reiterated that collective action can exist in the absence of farmer organisations. Farmer organisations are a more formal expression of collective action. Groups handle more or same services like marketing services, facilitate collective production activities, financial services, technology service, managing common property resources and policy advocacy. Therefore, the theory of collective action as analysed by Ostrom (1994) is a useful tool to analyse how to overcome the free rider problem and how to come up with cooperative solutions for the management of common resources or the provision of public goods.

On the other hand, Arrow (1969), defined transaction costs as the “cost of running an ecosystem” and are distinguished as ex-ante i.e. costs of drafting, negotiating and monitoring agreements and ex post i.e. cost of maladaptation, haggling, setup and running associated with governance and the bonding costs of securing commitment. Likewise, Coase (1960) in his paper “the problem of social cost” expanded on the concept of transaction costs and highlighted these costs to be costs of reaching, modifying and implementing agreements restraining the potential gains from trade. North (1990) observed that transaction costs are the most observable dimensions of institutional framework that underlies the constraints in exchange. They consist of those costs that go through the market and therefore are measurable and those that are hard to measure such as time acquiring information, queuing, bribery and so forth, as well as the losses due to imperfect monitoring and enforcement.

Therefore, one way of linking farmers to markets is to ensure they are in a collective action group to minimize on transaction costs and risks and ensure they capture a certain market share. Delia *et al.*, (2006) observed that collective action is important for smallholders to break in, and gain market access, but is unlikely to sustain without effective leadership and on-going facilitation, thus requiring expenditures on “repairs and maintenance” through continuous technical and leadership training for the collective, and technical back-up and facilitation by an intermediary. Organizing smallholder collective action is essentially a difficult task, requiring the supporting agency to hold a firm grasp of market realities, to invest in the maintenance of social capital, to provide continuous technical back-up, and to ascertain the conditions that make collective action succeed.

Makhura (2001) in his thesis investigated the role of transaction costs in determining market participation of smallholder farmers. The study expects that the identification of these transaction cost factors could assist in the formulation of policy interventions and/or institutional innovations to alleviate constraints on market participation and improve the ability of these small-scale farmers to become part of the commercial agricultural economy. Blandon (2008) also explored the role of transaction costs and collective action in shaping small-scale farmer participation in the fresh fruit and vegetable supply chain to supermarkets in Honduras. The study found out that transaction costs and collective action are significant in determining farmer participation in the Supply Chain. The study suggested that small-scale farmers can be included in new supply chains under certain conditions, especially if incentives to farmers, trust-based relationships between buyers and sellers, risk reduction practices and new forms of collective action are put in place.

Hualiang (2006) carried out an empirical study of vegetable supply chains in Nanjing area showed that transaction costs have a significant influence to the chains efficiency of supply in general. Transaction costs showed different impacts on different marketing chains. He showed that direct sales chain incurs the highest transaction costs resulting in the lowest efficiency level in specific areas. At sub stage level, vegetable production function more efficiently than marketing activities. So the management attention should be paid to knowledge the vegetable producers' market experiences and market information, such as where and how to sell their products, how to reduce costs during marketing among others.

Masuku (2003) observed that contractual relationships are close and well defined between firms with the aim of engaging in long term business relationships. He defined the relationships to an agreement or an option to an agreement under which there is exchange of goods, services or money between parties to the agreement. It governs risk apportionment, division of responsibilities and the reimbursement mechanism. The important part in contractual arrangements is its continuity and hence important in determining behaviour of the partners in the supply chain.

2.4.2 Information flow in the value chain

The basis for imperfect information is that lack of perfect and freely available information can lead to risk and uncertainty in transactions. Information is incomplete when sellers have more information than do the buyers about the availability and characteristics of the supply of products that they are offering for sale. Likewise, information is asymmetrical when buyers have more information than sellers about their demand and their ability and intention to pay for the product that they purchase (Kirsten et al 2009). Akerlof (1970) explains how quality guarantees (labels, certificates), reputation and trust are useful tools to ensure the production of quality goods and project information about them. His analysis also implies that governments need to intervene to increase information flow so as to make all parties well off.

CHAPTER 3

RESEARCH METHODOLOGY

This chapter outlines the methodology focusing on how this research was carried out. It includes the conceptual framework, empirical framework, study area, data collection techniques and analytical techniques.

3.1 Conceptual Framework: Agents in the chain

The agents of interest in this study are the farmers, traders, collective action groups that undertake processing of mangoes. Figure 3.1 shows how the value chain in Embu has been conceptualized including the linkages among the actors as well as product and information flow.

Farmers

They produce the raw material. They produce mainly for their own consumption and they may supply to passing traders not because they have surplus but the need to have income for immediate use. The first step to chain development is to support these farmers to improve their farming skills. This helps them produce higher yields of higher, more consistent quality, and produce which is better suited to the market. This enables them to make more money and improve their livelihoods. Their main function is crop and farm management, input sourcing, production and harvesting.

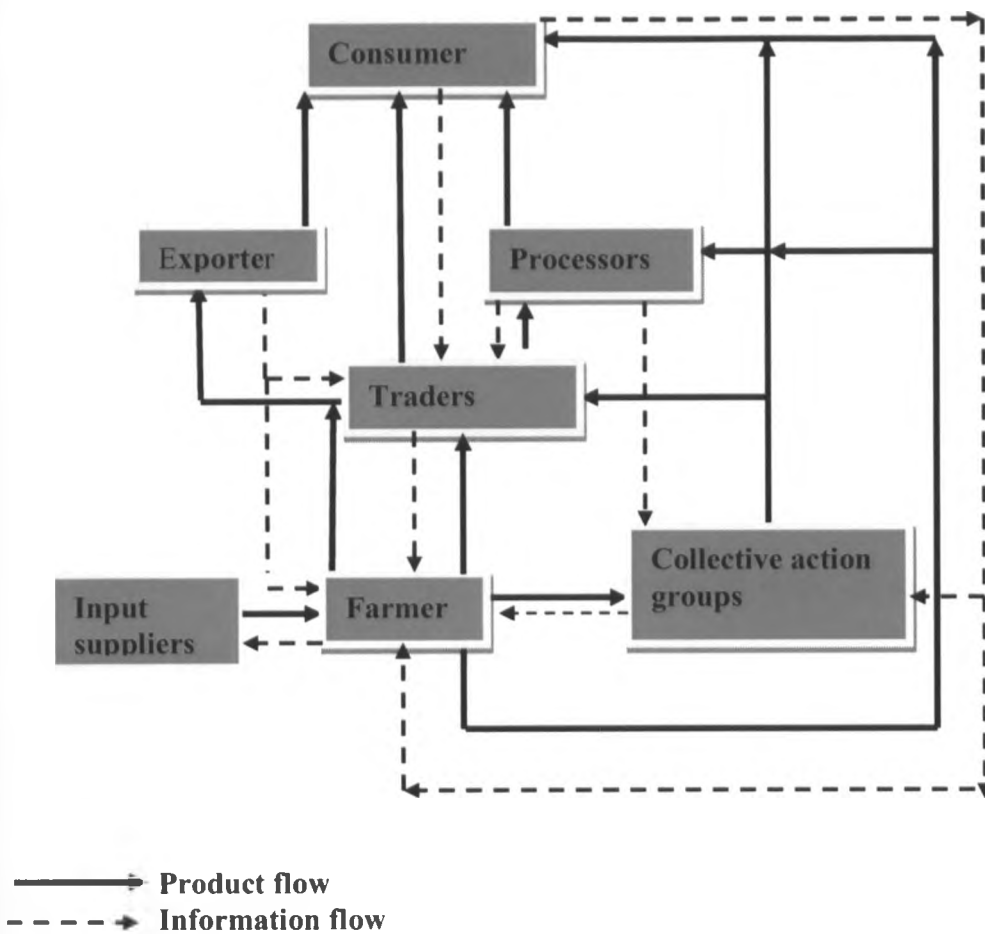


Figure 3.1: Conceptualized simple mango value chain

Collective action groups

Collective action (farmer groups) is important for smallholders to break through, and gain access to market. In this study they undertake processing and as well as do collective marketing of mangoes. This is unlikely to sustain without effective leadership and constant empowerment in all aspects of group dynamics. This requires expenditures on capacity building through continuous technical and leadership training for the collective, and technical back-stopping and facilitation by an intermediary such public and private extension agents. Organizing smallholder

collective action is essentially an enormous task, requiring the supporting agency to be at par with the market realities, to invest in the maintenance of social capital, to provide continuous technical back-stopping, and to ascertain the conditions that make collective action succeed.

Traders

They are wholesalers, retailers or even mobile traders. Though construed to be abusing the weak position of small holder farmers in developing countries, they are critical in supplementing farmers' efforts to get access to markets. With better cooperation, traders may also provide farmers with credit as some of these credit facilities may not always be accessed from local banks or microfinance institutions. They are also a key source of information about prices, quality requirements and potential markets. They provide transportation and logistics, source for produce, identify customers, bundle quantities and distribute them.

Processors

They set up technology, source raw materials, process the raw material into acceptable products by consumers and identify the particular customers. This study narrows down to primary processors who do their activities in collective action groups.

3.2. Empirical model

The study was based on Commodity Chain Analysis (CCA) within the framework of economic studies (Tallec *et al.*, 2005). Financial analysis at market prices was undertaken for the farmer, traders and the farmer group' (collective action groups') doing processing of mangoes. Business accounts for each agent were constructed and the following was calculated:

Value Added (VA)

Value added is a critical concept in commodity chain analysis where calculations are carried out in terms of the value added created by individual agents. A producer has input flow out of which comes a product or an output. Factors of production are divided into two: Intermediate inputs which are totally transformed or consumed during the production period and investment goods which are partially consumed over a number of years before being fully depleted.

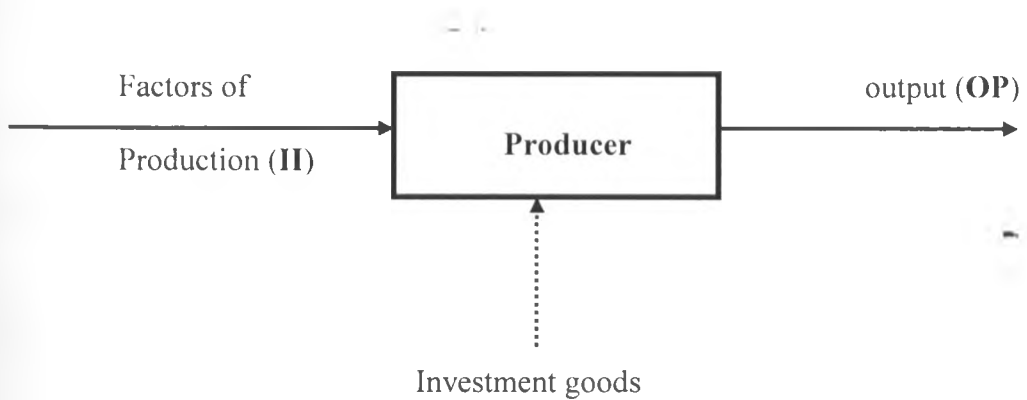


Fig 3.2. Illustration of Value added

Value added is the the difference between the value of the Output (OP) and the value of Intermediate Inputs (II). This represents the value which the agent has added during

the production period to the value of the inputs in the process of production or processing. See figure 3.2.

$$VA = OP - II \text{ (Revenue – Costs of Intermediate Inputs)}$$

Gross profit

Gross profit was calculated for farmers and traders. From figure 3.3, it's assumed that interest charges and taxes are zero for the farmer and trader. But once credit was incorporated in the software as a policy intervention, interest charged was then added.

