THE INTERFACE BETWEEN MANGO VALUE CHAIN ANALYSIS AND THE SOCIOECONOMIC DETERMINANTS

Gor, CO [*1], Agong S.G[1], Achieng L[2], Akuno W[1], and Andika D[1]

[1]Bondo University College School of Agriculture, Food Security and Biodiversity, P.O. Box 210-40601, Bondo-Kenya
[2]Freelance ICT Consultant Box 5641-00200, Nairobi
***Correspondence:** cogor@bondo-uni.ac.ke; obelchristopher@yahoo.com

Abstract

The study focused on a value chain analysis geared towards identifying the various, processes, inputs and major players in the mango value chain system. Data was collected from the main actors in the mango value chain at different segments including input suppliers, producers, traders and consumers using a structured questionnaire. The sampling method employed included stratification of respondents on the basis of functional roles of the various actors followed by a Sequential random sample of the requisite number of respondents per segment. Data and information collected were cleaned and coded for electronic entry and analysis. The Statistical Package for Social Sciences (SPSS) and Microsoft Excel were employed to generate basic descriptive statistics including frequencies, percentages, z-scores, chi-squares, standard deviations and minimum and maximum levels as well as the means. These were used to organize the data for in depth analysis and presentation. Results showed that important socio-economic determinants of the functional roles of actors in the various mango chain segments included income, education, age, gender, farm size or size of business operation. These variables influence the agribusiness uptake pathways impended in mango value chain and therefore their importance in policy formulation and technology recommendation domains.

Key Words: Analysis, Determinants, Constrains, Mango, Socio-economic, Value Chain

Introduction

As a sector in Agriculture and the bigger economy of the country, horticulture contributes immensely to economic growth, source of income to smallholders, improved nutritional status and a major foreign exchange earner. An overview of the horticultural sub-sector in Kenya shows that the sector comprises mainly of fruits, vegetables and cut flowers. The sub-sector accounts for about 10 percent of urban food consumption and a much larger percentage in rural areas. According to FAO (2009), vegetables dominate horticultural production, followed by fruits and cut flowers. Estimates by the early 2000s indicated that a total area of 373 000 hectares was under horticultural production, with an estimated production level of 4.35 million tonnes of horticultural products, valued at US$494.4 million. Mango had been the third most important fruit in terms of area and total production over the last ten years with bananas (including plantains) and pineapples as number one and number two respectively in terms of production.

In a case study of Value Chain Analysis in Kenya, FAO (2009) indicated that by the year 2003, mango production was estimated at more than 183 000 tonnes with Eastern Province accounting for 54 percent of the production, Coast Province 22 percent and Nyanza Province for 8 percent. Results of the study indicated that Pests were the main factor affecting yields; particularly the mango weevil was of a major concern to farmers. The study found that the major constraints which were hindering the development of the mango supply chain could be categorized according to the four

basic stages in the supply chain, that is, the farm level, the marketing stage, the processing stage and the export stage.

This study was sponsored by Plan International with the motivation of identifying agricultural enterprises with a potential in the study area and carry out a value chain analysis to isolate the constraints which inhibit profitability and scaling up. The study was to form the foundation for identifying and reviewing of the desired mango market interventions, training needs, potential demand driven market infrastructure investments, evaluating requests for programme support, and providing support to increase the efficiency of natural mango market evolution that has positive impact on the rural community livelihoods. Mango was identified along side four others commodities i.e. sunflower, fish farming, local poultry and bee keeping as agricultural enterprises that have the greatest potential to serve as a vehicle for poverty reduction and source of livelihood for a majority of smallholder farmers and traders in the project areas.

Kaplinsky (2000) views on value chain analysis and the determinants of income distribution was adopted in this study. Kaplinsky indicated that value chain analysis can help to explain the growing disjuncture between the global spread of activities and incomes. This can be done first, by mapping the range of activities in the chain that will provides the capacity to decompose total value chain earnings into the rewards which are achieved by different parties in the chain. Secondly, a value chain perspective, analyses the way in which particular firms, regions and countries are linked to the global economy. This will determine to a large extent the distributional outcomes of global production systems and the capacity which individual producers have to upgrade their operations and thus to launch themselves onto a path of sustainable income growth. Thirdly, value chain analysis identifies the

normative levers which can be used to alter these distributional patterns.