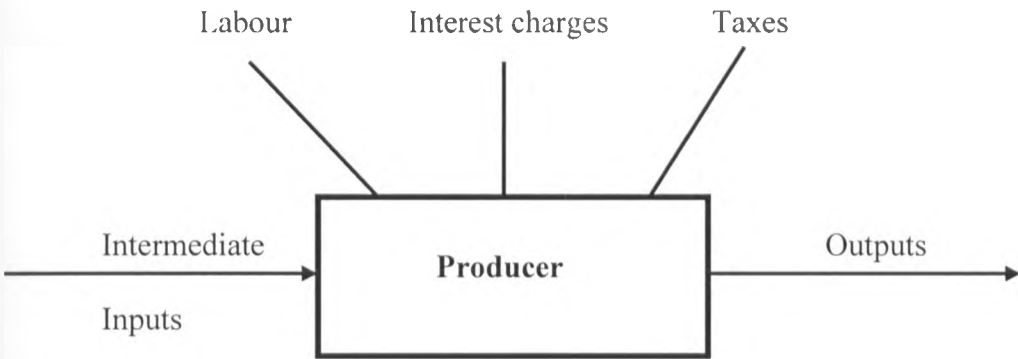


Figure 3.3 Illustration of Gross profit

The difference between value added and expenditure on labor, interest charges and taxes is termed as **gross profit (GP)**.

$$GP = VA - (\text{Wages/salaries} + \text{Interest charges} + \text{Taxes})$$

GP represents the return to cultivation, once the costs of production, intermediate inputs, labor costs, interest charges and taxes have been deducted.

Net profit

Some investment is often realized prior to production but continues to provide services over a period of time, and is to some extent consumed in the production period as in the case with processors especially when processing only takes place during the mango season. See figure 3.4. A theoretical value, depreciation, must be attributed as a cost to production corresponding to the use of that investment. In this case the fruit pulper and driers for the processors were depreciated using the straight line method. These equipment are left idle once the mango season is over hence attracting depreciation value. When depreciation is subtracted from the Gross Profit, the balance is termed the Net Profit (NP):

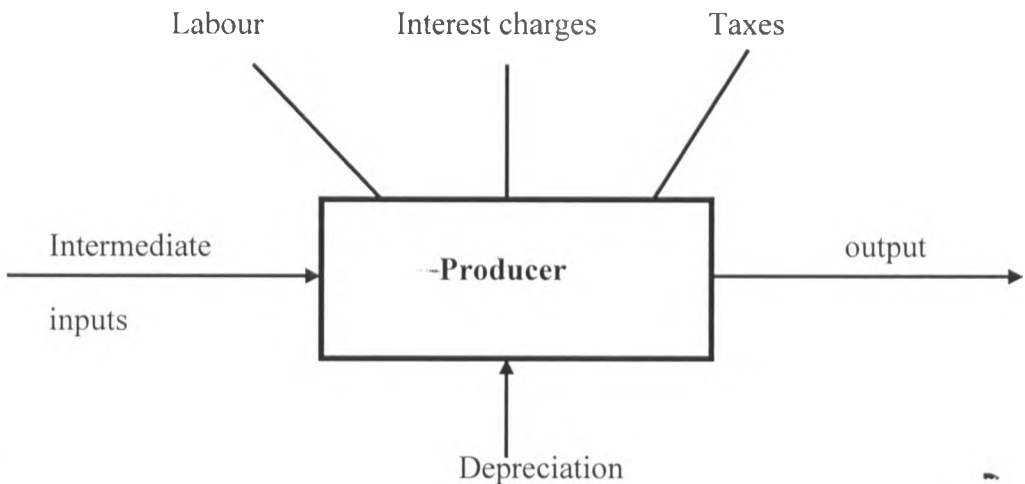


Figure 3.4 Illustration of Net Profit

$$\text{Net Profit} = \text{Gross Profit} - \text{Depreciation}$$

For uniformity, the software charges a value of zero where applicable hence the final outputs are all net profits

To achieve objective 2, a descriptive analysis was undertaken. Questions asked handle issues of transaction costs, information asymmetry and collective action.

3.3 Research design

3.3.1 Study Area

Embu District is one of the 13 districts in Eastern province. It has a diversity of agro ecological zones ranging from high altitude Tea -dairy zone (LH₁) to upper midland, maize- sunflower zone (UM₄). Other includes the LH₀ which is the forest zone which is the same as UH₀ which are basically catchment areas. Five major agro ecological zones covering 81 percent of agricultural land exist in the district (FMHK, 2007). The district covers an area of 819 km² and has a population of more than 278,000 (1999 population census). It has a high population density of 456 people per km. The district is divided into five administrative divisions: Central, Kyeni, Nembure, Runyenjes, and Manyatta .These five divisions are sub-divided into 15 locations and 52 sub-locations with about 45,000 farm families.

The average family size is six and the average farm size is 0.8 ha and 2.4 ha in the upper and middle zones, respectively. The rainfall is bimodal: the October-November short rains provide between 1,200 to 1,850 mm and April to May long rains between 850 to 1,850 mm (Embu, 2009). Mango production is distributed in the whole district.

3.3.2 Sampling Procedure

Sampling method

Different sampling methods were used in this study for different agents. To identify the sampling unit, multistage sampling procedure was used. Mangoes are produced in the whole of Embu district. Three divisions with the largest acreage were initially selected; Kyeni (445 acres), Runyenjes (135 acres) and Nembure (33.5 acre). From each of the three divisions, locations with highest acreages were then sampled. In Kyeni division: Kyeni North (15 acres), Kyeni south (90 acres) and Karurumo (340acres). In Runyenjes division: Kagaari South east (120 acres) and township (15acres). In Nembure division only Kithimu location (28 acres) was sampled. Since each of the enumerator (FEO) was responsible for a location, they had to sample farmers from all the sub locations in their working units ensuring each village had representative farmers.

To sample the farmer respondent, systematic sampling procedure was used to get the respondents. Enumerators would meet at a central place and take different directions and interview every second farm. If the owner is not available the next farm would be sampled and questionnaires administered.

As for the collective action groups, Purposive sampling was used. The ministry of social services provided a list of all the registered groups undertaking agricultural activities in the district. Active groups undertaking processing of agricultural products were then picked. Frontline extension officers had to confirm the existence of the

groups as not all the registered groups were active. Questionnaire was then administered by interviewing group officials and some group members.

Sampling of traders was challenging as most of them do not reside in the district and only operate during the mango season. Purposive sampling was later adopted. Because of repeated dealing with the farmers; some of the farmers had their contacts which assisted in tracing them. Some farmers knew where some local traders resided hence it was easy to trace them and administer the questionnaire. Phone calls were made to locate the ones residing outside the district. Focus group discussion was held with a group of traders from city market and wakulima market. Keitte exporter stationed at Jomo Kenyatta International Airport was also interviewed.

Sample size determination

The sample size was determined by using the formula below (Cochran 1963)

$$n_0 = \frac{Z^2 pq}{e^2}$$

where: n_0 - the sample size

z - Standard normal deviate at the required confidence level

p - Proportion in the target population estimated to have characteristic being measured

q - $1-p$

e - The level of statistical significance set

$z=95\%$

$p=0.85$

$q=0.5$

$e=5\%$

Therefore $n_0 = 195$ respondents. A total of 176 farmer respondent were available for the interviews.

3.3.3 Data collection

Appendix 10 shows the data needs of the study. Apart from the traders and collective action groups, most farmers (88.1 per cent) do not keep records (see appendix 5). For this case the recall method was used to gather the needed data which was used to set up the accounts of each player of the value chain, analyse each player's interest in participating to the activities of the chain, consolidate the financial accounts of various agents and perform financial analysis of the chain as a whole.

Both primary and secondary data was collected during the surveys. Primary data was collected by administering semi structured questionnaires and also conducting focus group discussions to an estimated 176 farmers, 9 traders and 6 primary processors. The survey was to be conducted during the mango season but unfortunately it was done after the season was over hence most of the traders were already out of the area and could not be traced. During the interviews farmers were asked to provide contacts of the traders whom they have had continuous dealing with to facilitate their interviews.

Secondary data was obtained from ministry of Social Services who provided a list of all registered groups undertaking agricultural activities.

3.4 Framework of analysis

Data analysis commenced with the questionnaires being keyed into the SPSS software. Business accounts for each agent: the farmer, traders and primary processors was input in SPSS.

VCA software from FAO was used for financial analysis of the value chain. The software helps build up a step by step quantitative database and handle it to make up different value chain scenarios. The base scenario corresponds to the current practice by the agents. The modification of a base scenario makes it possible to take into account certain external impacts, generated by policy measures or changes in the value chain in this case credit provision and strengthening of extension services.

During the interviews, farmers were unable to estimate the acreage under mangoes in their farms. Outlined below are some assumptions that were made to facilitate the use of the software. One acre is about 4000m² and can accommodate approximately 100 mango trees at a spacing of 7m by 6m, farmer practice. The recommended spacing is 7m by 7m. All the mango trees owned by individual farmer were then converted in to acreage. All other farm activities, farm inputs, labour use and mango production were all converted to per acre.

Step 1. To use the FAO software, one has to calculate the input/output commodities per acre as per the farmer's current practice.

Step 2. To input all the actual inputs used by the farmer per acre of land. Once the data is entered the software automatically calculates the per acre net benefits and value added.

Step 3. Creation of the farm plan: The average acreage per farmer was first calculated. This was input in the software to calculate the average per farmer net benefit and value added.

Step 4. Creation of a plan for all farmers growing mangoes in Embu. A survey conducted by Institution Development and Management Services Inc project in May 2010 established that there are 3469 mango farmers, owning 136,027 mango trees in 1940 acres of land. The final plan incorporates the 3469 farmers to create the final plan for all mangoes farmers in Embu and hence calculate the net benefit and value added by all Embu mango farmers.

The modification of the base scenario included provision of credit so that farmers can apply the recommended inputs at the current prices, the adjustments of the price per piece offered to the farmer and strengthening of extension services. The effects of these adjustments should be reflected on the net benefit and value added by the farmers. The same procedure is followed to calculate net benefit by the traders and processors.

To estimate the number of all traders operating in the district, an estimation using the ratio of mango bought was used. Two groups of traders were identified, the local traders (trader 1) and traders outside (trader 2) the district. The ratio of the highest two buyers was then estimated. This estimation was done during data analysis, after analysing the farmer's accounts. From the plan of all the mangoes farmers, farmers produce an average of 69,389,840 pieces of mangoes as at the season in review. The highest local trader handles 192,000 pieces and the highest outside trader handles 640,000 pieces. This gives a ratio of 1:3. Hence the local trader handle approximately 23.13 million pieces while the outside ones handle approximately 46.26 million pieces. Dividing these figures with the highest amount handled gives an estimate of

120 local trader and 72 outside trader. These figures were then used to estimate the plans for the two categories of traders operating in the area.

Finally an aggregation of all the plans for the farmer, traders and primary processors gave the consolidated account for mango production in Embu district. The outputs from the software were then transferred to excel worksheet for referencing.

The second objective on institutional factors was analysed using descriptive analysis. The factors included contacting, imperfect information and transaction costs: that affect the operations of the value chain actors i.e. the farmers, traders and processors.

CHAPTER 4

RESULTS AND DISCUSSIONS

This chapter presents and discusses the results of the study. Net profit and value added of different agents, effects of recommended policy on the benefits and value added, chain supporters and challenges experienced by the said agents are presented and discussed. Institutional economics: collective action, contracting and information asymmetry are all discussed in this section.

The financial analysis gave insight as to whether every agent is generating any surplus and whether it is enough to ensure sustainability to player's activities such as production, maintenance and replacement of equipment, ability to cover other financial charges and if the whole chain is profitable.

4.1 Net profit and value added by value chain agents in Embu

Value added represents the value which the agent has added during the production period to the value of the inputs in the process of production or processing. The difference between value added and expenditure on labor, interest charges and taxes is termed gross profit. When depreciation is subtracted from the Gross Profit, the balance is termed the Net Profit.

4.1.1 Base scenario (Current farmer practice)

4.1.1.1 Farm level

The study shows that farmers gain less and have the lowest figure for value added compared to traders and the processors (Kshs 30,259.2 and Kshs 63,069.9: net profit and value added respectively per farm) (Appendix 12). The profits per acre amount to Kshs 18,678. This finding is close to what Krain *et al.*, (2008) found in Embu (Net income of Kshs 15,495 per acre). Because of the low producer price offered per piece of mango (Kshs 4), farmers claim that they cannot carry out proper mango husbandry (12,327 fruits per acre). Tu (2008) established that farmers in Tanga, Tanzania, were offered Tshs 5 per piece of orange against wholesalers who were selling at between Tshs 30-50 per orange.

As a result of the poor management, farm productivity is low, leading to low farm production, poor quality fruit and a lot of waste at farm level (13.2 per cent of the total production) as a result of infestation by fruit flies, mango weevils, rusts and heavy fruit drop off due to flower and fruit abortion. Input use is minimal or no fertilizer application, varied use of chemicals at non recommended rates and poor orchard management. Labour costs are too high hence delays in carrying out farm activities. This is in line with the findings by FAO (2003) and Cathelijne *et al.*, (2007) who identified key constraints experienced by farmers as lack of clean planting material, inadequate knowledge on improved production technology, and there is little or no use of fertilizers and pesticides.

The results in Table 4.1 shows that farmers make on average Kshs 1.5 per fruit with the value added of Kshs 3.2 per fruit. Huang (2009) found that farmers' value adding ratio in the pear industry was less than the wholesalers' and retailers'. Farmers indicated that if they can be assisted to reduce farm waste, then the price of Kshs 4 per mango would suffice but if they have to do proper husbandry they would not take anything less than Kshs 10 per piece.

Table 4.1: Net profit and value added by a farmer (Kshs).

	production per acre	Farm production (1.62 acres)	All mango farmers (Million)
Net profit	18,678.5	30,259.2	105.0
Value added	38,932.0	63,069.9	218.8
Net profit per mango	1.5	1.5	
Value added per mango	3.2	3.2	

Farmers who use herbal treatment for spraying their fruits claim to have fewer losses and so were the farmers on trial with ICIPE who use baiting technique for fruit flies. Farmers felt that extension services should be strengthened, especially training on crop husbandry. They reiterated the need for provision of credit facilities by credit service providers to enhance acquisition of farm inputs.

Group cohesion is poor in this area thus most farmers prefer to sell individually to middlemen who provide quick income. Even though 52.3 percent of the farmers were

members of a group (collective action groups) (see appendix 1), 78.4 percent of the same farmers sell their mangoes through brokers who act on behalf of traders. Only 3.4 per cent sell directly to collective action, 0.6 percent sell directly to processors outside the district.

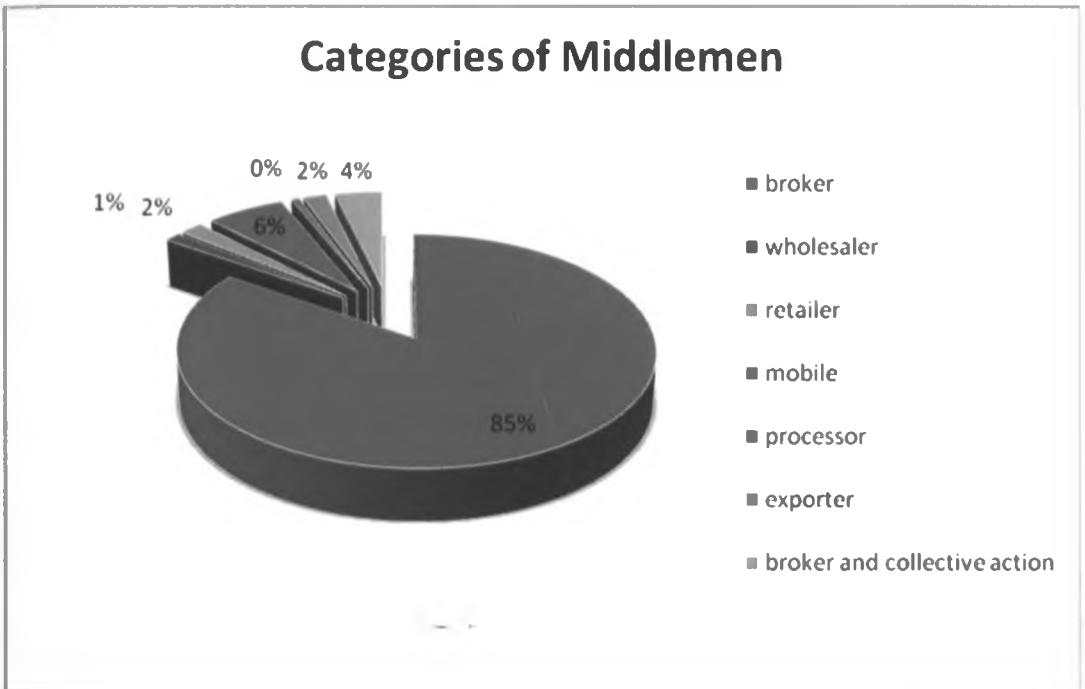


Figure 4.1. Graph showing the percentage point of sale of the mangoes

The results in Figure 4.1 show that more than 85 per cent of the respondents sell their mango fruits to brokers. The brokers act on behalf of the traders who are either locally based or based outside the district. They do not take ownership of the fruits but are paid commission by the traders. The rate of rejection of the fruits by traders is low compared to processors and exporters which is high as the latter insists on fruit quality. The traders rely on the brokers since the brokers are residents and hence are

better placed to identify the farmers whose mangoes are ready for sale. The mobile traders buy mangoes from the farmers and sell to their final consumers.

The percent of exporters and processors is very small as the quality of the mangoes in the area is still low. The few exporters and processors have specific farmers whom they buy from. Retailers are farmers who decide to take small volumes of mangoes to the market and sell on their own while the category of broke and collective actions are farmers who decide to sell part of the mangoes to their groups for processing and partly to brokers as groups rarely pay for the mangoes delivered.

4.1.1.2 Traders

Traders in this study are the main beneficiaries as they buy and sell mangoes in large quantities and hence enjoy high benefits. The major players are the wholesalers. Tu (2008) found similar results of traders enjoying high profits as they dealt with large quantities of oranges. Two categories were identified; local traders and traders from outside Embu. The local ones have a lower capacity in terms of volumes of mangoes handled than the outside ones and mostly use Public Service Vehicles (PSV) to transport their mangoes to the final destination. They handle between 5,000-192,000 pieces of mangoes per season packed in bags or crates of about 200 pieces irrespective of the variety. Buying price ranges between Kshs500 to Kshs 650 per bag and sell at a range of Kshs 1050 to Kshs 1200 per bag

Traders from outside the district have a higher capacity and come from the other major towns which host the major market centres like Karatina, Nairobi and even Mombasa. They use 7 ton lorries to transport the mangoes to main trading centres. They handle between 235,000 to 640,000 pieces. In one trip they transport on average 18000 pieces. Buying price ranges between Kshs 4 to Kshs 5 depending on the quality and selling price can go up to Kshs 10 per piece.

Table 4.2. Net profit and value added by Traders (Kshs).

	Trader 1(Large scale)	All Trader 1	Trader 2 (small scale)	All trader 2
Net profit	2,133,938	153,643,075.6	398,699.7	47,843,962.0
Value added	2,505,308	180,382,100	430,337.5	51,640,500
Net profit per mango	4.7		6.5	
Value added per mango	5.6		7.0	

The results in Table 4.2 show that the variation between the two traders in terms of net profit and value added per fruit is small. The local traders gain Kshs 6.5 and Kshs 7.0 while the traders from outside make Kshs 4.7 and Kshs 5.6 respectively for net profit and value added per fruit.

Traders have a monopoly of information on market performance and hence dictate the producer prices. 80.1 per cent (Appendix 3) of the farmers rely on the middlemen for provision of market information on pricing and even quality while 79 per cent

actually wait for the buyers to visit them and provide the necessary market information.

Poor post harvest handling of the fruits affects the quality of mangoes offered by farmers among the other factors cited by middlemen this contributes to the lowering of the price offered to the farmer. Fruits are infested by mango weevils, fruit flies and rust. The aspect of farmers doing own grafting (84.7 per cent) (Appendix 6) also affects the final fruit quality as they do not take into consideration the quality of the scion and the root stock. The major challenge for the traders was the high cost of transport and packaging. Tu (2009) found similar constraint among the traders in Tanga. Marketing of the fruits is not a problem. A number of the traders indicated that they focus on mangoes during the peak time and divert to other products like watermelon, paw paw and even oranges during the low mango season as a coping livelihood mechanism.

Some traders felt the need of establishment of traders' associations which will help them to agree on quality standards for their produce, negotiate with municipal authorities on the improvement of basic market facilities, and to mediate in conflicts between traders themselves and with farmers.

4.1.1.3 Collective action groups doing processing

Primary processors have low processing capacity per unit. They are unable to estimate the capacities of their equipments hence under utilization of the machinery

and equipments. General skills and knowledge on mass production is still lacking; food safety and quality control need to be given a priority to these groups. Production costs are too high compared to what is being produced; 75.5 per cent for mango juice and 65.3 per cent for dried mangoes of the total revenue for mango juice.

The results in Table 4.3 shows that primary processors actually make more money per fruit in terms of net benefit and value added per fruit compared to the other agents. Juice processors, make Kshs 5.5 and Kshs 7.6 as net profit and value added respectively (Appendix 18).

Table 4.3. Net profit and value added by mango juice processor (Kshs)

	Per Litre	Per processor	All processors
Net profit	22.7	340,800.00	3,408,000.00
Value added	30.4	455,850.00	4,558,500.00
Net profit per mango	5.7		
Value added per mango	7.6		

Net profit and value added stand at Kshs 22.7 and Kshs 30.4 per litre of juice respectively. Net profit and value added per mango is Kshs 5.7 and Kshs 7.6 respectively.

Table 4.4 indicates that dried mango processors have a net profit and value added of Kshs 311.2 and Kshs 626.2 per kg of dried mangoes (Appendix 21). Further analyses

indicate that dried mangoes processors make Kshs 12 and Kshs 24 as net profit and value added per fruit respectively.