Tineke (2003) while analyzing the Export chain of French beans from Kenya, carried out a t-test to get a better insight into the factors that might influence the choice of the channel. A further analysis using logit regression was used to establish factors that contribute to participation in the value chain. The t-test results indicated that prices, average amount of French beans sold and knowledge about Retail Produce Good Agricultural Practices (EUREPGAP) were significant in determining the channel choice. On the other hand the logit regression showed that information about (EUREPGAP) and record keeping were significant factors in determining the channel choice. However, the aim of the study on the interface between socio-economic determinants and mango value chain analysis was to assess the influence which the social and economic variables have on various actors in the mango value chain in order to enhance production and market performance.

Melle et.al (2007) indicated that a value chain encompass a full range of activities required to bring a product or service from conception, thorough production, transformations, and delivery to final consumers and final disposal after use. It includes a series of actors from inputs suppliers to producers and processors to exporters and buyers –engaged in the activities required to bring a product from its conception to its end use.

In the first place an effective value chain analysis approach would help in the identification of good policies and programmes to accelerate development and this requires a good understanding of how local enterprises fit into the global economy. Secondly, the approach would helps to identify and select relevant stakeholders for programme planning, including distant buyers where they exert strong influence over the chain. Thirdly it helps to identify all

the enterprises that contribute to the production of a good or service and shows what institutions are needed to support the enterprises. Lastly, the value chain analysis approach helps policymakers and entrepreneurs find out which parts of the chain are holding up progress –which bottlenecks deserve priority attention and provides a framework for sector-specific action

Materials and Methods

Study Design

The study started with a desktop review of trends in production, marketed volume, commodity market price and gross margins for the mango commodities in the Kisumu West District as well as relevant literature and publications on value chain analysis. The desktop review was followed by consultative meetings with the Kisumu Plan International staff and the line Ministry District technical team. A two day participatory training for the enumerators was conducted involving the use of the study tool and pilot testing of the instrument.

Sampling Method

The two divisions in the district namely Maseno and Kombewa were clustered into locations and stratified by mango production and marketing concentrations. Sixty 60 farmers, 7 input suppliers, 23 traders and Farmer/traders were interviewed for a total of 118 respondents in the division from the 3 locations identified for the study. In Kombewa division, 4 locations were selected based on the concentration of mango production and marketing. Sixty four (64) farmers, 5 input suppliers, 42 traders and 21 farmer/traders were targeted for a total of 132 respondents in the division. This adds up to 250 questionnaire respondents. This was augmented by 2 parallel Focus Group Discussions (FGDs), field observations and Key Informant Interviews. Once in a location with a concentration of mango production and marketing, respondents were selected

using a sequential random sampling from a list provided by the local Agricultural Extension Officer. Table 1 below show the major parameters targeted for the study.

Table 1: **Main parameters captured in the study**

Parameters	Examples
Socio-economic profile	Farm size, age structure, educational level, family size, income category and civil status
Types of inputs	Planting materials, Fertilizers, agrochemicals and farm implements
Operational expenses	Purchase of farm inputs, transport, storage, land preparation, fuel and oil, and repair costs
Chain segment specific constraints	Input supply constraints, production constraints, marketing constraints and consumption constraints
Access to and management of Microfinance institutions	Availability, application for credit facility, purposes for the credit facility
Agronomic activities	Land clearing, planting, watering, pruning, pests and disease control, post harvest loss management.

Data collection methods

The following were the methods used for the data collection purposes:

Key Informant interviews

These were held and the following respondents were involved; District Agricultural Officer; District Crops Officer; District Agribusiness Development Officer and District Livestock Officer. Others included the Divisional Agricultural and Livestock Officers. Discussions centred on information and data related to production

trends (in hecterage and tonnage); marketed volume (tonnage and KES); the selected commodity market prices; and individual commodity gross margin trends over the past three to five years. As important the District technical team were also consulted on the logistical arrangements for data capture in terms of regional disparities, gender distribution, and sectorial considerations.

Focused group discussions

Two focus group discussions were held concurrently in both the Kombewa and Maseno agricultural divisional head offices. The participants in the discussions were selected with the help of the District technical team and the group consisted of representatives of farmer groups; individual farmers; youth and women group representatives; other Self Help Group (SHG) and Community Based Organizations (CBO) representatives associated with agricultural production and marketing in the study area.

Field Observations

These involved making pertinent observations in relation to institutional arrangements between the value chain actors and the service providers including public institutions, development partners and other Non-Governmental Organizations (NGOs) and relevant organizations operating in the agricultural sector in the study area. Additional data and information relevant to value chain analysis were also collected from various sources in the study area.