Table 4.4. Net profit and value added by dried mango processors (Kshs)

	Per kg	Per processor	All dried mangoes processors
Net profit	311	31,120.0	155,600
Value added	626.2	62,620.0	313,100.0
Net profit per mango	12		
Value added per mango	24		

Ehlers *et al.*, (2008) reiterates that an organisation has to match what it can do with what it might do in order to develop its vision and mission statement to enable them meet their strategic objectives. This aspect is missing in most of the groups interviewed. An internal and external analysis is never done and is a prerequisite to help understand and establish group’s competitive advantage. This can be achieved through SWOT analysis (Strength, Weaknesses, Opportunities and Threats). While internal analysis highlights group’s resources, capabilities and core competencies, external analysis is composed of dimensions in the society that influence groups operations such as consumer demand, nature of positioning and market segmentation, choice of business, competitors actions, suppliers and distributors and more so government regulations and laws. Groups need this understanding of their current situation before embarking into any meaningful venture.

As a result of this poor performance, some of the groups disintegrate after few years of operations as benefits to group members do not warrant participation in these groups. Labour is normally provided by group members and never paid for and so are the raw materials which are provided by the group members. Mango processing is labour intensive hence need for a technology to reduce on manual work especially on peeling and slicing of mangoes before drying.

The choice of the variety for dried mangoes should be done carefully. For instance a processor requires 24 pieces of Tommy variety, 40 pieces of Vandyke variety and 16 pieces of Kent variety to produce one kg of dried mangoes. With local varieties one requires one bag which could be well beyond 300 pieces to produce one kg dried mangoes. One of the collective action groups interviewed, Mbuvari self help group were using local mangoes as raw material. The group collapsed as they could not sustain the activity. The drier were later auctioned as they had a loan which they could not repay as the drying of mangoes was not sustainable.

Lack of markets for the juices produced is major challenge. Out of the 3000 litres of concentrate produced by Karurumo horticulture Self help group, 2000 litres fermented as a result of poor handling. The remaining 1000 litres concentrate was diluted but has not cleared from the processing unit. The uptake of such juice by the market is still low. KEBS demand for diamond mark of quality also reduces the uptake of the juice by the market. The certification process is tedious, costly and time consuming.

There are no losers in this value chain. All the agents' accounts indicate that each is making profit though not enough to take care of their entire financial obligation. The results in table 4.5 shows that the profits accruing from all the agents are Kshs 295.94 million while value added is Kshs 441.61 million (Appendix 24). These figures justify the high number of farmers growing mangoes in Embu and the high number of traders who operate in the region during the season.

Table 4.5. A consolidated account for net profit and value added by farmers, traders and primary processors of mango fruit in Embu (Kshs)

	Mango enterprise
Net profit	310,019,747.6
Value added	455,683,600.0

The results presented in table 4.6 suggest that all the actors' benefit from the chain. The processors had a higher contribution in terms of value added as they gain more per piece but have the lowest net-profit margins as efficiency in processing is still low. Huang (2009) found that value adding percent among the farmers, local wholesalers and processors was 5, 7.5 and 87.5 per cent respectively. The farmers need to improve on their husbandry as all other agents depend on them as they are the source of the raw material.

Table 4.6. A comparisons of Net profit and Value added per piece by the farmer, traders and processors (Kshs)

	Farmer	Trader 1	Trader 2	Juice processor	Dried mango processor
Net profit	1.5	4.7	6.5	5.5	12
Value added	3.2	5.6	7.0	7.6	24

Value added share

The value added share for each actor was calculated within the mango chain by dividing the value added per piece by the total added values per piece for the agents.

The results in Figure 4.2 show that the dried mango processors have the highest share of value added among the other chain actors while the farmers have the lowest. The local traders are at 15 per cent compared to their counterparts who are 12 percent as they have less costs.

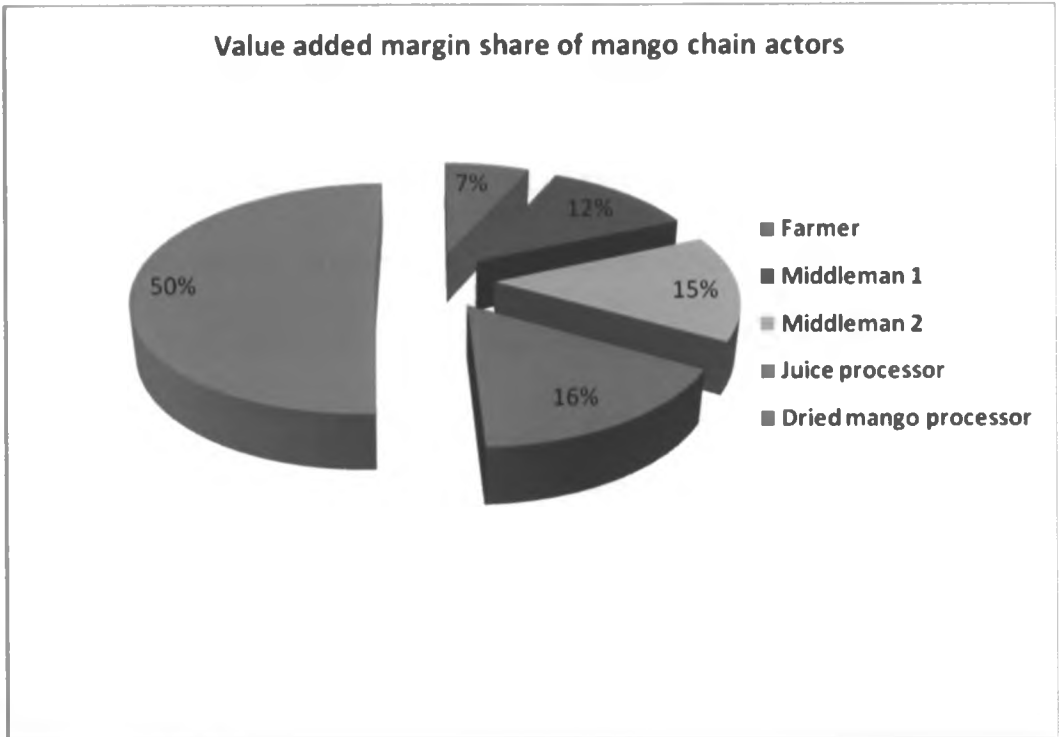


Figure 4. 2. Value added share of the chain actors by percentage.

4.1.2. Policy change

This was incorporated in the scenario changes in the software. Two aspects were considered: provision of extension services and credit provision to the farmers. With this software, the policy recommendations have to be valued and input in the software to observe the final net benefit and value added.

It is expected that with the provision of the extension services, farm waste can be reduced to less than 5 percent from the current 13.5 percent. Farmers will have more mango pieces to sell but at the current producer price of Kshs 4 and their current husbandry practice. With provision of credit, then the correct input use should be applied. Fruit quality will improve and the producer price will also go up, though the

law of supply and demand may still dictate the price. Collective action groups will also invest in current technology and improve on their production efficiency.

4.1.2.1 Scenario change 1. Strengthening of extension services

All the farmers will be required to form collective action groups for training. There are currently 3469 farmers which give approximately 140 groups of 25 members. One staff is needed to train the group for a whole year at cost of Kshs 120,000 per year. That policy will cost Kshs 16.8 million on extension services.

By providing better extension services, it results in reduction of waste to 5 percent from the current 13.5 percent. This intervention as seen in table 4.6 results in a 59.2 percent change in farmer net profit (Kshs 18,678.5 to Kshs 29,735.8). The total number of fruits sold per acre increases to 15,112 from 12,327. The net profit and value added also increased to 2.4 and 4.0 respectively (see appendix 11, 12, 13). There is also a 14.6 percent and 9.9 percent changes in net profit and value added respectively at the consolidated account level.

Table 4.7. Changes in net benefit and value added at farm level (Kshs)

		Base scenario	Scenario 1: provision of extension service and reduction of waste	Percent change
Per acre	Net profit	18,678.5	29,735.8	59.2
	Value added	38,932.0	49,989.3	28.4
	Net profit per fruit	1.5	2.4	60.0
	Value added per fruit	3.2	4.0	25.0
Per farm	Net profit	30,259.2	48,172.0	59.2
	Value added	63,069.9	80,069.9	28.4
	Net profit per fruit	1.5	2.4	
	Value added per fruit	3.2	4.0	
All farmers	Net profit (Million)	105	167.1	
	Value added (Million)	218.8	280.9	
	Net profit per fruit	1.5	2.4	
	Value added per fruit	3.2	4.0	
Consolidated account	Net profit (Million)	310	355.3	14.6
	Value added (Million)	455.7	501	9.9

4.1.2.2. Scenario change 2. Provision of credit

Calculations of costs of credit incorporated the current interest rates (10 percent per annum) used by many financial service providers. To carry out mango husbandry effectively for a year, a farmer requires on average Kshs 30,000. With interest rate of 10 percent then each farmer will have to repay Kshs 33000. This policy will cost on average Kshs 114,477,000. The table below shows the impacts of this intervention on

farmers net benefit, value added and net profit and on the consolidated account generally.

Table 4.8. Net profit and value added at farm level with provision of credit to farmers (Kshs)

		Base scenario	Scenario provision credit	2: Percent change of
Per acre	Net profit	18,678.5	121,325.4	549.5
	Value added	38,932.0	141,578.9	263.7
	Net profit per fruit	1.5	5.4	326.0
	Value added per fruit	3.2	6.4	100.0
Per farm	Net profit	30,259.2	196,547.2	
	Value added	63,069.0	229,357.9	
	Net profit per fruit	1.5	5.4	
	Value added per fruit	3.2	6.4	
All farmers	Net profit (m)	105.0	681.8	
	Value added (m)	218.8	795.6	
	Net profit per fruit	1.5	5.4	
	Value added per fruit	3.2	6.4	
Consolidated account	Net profit (m)	310.0	753.2	143
	Value added(m)	455.7	898.9	97.3

Note: m =millions

By injecting the aspect of credit in to the policy, farmers will be able to purchase the required inputs and carry out proper husbandry. In effect the quality of the fruit would improve (22,140 fruits per acre), fetching up to Kshs 8 per fruit from Kshs 4. There is tremendous improvement in net profit and value added as a whole. The consolidated account also improves considerably with net profit and value added increasing by 143 percent and 97.3 percent respectively.

4.2 Chain service providers in Embu

Value Chain supporters are stakeholders that provide services to the value chain actors such as improving capacities of producers and traders, ensuring access to information, knowledge and skills and linking small producers with markets.

Ministry of agriculture: Provide extension services to farmers. They also help farmers form extension groups which later become entry points to some NGOs.

SACDEP Kenya: Provide extension services especially to collective action groups. They basically handle group dynamics and value addition aspects of various fruits vegetables and even provide the required equipment for value addition to some groups. They also link the collective action groups to markets.

International Centre for Insect Physiology and Ecology: Carry out research with some specific farmers on control of mango fruit flies. These farmers have very little waste in terms of fruit fall and rotting of mangoes.

Smallholder Horticulture Marketing Programme (SHOMAP): It is a project under the Ministry of Agriculture. The projects component C is about Investment in support of domestic value chains. It provides credit facilities and even value addition equipment to some selected groups in the district.

Local and municipal authorities: They manage the markets and are supposed to ensure the markets are habitable. They charge a fee to all produce that land in these

markets. Currently they need to improve on the market environment especially during the rainy seasons.

Credit provision: Organizations such as commercial banks; equity bank through Kilimo Biashara package and AFC provide loans at 10 per cent interest rates per annum. Others include SACCOs; Rukuriri and Mbeo, MFIs; KWFT, BEEP and BIMAS, agro dealers who provide credit in terms of inputs, collective action groups that do undertake ROSCAs (merry- go-rounds) and ASCAs (table banking), neighbours and even relatives. Despite all these credit providers only 26.7 percent applied for loans to undertake agricultural activities while only 4 percent invest in mango enterprise.

4.3 Institutional set up and value chain

The study found out that institutional set up in this value chain is still weak as elaborated below.

4.3.1 Collective action groups and transaction costs

Out of the 176 farmer respondents, 52.3 percent participate in collective action group activities while 43.2 percent do not participate (Appendix 1). Hellin et al (2007) observed that collective action does exist in the absence of farmer organisations. The groups are basically women groups, men groups, a mixture of men and women commonly referred to as self help groups. Services offered by these groups to farmers include capacity building, largely trainings and field tours. Others include input

acquisition, financial service, marketing and processing the same as what farmer organisations do provide.

None participation in collective action groups was mainly due to wrangles in group's leadership, and members and time consuming with little or benefit. Once some groups have established and are now performing, office bearers tend to change group objectives without consulting the members. This leads to most members dropping out. Few of the groups have many weekly to monthly contributions which inhibit some members from joining these groups.

Stockbridge *et al.* (2003) showed that it is often a challenge to establish rules on which members can adhere to enable groups achieve their objectives. Securing commitments on the part of the group members to abide by collectively-agreed rules and to monitor and enforce compliance with the rules becomes a major challenge to these groups as well hence a fall out by many members. In some cases, transaction costs are too high in running these collective action groups, the more reason why many farmers are better off not organizing themselves into groups. Furthermore, successful association requires management and entrepreneurial skills, which is lacking in many groups as the officials could be having little education, are less likely to have (Pingali *et al.* 2005). In this case only 33.5 per cent of the respondents have gone beyond secondary school (Appendix 2).

Discussions with group officials showed that bringing together people with diverse ideas on how things should be done is quite challenging' Stringfellow *et al.* (1997)

identify three key factors that could determine the success or failure of these groups:

i) There could be a gap between the existing skills/experience of members and what is actually required to undertake these group activities; ii) internal cohesion and a membership driven agenda; was the formation of the groups demand driven or supply driven and iii) successful, commercially oriented group activities which can be integrated into the wider economy. The dilemma for development agents is that the conditions for successful group participation such as minimum levels of education, skill, financial capacity tend to work against successful cooperation by the poor, especially the poorest of the poor (Hulme and Shepherd 2003) hence the non performance of these groups.

Other issues cited by the group officials was lack of commitment by group members as most of them claim not to have constant income to meet group obligation. Coupled with lack of appropriate equipment to enjoy economies of scale, tedious certification procedures by Kenya Bureau of Standards (KEBS) of their products and the cost of certification as well as non availability of ready markets for their products makes the running of these groups a big challenge. Many group members acknowledged that the activities undertaken are labour intensive and since they are group members, returns to their labour are never considered. Most of these groups get little or no profit and even raw materials from their farms are rarely paid for thus most of them prefer selling their mangoes to middlemen though at a lower price, but they are assured of an income.

Surprisingly, all the groups interviewed do not have business plans. General records were kept but the aspect of cash flow analysis which is crucial for any group's operation is lacking. This depicts what Stringfellow *et al.* (1997) found; a gap between the existing skills/experience of members and what is actually required to undertake these group activities. Baker *et al.*, (2000) highlights these skills as finance, marketing, operations, forms of business ownership, organisational management and human resource. Others include food safety risks, environmental risks, agricultural policy and international trade and issues associated with emerging technologies. Operation capacity of the machinery and equip is not known to these processors and how else the machinery can be utilized after the mango season is over is not well understood. Currently there is no processing going on as the mango season is over. The equipment and machinery are now idle; under utilization of available resources.

4.3.2. Contracting and transaction costs

There are no formal contracts in this value chain. Producers and buyers rely on trust due to repeated dealing with each other. Middlemen interviewed reiterated that contracts whether formal or informal are never kept. Williamson (1981) pointed out that all transaction costs are derived from a combination of bounded rationality which reflects both imperfect information and a limited capacity to analyze it and the opportunism tendencies; that is individuals 'self-interest seeking with guile.' Since there is imperfect information about the future, all contracts are incomplete. However, if people ceased to be opportunistic in nature, incomplete contracts would not lead to contract enforcement problems. Contracts would simply state that if unforeseen

circumstances arose during implementation of the contracts, the concerned parties would act in a manner acceptable to all. Agents would readily accept, then, to enter into contracts with one another.

The process of establishing contracts can itself lead to high transaction costs, costs which none of the agents is ready to incur. Williams (1975) described these costs as costs of discovering relevant market prices and the costs of negotiating and completing contracts. The enforcements of contracts in some enterprises are very costly. Collection of market information, negotiation, monitoring, and enforcement of contracts are costly and lead to high transaction costs which no player in the value chain is ready to incur.

All the agents being analysed rely on the law of supply and demand to determine the prices, hence do not see the need for contracts. When the spot market prices are higher than the contract prices, most small-scale producers will definitely sell their goods produced under contract on the open market. When the contract prices are higher than on the open market, farmers try to supply more products to the contracting processor, having obtained produce from other farmers who are not included in the contract. The argument from transaction cost approach is that the organizational form or "governance structure" that minimizes the sum of production and transaction costs for a given activity will have a competitive advantage and hence tend to dominate that activity.

4.3.3. Information flow in the value chain

The basis for imperfect information is that lack of perfect and freely available information can lead to risk and uncertainty in farming. 80.1 per cent of the respondents (Appendix 3) rely on middlemen to provide information on prices and quality of the mangoes. 79 percent of the farmer (Appendix 4) await for the middlemen to inform them of the prices while 4.5 per cent consult the other farmers. In this case information is incomplete and asymmetrical since the middlemen have more information than the farmers about the nature of their demand and their ability and intentions to pay for the mangoes. Searching for and obtaining information about middlemen or buyers, pricing, quality and consumer demand is, therefore, necessary for buyers and sellers, respectively, to reduce the risks of transaction failure. However, searching and obtaining information is an important source of transaction costs which none of the agents is willing to incur thus increasing the risks and uncertainty in farming.

4.4 Analysis of constraints within the Current Mango Value Chain

Actor	Constraint	Cause	Effect	P
Farmer	Over production	-Competition among producers -Production without plan	-Low producer price -low income -Poor post harvest handling -A lot of farm waste	-M -T -F -F in -C
	Poor quality fruit	-infestation of fruits by pests and diseases -lack of information on proper control pesticides -high cost of agro chemicals	-low producer price -low income -lack of market for the fruit -A lot of farm waste	-c m -p
Traders	-High cost of transport	-rising cost of fuel	-Increased operations costs -Forced to give low price to the farmers	-F th tr
	-high packaging costs	-repackaging of mangoes as demanded by consumer		-F p m se
	-poor quality fruit	-farmers doing own grafting not considering the quality of grafting material	-Offer low producer price	-C w -C to

Actor	Constraint	Cause	Effect	P
		<ul style="list-style-type: none"> -poor husbandry management by the farmers -poor storage and market environment 		<ul style="list-style-type: none"> in h -I in er
<p style="text-align: center;">Collective action (groups) doing processing</p>	<p>Governance challenges</p>	<ul style="list-style-type: none"> -Lack of trust among members -Shifting of groups' objectives 	<ul style="list-style-type: none"> -Wrangles among leaders and group members -Low commitment to group activities 	<ul style="list-style-type: none"> -T d
	<p>Low processing capacity</p>	<ul style="list-style-type: none"> -lack of appropriate technology -lack of appropriate skills 	<ul style="list-style-type: none"> -low processing efficiency -poor quality of processed products -Increased costs of production -lack of ready markets for processed products 	<ul style="list-style-type: none"> -E fo ap te -C o h -C th ac
	<p>Certification process by KEBS</p>	<ul style="list-style-type: none"> -lack of proper processing units -poor quality products -certification takes too long 	<ul style="list-style-type: none"> -lack of markets 	<ul style="list-style-type: none"> -c re p -i q p

CHAPTER 5

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

This chapter gives a summary of the main findings, implications and recommendations. It discusses the extent to which the main objective of the study of collecting, collating and analyzing data for the value chain analysis in Embu was attained.

5.2 Summary of the findings

The study found out that the mango value chain in Embu involved the farmer, traders who work hand in hand with the brokers and farmer groups (collective action groups) doing processing of mangoes. In the aforementioned chain actors it was noted that the traders had the largest share of the chain's net margin. The study also revealed that the traders were very influential in the governance of this value chain especially price determination. The traders are fewer than the farmers who are dependent on their services to change their mangoes into money and get the required market information. Transportation and packaging costs are most significant to the middlemen and accounts for largest part of their cost. However this business is quite profitable considering the number of middlemen operating in the area during the peak mango season.

Farmers are the producers of the mangoes but due to the challenges they experience their net margin and value added is the smallest among all other actors. There is great potential to improve on the productivity and the quality of the fruit.

Groups doing processing on the other hand have low processing capacity and have the lowest net margin even though their value added share is high compared to all other actors. Appropriate technology, certification and lack of ready market for their products are a major drawback to these processors. Group governance (leadership) is a nightmare to group members and quite often it is a challenge to establish rules on which members can adhere to enable groups achieve their objectives.

Some farmers attribute their non participation in collective action as time consuming with little or no benefit. In some cases, transaction costs are too high in running these collective action groups and hence the more reason why many farmers are better off not organizing themselves into groups. Furthermore, successful association requires management and entrepreneurial skills, which is lacking in many groups as the officials could be having little education or are less likely to have.

There are no formal contracts in this value chain. Producers and buyers rely on trust due to repeated dealing with each other. The enforcements of contracts in some enterprises are very costly. Collection of market information, negotiation, monitoring, and enforcement of contracts are costly and lead to high transaction costs which no player in the value chain is ready to incur.

Information in this value chain is incomplete and asymmetrical. Majority of the respondents rely on middlemen to provide information on prices and quality of the mangoes. Searching for and obtaining information about middlemen or buyers, pricing, quality and consumer demand is, therefore, necessary for buyers and sellers, respectively, to reduce the risks of transaction failure. However, searching and obtaining information is an important source of transaction costs which none of the agents is willing to incur thus increasing the risks and uncertainty in farming.

5.3 Conclusions

Within the limitations of this study, the following conclusions are made:

The level of chain integration for the mango value chain in Embu is low. However, all actors in this value chain benefit from it and have a role to play in ensuring that the chain integration is achieved.

Farmers have to ensure that the right quality of the fruit is achieved. The study reveals that improving and strengthening the activities of Primary processors who do their activities under collective action groups will help the processors meet the required standards of their products: juices and dried mangoes thus have a competitive advantage over other products from other agriculture enterprises. Certification system needs to be simplified. Agribusiness management skills and group dynamics need to be imparted on the collective action groups before they can be allowed to practice. This calls for the enhancement of extension services and research, especially on

disease and pest control and the quality of grafting material. Middlemen are available to mop out all the available mangoes as long as quality of the fruit is achieved. Possibility of having all the middlemen registered by council in their areas of operations for ease of monitoring their activities should be looked into.