Framework of Analysis

Data and information collected were cleaned and coded for electronic entry and analysis. The Statistical Package for Social Sciences (SPSS) and Microsoft Excel were employed to generate basic descriptive statistics including frequencies, percentages, z-scores, chi-squares, standard deviations and minimum and maximum levels as well as the means. These were used to organize the data for in depth analysis and presentation. The findings were presented in histograms, bar charts, pie charts, matrixes and graphical formats.

Results and Discussion

Mango Value Chain Mapping

The main actors in the mango value chain in Kisumu West District were: Input Suppliers, Producers, Brokers, Traders (Wholesalers, Retailers and Mobile traders) and Consumers. Personal interviews and discussions with these actors indicated that there was various service providers involved in the value chain map. However it was observed that the majority of the service providers did not have a strong presence on the ground. The major channels in the mango sub-sector in the district included fresh sale of mango at the farm gate, direct home consumption and sales to traders who in turn sell the produce in the market. In terms of volume movement in the value chain, individual interviews with producers and traders showed that about 30% for home consumption, 54% was sold to brokers, and 16% was considered as wastage.

The domesticated mango value chain map in Kisumu West District was as shown in figure 1 below with the 1st row indicating the basic functions along the chain; 2nd row depicts the main actors and the 3rd row show the service providers.

The study results indicated that there were more farmers in Kombewa division dealing with mango as compared to the other actors while in Maseno there were more traders as compared to the other actors as shown in table 2 below. Generally the actors in the production segment of mango were the majority in the entire district.

Input Suppliers

These were engaged in sourcing mango farm inputs from distributors/ agents, and selling to farmers while in some cases distributing directly to the farm gates. However the overall field observations indicated that input suppliers (Agro-Vets and stockists) had a poor presence in the study area. The actors in

the input supply chain are summarized in table 3 below.

Mango Production

Mangos are consumed as fresh fruits, ripen and processed juice forms. In the study area, mangos were grown mostly by small scale farmers. However at the regional level there were a few commercial farms which produce mangos for consumptions in hotels and restaurants. Farmers in the project area inter-cropped mangos with a variety of crops, which include cereals, legumes, root crops, vegetables and other fruit and tree crops. Mango was generally a low input crop as compared to other horticultural products in the district.

Mango production trends analysis: The production of mango in Kisumu West district was largely rain fed and therefore vulnerable to drought. In the 1st and 2nd year the production was at a constant of 5000k/grams while in the 3rd year it doubled to 10000k/grams as indicated in Figure 3 below. It increased sharply in the 4th year with a production level of 15000k/grams.

Mango Production Constraints: From the focus group discussion with farmers and farmer groups, as well as data analyzed from personal interviews, it was established that there are various constraints which affect mango production in Kisumu West district. Their causes, effects and possible interventions were analyzed and presented in the matrix as discussed in table 5 below.

Recommendations on Mango Production Constraints

Several constrains were identified by farmers in the mango production segment in the value chain as stated above. For intervention purposes, various recommendations were identified in view of the prevailing conditions and desired opportunities to revitalize the mango production sub-sector as rationalized in the narratives below:

Increased Access to capital: Discussion with mango producers in the district showed that access to finance and credit among mango producers is a major challenge. This is because procedures and processes to access the financial services have not been streamlined even for those who can afford them. The subsequent result is inadequate use of farm inputs leading to low production and poor quality of produce. Plan International should work in collaboration with Ministry of Cooperative Development and Marketing (MoCDM), Equity bank and other micro –finance institutions to facilitate access to credit facilities for mango producers.

Reduction of mango perishability: Discussions with farmers suggested that excess supply of mango during the peak season is a major challenge due to its perishability. Farmers transport the produce to the market and bring them back home to store in boxes for lack of customers. Currently there is no single cold storage facility available in Kisumu West District and this is caused by lack of resources as well as high cost of investment required for such facilities. As a result of this setback, it was recommended that Plan International should work in collaboration with the Local Authorities, Constituency Development Fund (CDF), Ministry of Public Works (MoPW) and other development partners such as Japanese International Cooperation Agency (JICA) to support construction of collection centers, grading sheds and cold storage facilities in the locations identified during the FGDs by stakeholders.