There is great potential for other chain actors like large scale processors and exporters to participate in the value chain once the quality of the fruit is achieved.

5.4 Recommendations

There is need for the farmers to provide acceptable quality fruits to the other players in the chain and hence better management of the mango orchard. Diseases and pests have to be managed at the farmer level and improvements in post harvest management of the fruits have to be put in place. This calls for extension agents to work closely with the farmers to ensure proper mango husbandry is adhered to. Extension agents must also avoid supply driven extension and let the farmers and collective action groups demand what they are competent in and they can actually achieve it.

Traders play a crucial role at present when it comes to marketing of the mango fruit and most farmers cannot do without them. However, if farmers organized themselves into farmer and went into group marketing, they would receive part of the net benefits which are now being made by the middlemen as they would have collective bargaining power.

Since traders have the monopoly of information on availability of markets, the required fruit quality by the consumers and the prices being offered by different markets, they have to ensure that farmers also get that information at the right time. As expressed by the traders, municipal and local councils need to improve on the market infrastructure (roads, physical markets, stalls) especially during the rainy season to reduce on the rate of deterioration of the quality of the fruits. However, it would be advisable for traders to invest in storage facilities which might improve the shelf life of the fruits. Processors and exporters should also support farmers either in kind or cash to improve on fruit quality. Contracts can be executed so that farmers provide high quality fruit while processors and exporters provide ready markets.

Primary processors have to improve on their processing skills and capacity. Trainings to improve on the existing skills need to be conducted especially on proper processing of the mango products and the adoption of quality standards for their products. KEBS should review their certification process. The cost is prohibitive to most primary processors and the time span to acquire the diamond mark of quality of these products is too long.

As expressed by all the agents in the value chain, stakeholders in the mango sector should ensure provision of credit by mainstream financiers. This will enable the farmers to carry out proper mango husbandry; middlemen to improve on packaging; primary processors to acquire appropriate technology to improve on their processing capacity and efficiency.

To avoid monopoly of information by traders, government through the relevant ministries and other stakeholders need to set up systems of information acquisition and flow to ensure transparency in the chain. Farmers and primary processors should be shown the need to practice some kind of market oriented production planning. Contract farming is, therefore, seen as a possible solution for this market failure and may eventually lead to reduced transaction costs.

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APPENDICES

Appendix 1. Percent Group participation of the farmers

	Frequency	Percent
Yes	92	52.3
No	76	43.2
No response	8	4.5
Total	176	100.0

Appendix 2. Education level of the farmers

	Frequency	Percent
No education(NE)	16	9.1
Primary school not finished(PNF)	37	21.0
Primary school finished(PF)	50	28.4
Secondary school not finished(SNF)	14	8.0
Secondary school finished(SF)	52	29.5
University(U)	3	1.7
college	4	2.3
Total	176	100.0

Appendix 3. Ways in which farmers get information about prices of mangoes

	Frequency	Percent
Exporter	4	2.3
Calculation from cost of production	6	3.4
Middlemen	141	80.1
Collective action group	2	1.1
Other farmers	11	6.3
No response	11	6.3
Total	176	100.0

Appendix 4. Means by which farmers receiving market information

	Frequency	Percent
Phone	13	7.4
Buyer visits me regularly	139	79.0
I visit the buyer regularly	3	1.7
Visit other farmers	8	4.5
Do not get information	1	.6
No response	12	6.8
Total	176	100.0

Appendix 5. Indication of farmer keeping farm records

	Frequency	Percent
Yes	20	11.4
No	155	88.1
Total	175	100.0

Appendix 6. Sources of seedlings for the farmers

	Frequency	Percent	Valid Percent
KARI	1	.6	.6
Private nurseries	24	13.6	13.6
Own grafting	149	84.7	84.7
Total	176	100.0	100.0

Appendix 7. Middlemen in contact with the farmers

	Frequency	Percent
Broker	138	78.4
Wholesaler	2	1.1
Retailer	3	1.7
Mobile	10	5.7
Processor	1	.6
Exporter	3	1.7
Broker and collective action	6	3.4
None	13	7.4
Total	176	100.0

Appendix 8. Credit acquisition by farmers

	Frequency	Percent
Yes	47	26.7
No	118	67.0
No response	11	6.3
Total	176	100.0

Appendix 9. Purpose for which credit is applied for.

	Frequency	Percent
No loans	129	73.3
Maize farming	11	6.3
Coffee production	1	.6
Mango processing	1	.6
Mango farming	7	4.0
Horticulture farming	4	2.3
School fees	11	6.3
Business	4	2.3
dairy	2	1.1
General development	5	2.8
Land case	1	.6
Total	176	100.0

Appendix 10. Data needs of the study

Data source	Type
Farmers	Household characteristics (gender, education level) Farm characteristics: total number of acres of land under mango production. Number of mango trees Total mango production Investment costs (production costs) Contractual arrangements (quantity, price, quality) Participation in collective action group Extension service provision Credit acquisition Challenges faced
Middle men	Personal characteristic (gender, education level, years of operations) Buying price of the mangoes Selling price of the mangoes Transaction costs Contractual arrangements Challenges faced
Processors	Company characteristics (time of operations, products for trade, number of employee, amount of mango processed) Marketing channel (buy from and sell to whom) Contract arrangements Production costs Selling costs Transaction cost Challenges faced

The following appendices are outputs from the VCA software.

Appendix 11. Per acre calculations (with policy changes incorporated)

		Current practice	Strengthening of extension services	Provision of credit
INPUT	COSTS			
icide		2,750.00	2,750.00	5,000.00
icide		2,300.00	2,300.00	4,763.00
icide		2,485.00	2,485.00	2,485.00
ations and maintenance		16,205.20	16,205.20	16,205.20
icide application		2,064.70	2,064.70	2,064.70
ding		1,297.90	1,297.90	1,297.90
ing		685.7	685.7	685.70
olishment cost		2,922.70	2,922.70	2,922.70
est		0.00	0.00	1,851.90
a principle		0.00	0.00	18,518.50
	TOTAL	30,711.20	30,711.20	55,794.60
OUTPUT	REVENUES			
go-farmer		49,389.70	60,447.00	77,120.00
	TOTAL	49,389.70	60,447.00	177,120.00
NET	PROFIT	18,678.50	29,735.80	121,325.40
alue	Added	38,932.00	49,989.30	141,578.90

Appendix 12. Per average farm size calculations

		Current practice	Strengthening of extension services	Provision of credit
	COSTS			
UT		4,455.00	4,455.00	8,100.00
de		3,726.00	3,726.00	7,716.10
ide		4,025.70	4,025.70	4,025.70
ions and maintenance		26,252.40	26,252.40	26,252.40
de application		3,344.80	3,344.80	3,344.80
ng		2,102.60	2,102.60	2,102.60
g		1,110.80	1,110.80	1,110.80
ishment cost		4,734.80	4,734.80	4,734.80
t		0.00	0.00	3,000.00
rinciple		0.00	0.00	30,000.00
	TOTAL	49,752.20	49,752.20	90,387.20
	REVENUES			
PUT		80,011.30	97,924.10	286,934.40
-farmer				
	TOTAL	80,011.30	97,924.10	286,934.40
	PROFIT	30,259.20	48,172.00	196,547.20
	Added	63,069.90	80,982.70	229,357.90

Appendix 13. All Farmers calculations (Million Kshs)

		Current practice	Strengthening of extension services	Provision of credit
INPUT	COSTS			
Pesticide		15,454,400.00	15,454,400.00	28,098,900.00
Fungicide		12,925,490.00	12,925,490.00	26,767,010.00
Herbicide		13,965,150.00	13,965,150.00	13,965,150.00
Operations and maintenance		91,069,590.00	91,069,590.00	91,069,590.00
Pesticide application		11,603,220.00	11,603,220.00	11,603,220.00
Weeding		7,293,918.00	7,293,918.00	7,293,918.00
Pruning		3,853,483.00	3,853,483.00	3,853,483.00
Establishment cost		16,424,990.00	16,424,990.00	16,424,990.00
Interest		0.00	0.00	10,406,990.00
Loan principle		0.00	0.00	104,070,000.00
	TOTAL	172,590,243.80	172,590,243.80	313,553,263.80
OUTPUT	REVENUES			
mango-farmer		277,559,400.00	339,698,800.00	995,375,400.00
	TOTAL	277,559,360.00	339,698,848.00	995,375,424.00
NET	PROFIT	104,969,116.30	167,108,604.30	681,822,160.30
Value	Added	218,789,300.00	280,928,800.00	795,642,400.00

Appendix 14. Calculations for Trader 1

		Current practice
INPUT	COSTS	
Mango		49,389.70
Casual labour		71,700.00
Transport		522,730.30
Packaging		789,990.90
Loader		23,581.80
Council cess		43,233.30
Storage		7,860.60
Broker		35,372.70
Counting of mangoes		7,860.60
Permanent labour		225,000.00
	TOTAL	1,776,720.10
OUTPUT	REVENUES	
Mango trader 1		3,635,531.00
	TOTAL	3,635,530.50
NET	PROFIT	1,858,810.40
Value	Added	2,230,186.00

Appendix 15. Calculation for trader 2

		Current practice
INPUT	COSTS	
Mango-farmer		49,389.70
Casual labour		16,625.00
Transport		42,991.20
Loader		15,012.80
Council cess		12,283.20
	TOTAL	136,301.90
OUTPUT	REVENUES	
Mango trader 2		582,769.60
	TOTAL	582,769.60
NET	PROFIT	446,467.70
Value	Added	478,105.50

Appendix 16. All trader 1 calculations

		Current practice
INPUT	COSTS	
Mango-farmer		3,556,060.00
Casual labour		5,162,400.00
Transport		37,636,580.00
Packaging		56,879,350.00
Loader		1,697,891.00
Council cess		3,112,800.00
Storage		565,963.60
Sroker		2,546,837.00
Counting of mangoes		565,963.60
Permanent labour		16,200,000.00
	TOTAL	127,923,846.40
OUTPUT	REVENUES	
mango		261,758,200.00
	TOTAL	261,758,192.00
NET	PROFIT	133,834,345.60
Value	Added	160,573,400.00

Appendix 17. Calculation for trader 2

		Current practice
INPUT	COSTS	
Mango-farmer		5,926,766.00
Casual labour		1,995,000.00
Transport		5,158,944.00
Loader		1,801,536.00
Council cess		1,473,984.00
	TOTAL	16,356,230.00
OUTPUT	REVENUES	
Mango trader 2		69,932,350.00
	TOTAL	69,932,352.00
NET	PROFIT	53,576,122.00
Value	Added	57,372,660.00

Appendix 18. Calculation for one litre juice

		Current practice
INPUT	COSTS	
Mango-farmer		64.00
Transport		0
Maintenance		2.60
Electricity/fuel		0.60
Casual labour		5.70
Permanent labour		1.40
Rent		0.50
Marketing cost		0.60
Depreciation-pulper		1.80
	TOTAL	77.30
OUTPUT	REVENUES	
Juice sales		100.00
	TOTAL	100.00
NET	PROFIT	22.70
Value	Added	30.40

Appendix 19. Calculation for a juice processor

		Current practice
INPUT	COSTS	
Mango-farmer		960,000.00
Transport		450.00
Maintenance		39,000.00
Electricity/fuel		9,300.00
Casual labour		85,500.00
Permanent labour		21,600.00
Rent		7,950.00
Marketing cost		8,850.00
Depreciation-pulper		26,550.00
	TOTAL	1,159,200.00
OUTPUT	REVENUES	
Juice sales		1,500,000.00
	TOTAL	1,500,000.00
NET	PROFIT	340,800.00
Value	Added	455,850.00

Appendix 20. All mango juice processors

		Current practice
INPUT	COSTS	
Mango-farmer		9,600,000.00
Transport		4,500.00
Maintenance		390,000.00
Electricity/fuel		93,000.00
Casual labour		855,000.00
Permanent labour		216,000.00
Rent		79,500.00
Marketing cost		88,500.00
Depreciation-pulper		265,500.00
	TOTAL	11,592,000.00
OUTPUT	REVENUES	
Juice sales		15,000,000.00
	TOTAL	15,000,000.00
NET	PROFIT	3,408,000.00
Value	Added	4,558,500.00

Appendix 21. Calculations for 1kg of dried mangoes

		Current practice
INPUT	COSTS	
Mango		240.00
Transport		60.00
Maintenance of ordinary drier		3.00
Casual labour		315.00
Packaging		2.80
Depreciation-drier		18.00
	TOTAL	638.80
OUTPUT	REVENUES	
dried mangoes		950.00
	TOTAL	950.00
NET	PROFIT	311.20
Value	Added	626.20

Appendix 22. Calculations for one processor processing dried mangoes

		Current practice
INPUT	COSTS	
Mango		24,000.00
Transport		6,000.00
Maintenance of ordinary drier		300.00
Casual labour		31,500.00
Packaging		280.00
Depreciation-drier		1,800.00
	TOTAL	63,880.00
OUTPUT	REVENUES	
dried mangoes		95,000.00
	TOTAL	95,000.00
NET	PROFIT	31,120.00
Value	Added	62,620.00

Appendix 23. Calculations for all processors drying mangoes

		Base Scenario
INPUT	COSTS	
Mango-farmer		120,000.00
Transport		30,000.00
Maintenance of ordinary drier		1,500.00
Casual labour DM		157,500.00
Packaging DM		1,400.00
Depreciation-drier		9,000.00
	TOTAL	319,400.00
OUTPUT	REVENUES	
dried mangoes		475,000.00
	TOTAL	475,000.00
NET	PROFIT	155,600.00
Value	Added	313,100.00

Appendix 24. Consolidated account for farmers, middlemen and processors

INPUT	COSTS	Base Scenario	Strengthening of extension services	Provision of credit
pesticide		15,454,400.00	15,454,400.00	28,098,900.00
Fungicide		12,925,490.00	12,925,490.00	26,767,010.00
Herbicide		13,965,150.00	13,965,150.00	13,965,150.00
operations and maintenance		91,069,590.00	91,069,590.00	91,069,590.00
pesticide application		11,603,220.00	11,603,220.00	11,603,220.00
Weeding		7,293,918.00	7,293,918.00	7,293,918.00
Pruning		3,853,483.00	3,853,483.00	3,853,483.00
Transport DM		30,000.00	30,000.00	30,000.00
maintenance of ordinary drier		1,500.00	1,500.00	1,500.00
casual labour DM		157,500.00	157,500.00	157,500.00
packaging DM		1,400.00	1,400.00	1,400.00
Casual labour mm 1		5,162,400.00	5,162,400.00	5,162,400.00
transport mm 1		17,827,850.00	17,827,850.00	17,827,850.00
Packaging mm 1		56,879,350.00	56,879,350.00	56,879,350.00
Loader mm 1		1,697,891.00	1,697,891.00	1,697,891.00
council cess mm 1		3,112,800.00	3,112,800.00	3,112,800.00
storage mm 1		565,963.60	565,963.60	565,963.60
broker mm 1		2,546,837.00	2,546,837.00	2,546,837.00
counting of mangoes mm 1		565,963.60	565,963.60	565,963.60
Establishment cost	-	16,424,990.00	16,424,990.00	16,424,990.00
Transport MJ		4,500.00	4,500.00	4,500.00
Maintenance MJ		390,000.00	390,000.00	390,000.00
Electricity/fuel MJ		93,000.00	93,000.00	93,000.00
casual labour MJ		855,000.00	855,000.00	855,000.00
permanent labour MJ		216,000.00	216,000.00	216,000.00
rent MJ		79,500.00	79,500.00	79,500.00
Marketing cost MJ		88,500.00	88,500.00	88,500.00
Policy		0	16,800,000.00	114,477,000.00
Depreciation-drier		9,000.00	9,000.00	9,000.00
Depreciation-pulper		265,500.00	265,500.00	265,500.00
Permanent labour mm 1		16,200,000.00	16,200,000.00	16,200,000.00
Casual labour mm2		1,995,000.00	1,995,000.00	1,995,000.00
Transport mm 2		10,891,100.00	10,891,100.00	10,891,100.00
loader mm2		1,801,536.00	1,801,536.00	1,801,536.00
Council cess mm2		1,473,984.00	1,473,984.00	1,473,984.00

Interest		0.00	0.00	10,406,990.00
Loan principle		0.00	0.00	104,070,000.00
	TOTAL	295,502,324.40	312,302,324.40	550,942,344.40
OUTPUT	REVENUES			
Mango-farmer		258,356,500.00	320,496,000.00	956,969,800.00
Mango mm 1		261,758,200.00	261,758,200.00	261,758,200.00
dried mangoes		475,000.00	475,000.00	475,000.00
Juice sales		15,000,000.00	15,000,000.00	15,000,000.00
Mango mm2		69,932,350.00	69,932,350.00	69,932,350.00
	TOTAL	605,522,072.00	667,661,576.00	1,304,135,336.00
NET	PROFIT	310,019,747.60	355,359,251.60	753,192,991.60
Value	Added	455,683,600.00	501,023,100.00	898,856,800.00

QUESTIONNAIRE FOR MANGO FARMERS

.....Gender M.....F.....

.....Village.....

.....Land holding.....Acres/ha

Education level of the farmer (6 levels)

-Education (NE)
-Primary school not finished (PNF)
-Primary school finished (PF)
-Secondary school not finished (SNF)
-Secondary school finished (SF)
-University (U)

crops do you grow?

	Area(acres/ha)

.....and keeping (1=yes, 0 otherwise).....

.....indicate the types

-Irrigation
-Arboriculture
-Mangoes
-Others (specify)_____

.....Mango, do you keep the following records?

-Income Statement
-Farm Operation expenses (e.g fertilizers, agrochemicals)
-Revenue receipts
-Purchase records
-Sales records

.....EVIDENCE?

Marketing

Crop code	Field No.	Harvest		Sales	Middlemen 1=broker 2=wholesaler 3=retailer 4=mobile 5=others(specify)	Costings			No of years	Quantity consumed at home	Quantity harvested that is spoiled	From whom do you get the information about prices and the required quality 1 =From the exporter 2= calculation from cost of production 3= From a middleman 4=collective action group 5= Other farmers 6=From someone else, namely...	How do you determine the sale price 1=production cost 2=market forces 3= both	How do you receive the information about the market prices? 1= By phone 2=By fax 3=By mail 4=The buyer visits me regularly 5= I visit the buyer regularly 6= Other, namely....	What is the cost involved	
		Unit	Qty	1=None 2= Middlemen 3= Collective action 4=Middlemen and collective action 5=Others (specify)		unit	Quantity	price								

Extension service provision				Group participation			Credit acquisition						
Did you actively seek advice on crop 1=yes 2= No	If Yes, who did you approach for the advice	If No, why didn't you seek advice	Capacity buildings 1=trainings 2=study tours 3=others (specify)	Do you belong to any group 1= yes 2= No	Type of group 1= Women 2= men 3= savings & credit 4=marketing	What services do you get from the group 1=None 2= trainings 3= input acquisition 4=Financial services 5=marketing 6=processing 7=Others (specify)..	Did you apply for any credit 1= yes 2=No	What was the source of the credit	Purpose of the credit	How much did you receive	Duration of the loan	At what interest rate	

<u>Extension service providers</u> 1=public extension agent 2=private extension agent 3=neighbour/farmer 4=ASK Shows 5=traders/input dealers 6=radio /television	7=family/friend 8=newspaper/magazines 9=farmer organizations/cooperatives 10=field days/demonstrations 11= NGO agent 12=research organizations 13= other, specify	<u>Reasons for not seeking extension services</u> 1=long distance 2=Expensive 3=time consuming 4=extension agents not available 5=other , specify _____	<u>Sources of credit acquisition</u> 1= Neighbour 2= farmer group 3= SACCO (specify) 4=Commercial bank 5= Relatives/friends 6=NGO/MFI (specify) 7=AFC 8=ROSCA 9=Others (specify)..	<u>Purpose of credit</u> 1=maize farming 2=Mango farming 3=Horticulture farming 4=School fees 5=Medical 6=Business 7=Others(specify)
--	---	---	---	---

Contract farming

Contract farming

Do you have made agreements with your buyer regarding the quantity that should be delivered 1=yes 2= No	If yes, are these agreements written down? 1 =Yes 2 =No	Do you have made agreements regarding the price? 1= Yes 2=No	If yes, are these agreements written down? 1= Yes 2=No	Could you negotiate with your buyer? 1 =Yes 2= No	Do you have made agreements regarding the delivering date? 1 =Yes 2= No	If yes, are these agreements written down? 1 =Yes 2= No	What is the cost involved	Do you have made agreements regarding the quality? 1 =Yes 2= No	If yes, are these agreements written down? 1 =Yes 2= No	When do you receive your money? 1=The day I deliver the mangoes 2= Later	If later, when exactly? 1 =After a day 2= After one week 3=After two weeks 4= After three weeks 5= After a month 6= After a season 7= Differs with the buyer 8= Other, namely... n	Do you always receive your money the day the buyer promised you? 1=Yes 2 =No	Does your buyer always buys the total amount of mangoes you have, or just a part? 1 =Yes 2= No, he has limits during low season

Do you use any machinery/implements.....

If yes, please list the activity and type of machinery/implement used

Activity	Machinery/implement	Hired or owned	Book/current value	Market price of new	Cost per acre

Please list in order of priority, the most important constraints as far as mango production is concerned

Problem analysis

Do you have any specific problems/challenges related to mango production that hinders you undertaking your activities efficiently? List them	What are the causes of the problems you have listed in column 1?	What are the effects of the problems on your mango production?	What do you think are the possible solutions to the challenges

26. Farmers' Groups' Questionnaire

Location

..... Location: Village:.....
n:

Farmers' Groups details

Farmers' Group:
of group members: Males: Females:

Group: 1=Women group 2=Men group 3=Mixed group 4=Youth group

Self help group 6. Multipurpose group

Registration status: 1=Registered 2=Not registered

Registered, type of registration: 1=Association 2=Cooperative 3=Self Help Group

(Specify).....