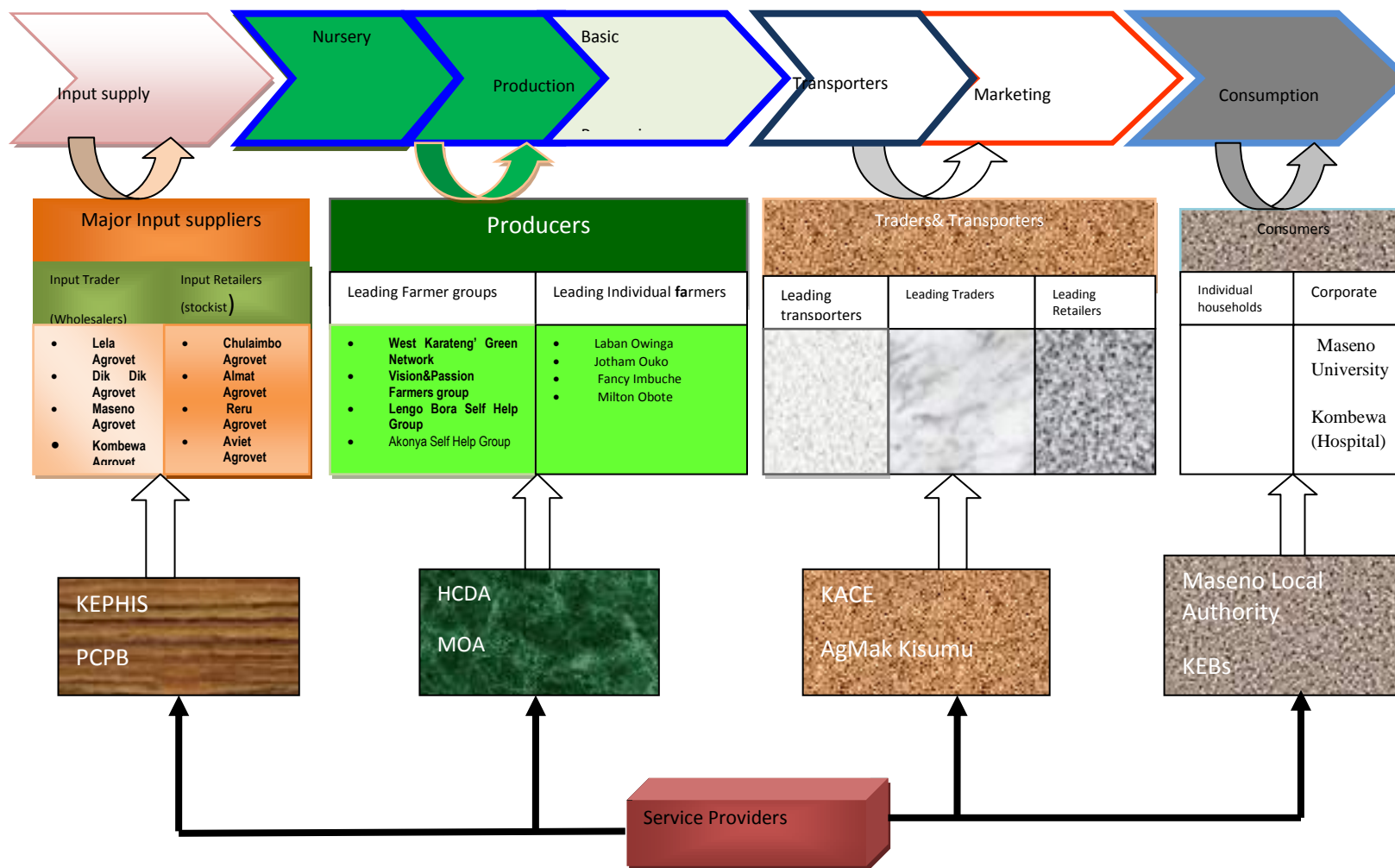Figure 1; *Mango Value chain Map in Kisumu West District*

Table 2: **Cross tabulation comparing the actor dominance in the mango subsector in Kisumu West District**

Respondent category	Division		Total
	Kombewa	**Maseno**	
Consumer	0	1	1
Farmer	64	60	124
Trader	42	23	65
Input Trader	5	7	12
Product Trader	21	27	48
Total	132	118	250