Group by-laws: 1=Group has by-laws 2=Group doesn't have by-laws

Group have office bearers: 1=Yes 0= otherwise If yes, indicate the groups' office

g. Chair,

y, Vice Chair

Group have smaller sub groups of 5-6 members? 1=Yes 0 otherwise

Smaller and main groups have regular meetings? 1=Yes 0 otherwise

(Specify).....

What is the frequency of meetings? 1=Weekly 2=Fortnightly 3=Monthly

(specify).....

Do majority members participate in decision making? 1. Yes 2. No

v

What is the duration for the term of office?Years

How many terms is an office bearer (e.g Chairperson) allowed to serve?terms.

Group objectives:

.....

.....

Inventory of group resources

List the activities of the group:

..... b.

..... d.

.....

.....

.....

.....

.....

the income generating activities/enterprises of the group:

Crops enterprises

..... Annual income earned KES.....
 Annual income earned KES.....
 Annual income earned KES.....
 (specify) Annual income earned KES.....

Livestock enterprises

..... Annual income earned KES.....
 Annual income earned KES.....
 Annual income earned KES.....
 (specify) Annual income earned KES.....

Mobilization

Do group contribute savings? 1= Yes 0 otherwise If yes, how are savings contributions

1= fortnightly 2= monthly 3= others (specify)

How much per member? KSh..... How much has the group contributed to date?

How are the savings used? 1=table banking 2=merry go round 3=security for loans 4=buy farm

5=unutilized savings 6=loans to members 7=others

If savings are loaned or table banking, what is the interest rate charged per month (in %)?

Do group have an account? 1=Yes 0 otherwise If yes, which financial institution/bank?

How are the group savings kept safely? 1=group bank account 2=with treasurer

3=with others (specify).....
 Are financial service institutions/banks available locally (formal/informal)?

Processing type

What is the processing unit.....capacity of the unit.....

Equipment

Equipment	Year acquired	costs	capacity	condition	Estimated maintenance cost

Processing activity began.....Conversion ratio.....

Costs used in the processing.....

Production in the last 5 years

	2005	2006	2007	2008	2009
Costs					

Production

Transport.....

Electricity/fuel.....

Maintenance.....

Labour.....

Plant labour.....

Management.....

Material purchase.....

.....

.....

Raw material.....

Overhead costs.....

Utilities.....Dried mangoes.....

Other.....

Reconciliation calculations

Value /cost of current

Inventory.....

Production.....

.....

Costs in processing

Marketing

product code 1=juices 2= dry mangoes	Production		Sales	Costings			No of years	Quantity processed that is spoiled	From whom do you get the information about prices and the required quality 1 =From the exporter 2= calculation from cost of production 3= From a middleman 4=collective action group 5= Other farmers 6=From someone else, namely...	How do you determine the sale price 1=production cost 2=market forces 3= both	How do you receive the information about the market prices? 1= By phone 2=By fax 3=By mail 4=The buyer visits me regularly 5= I visit the buyer regularly 6= Other, namely....
	Unit	Qty		unit	Quantity	price					

Contracting

Do you have made agreements with your buyer regarding the quantity that should be delivered 1=yes 2= No	If yes, are these agreements written down? 1 =Yes 2 =No	Do you have made agreements regarding the price? 1= Yes 2=No	If yes, are these agreements written down? 1= Yes 2=No	Could you negotiate with your buyer? 1 =Yes 2= No	Do you have made agreements regarding the delivering date? 1 =Yes 2= No	If yes, are these agreements written down? 1 =Yes 2= No	Do you have made agreements regarding the quality? 1 =Yes 2= No	If yes, are these agreements written down? 1 =Yes 2= No	When do you receive your money? 1=The day I deliver the mangoes 2= Later	If later, when exactly? 1 =After a day 2= After one week 3=After two weeks 4= After three weeks 5= After a month 6= After a season 7= Differs with the buyer 8= Other, namely... n	Do you always receive your money the day the buyer promised you? 1=Yes 2 =No	Does your buyer always buys the total amount of mangoes you have, or just a part? 1 =Yes 2= No, he has limits during low season

Annex 27. Questionnaire for middlemen

General information

Name and address of the respondent

How many years have you been a middleman for mangoes

What is your education level?

1=Primary school not finished (PNF)

2=Primary school finished (PF)

3=Secondary school not finished (SNF)

4=Secondary school finished (SF)

5=University (U)

Which products do you buy and sell?

1=Beans

2=Mangoes

3=Bananas

4=Avocado

5=Tomato

6=Mango

7=Other, namely...

What is the commission rate that you charge per

What is the average amount of mangoes that you buy and sell annually in kg?

What percentage of your income does arise from mango trade?

Do you own any fixed assets?

If yes, which ones?

1=House

2=Cows

3=Motorcycle

4=Water pump

5=Land

6=Shop/business

7=Other (specify)...

What percentage of the mango is meant for export?

What is the main destination for export?

1 UK

2 France

3 The Netherlands

4 Germany

5 The Middle East

6 South Africa

7 Belgium

8 Another country, namely...

11. Do you hire any employees (1=permanent 2=casual) to assist you?

1=Yes

2= No

12. If yes, how many? What is the cost

13. What percentage of the harvest do you refuse to buy from farmers because it doesn't meet the quality requirements?

14. What mode of transport do you use?

1=Bicycle

2=pickup

3=donkey

4=Lorry

5=Nissan Matatu

6= others (specify)

Total cost involved

B. Inputs provision

1. Do you provide or specify any of the following inputs that are needed to grow mangoes? (1=seedlings, 2=fertilizer, 3=pesticides,4= labour, 5=equipment,6= credit, 7=other input)

2. Do the farmers have to pay for these inputs?

1 =Yes

2 =No

3 If yes, how?

1 =I reduce the payment to the farmers after harvest

2 =They have to pay in advance

3= Other, namely....

C. Monitoring

1. Do you visit growers in the field?

1=Yes

2 =No

2. If yes, on average, how many times do you or your representatives visit each grower during a typical year?

ce a week
ce a week
ee times a week
ce every two weeks
ce a month
er, namely...

at kind of things do you check during such a

advise about chemical use
advise about fertiliser use
advise about irrigation
advise about the planting method

Quality Measurement

ny part of your growers' final payment
ed on the basis of measured quality for the
oes?

v do you measure the quality?

ch product attributes are important to you
(sample colour, size, variety used)?
e physical quality
e pest infection
size of the mango
cleanliness of the produce
thing else, namely...

s the payment you make to your growers of
o depend explicitly on the price you receive
sale of the product downstream?

Information flow

m whom do you get the information about
and the required quality?
m the exporter
m a middleman
m someone else, namely...

ost involved?

v do you receive the information about the
?

phone
ax
mail
buyer visits me regularly
sit the buyer regularly
er, namely....

Any cost involved?

3. When do you get an order from your buyer?
1= The same day as that he needs the produce
2=One day before
3=Three days before
4=A week before
5= Other, namely...

4. How do you make sure that you'll have enough
mangoes when the processor/consumer needs
them very urgently?
1=By visiting farmers who usually do not supply me
2=By visiting other middlemen
3=I just give what I have
4= I tell my farmers to pick more
5=Anything else, namely...

F. Information on contracting with other buyers

1. Do you sell your mangoes to a processor, an
exporter directly or to another middleman?
1= I sell my mangoes to an exporter directly
2 =I sell my mangoes to a middleman
3=I sell my mangoes to consumers directly
4=I sell my mangoes to processors

Selling price?

2. If to an exporter directly, to which one(s)?
1= Homegrown
2=Indu Farm
3= East African Growers
4= Greenland
5 =Avenue
6 =Vegepro
7 =Sunripe
8= Wilham
9= Fian Green
10= Sun Fresh
11=Wamu
12 =Everest
13= Sunfresh
14=Freshpak
15= Topsamrek
16= Kenya Horticultural Exports

3. Do you have one buyer for your mangoes every
year or do you have several buyers?
1= I have one buyer
2= I have two buyers
3 =I have several buyers (>2)

4. If one buyer, for how many years have you been
selling your mangoes to this buyer?

Several buyers, do you sell to them every year
Do you have other buyers every year?
Do buyers differ every year
Do you have the same buyers for
Do you have the same buyers for 3 years
Do you have the same buyers for more 3 years

16. If yes, are these agreements written down?
1 =Yes
2= No

Are you able to choose between more than one
Do you have a main buyer or is there just one person you
Do you sell your beans to?
Are you able to choose
Is there only one person I could sell my
Do you sell to

16. When do you receive your money?
1=The day I deliver the mangoes
2= Later

Do you have made agreements with your buyer
regarding the quantity that should be delivered?

17. If later, when exactly?
1 =After a day
2= After one week
3=After two weeks
4= After three weeks
5= After a month
6= After a season
7= Differs with the buyer
8= Other, namely...

Do you have these agreements written down?

Do any costs involve in writing agreements?

Do you always receive your money the day the
buyer promised you?
1=Yes
2 =No

Do you have made agreements regarding the

24. Does your buyer always buys the total amount
of mangoes you have, or just a part?
1 =Yes
2= No, he has limits during low season

Do you have these agreements written down?

G. Information about contracting-With farmer

Do you have these agreements written down?

1. Do you have a fixed number of farmers who
deliver mangoes to you after every harvest?
1 =Yes
2= No

Do you have made agreements regarding the

2. If yes, for how many years have you been
buying from them?

Do you have made agreements regarding the
quantity you are willing to buy from
them?
Do you have made agreements regarding the
price?

3. Do you have made agreements with the farmer
regarding the quantity you are willing to buy from
them?
1 =Yes
2= No

Do you have these agreements written down?

4. If yes, are these agreements written down?
1 =Yes
2= No

Do you have made agreements regarding the
price?

Any costs involved?

5. Do you have made agreements regarding the
price?

es
o
yes, are these agreements written down?
es
o

2. Do you have storage facilities?
1 =Yes
2= No

List and indicate the costs involved.

yes, what price do they get?
an they negotiate with you about the price?
es
o

3. If yes, do you have cooling facilities?
1 =Yes
2= No

what factor(s) does the price you are willing
y the farmers
nd?
n the price I receive from my buyer
n the quality the farmer delivers
n the costs I have to make
omething else, namely...

4. Does your buyer come to you or do you bring
the produce to the buyer?
1 =The buyer comes to me
2=I go to see the buyer
3= This differs

When do you pay the farmers?
When I collect the mangoes
fter receiving the money from my buyer
fter two weeks
fter a month
ther, namely...

5. Do you know if the farmers you buy from keep
records of the pesticides and fertilizers they used
the last two years?
1 =Yes
2= No
3= Some of them

Do you have made agreements regarding the
ering date?
es
o

6. If yes, for how long do they keep those records?
1= For one season
2 =For a year
3= For two years
4= Other, namely...
5 =I do not know

f yes, are these agreements written down?
es
o

7. Where does the water come from that the
farmers use for irrigation?
1= River
2= Dam
3= Other, namely...

Do you have made agreements regarding the
ity?
es
o

f yes, are these agreements written down?
es
o

Half live of mangoes
o you collect the produce at the same day as
farmers harvest it?
es
o



Serial number..... Name of Enumerator.....

I Problem analysis

Do you have any specific problems/challenges related to your work that hinders you from undertaking your activities efficiently? List them	What are the causes of the problems/challenges you have listed in column 1?	What are the effects of the problems on your work	What do you think are the possible solutions to the challenges