Table 3**: Main actors in the mango input supply segment**

Actors	Characteristics	Roles	Limitations	Opportunities
Farm input manufacturers	They are private companies or institutions	Manufacturing and distribution of agrochemicals	High cost of production, technical skills and high cost of transport	Effective demand for farm inputs and good weather conditions
Distributors /transporters	Are individual enterprises and farmers	Distribution and promotion of farm inputs	High transport cost and inadequate supply of inputs	Effective demand, good rural access roads and adequate supply of inputs
Farm input stockists	Either individuals, private businesses and majority are small in size	Sourcing, supplying, and distribution of farm inputs	High transport costs, low demand for farm inputs and credit delinquencies	Effective demand and good weather conditions
Farmers	Most are small scale, a few are operated in farmer groups and are typically resource poor	Multiplication and distribution of planting materials	Ineffective demand for planting materials, unfavorable weather conditions, pests and disease infestation	Increased demand for mango planting materials and favorable weather conditions

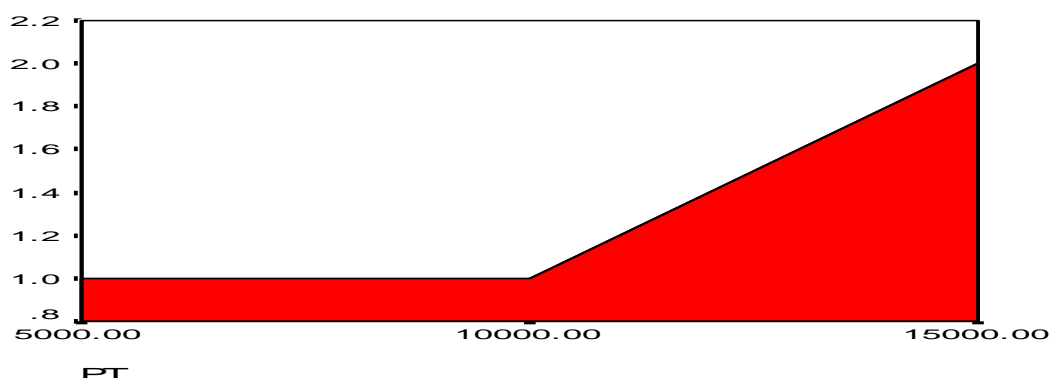Figure 2: **A Mango farmer in Kombewa division**

Figure 3: **Area graph for mango production in kilograms per Ha over the last four years**

Table 4**: Mango production constraints in Kisumu West District**

Constraints	Causes	Effects	Solutions	Opportunities
Lack of access to capital	Lack of knowledge of capital sources	Low profit margins and returns	Putting up of financial institutions in the area	Improved production
Perishability of commodity	Inappropriate storage facilities	Loss of commodity	Proper storage facilities	Improved production
High input prices	Poor rural access roads	Low demand for farm inputs leading to low production levels	Construction and rehabilitation of rural access roads	Increased use of farm inputs leading to improved production

Improved rural access roads: Farmers, traders and other market actors interviewed in addition to discussions and field observations indicated that the rural/trunk road networks in the remote parts of the district were mostly in pathetic conditions. According to the stakeholders in the sub-sector, the constraint was attributed to lack of development and maintenance by the relevant authorities leading to high farm input costs. In order to mitigate the impact of this constraint, it was recommended that Plan International, CDF and Ministry of Roads (MoR) should work jointly to Develop and rehabilitate the feeder roads and bridges identified by stakeholders during the FGDs..

In the production segment of the mango value chain, the most dominant actors were individual farmers with 57% of the respondents indicating having orchards of <1acre. For fertilizers they heavily substituted with farm yard manure. Several mango farmer groups were also identified and were undertaking both production and marketing activities in the mango value chain.

Mango Traders

Mango market segments: The supply of mango produce was determined by seasons. During high production seasons the produce was supplied locally by farmers and traders. It is important to note that during the period of study the production of mangos was in low season and most traders were sourcing from the regional markets in the neighborhood e.g. Luanda, Akala, Bondo and Kisumu City. The meeting points were the following markets: Maseno, Lela, Kombewa, Wang' Arot, and Holo. However there were also small mango retail markets in the rural set up which were not visited during

the study. The main Actors in the market segment of the mango value chain in the district were as shown below in Table 6 below

Table 5: **Actors in the mango market value chain in Kisumu West District**

Actors	Characteristic	Role	Limitation
Mobile traders	They are small and not stationary Mostly use bicycle and motorcycle as means of transport	Buy produce from farmers and sell to retailers, wholesalers and consumers	Poor rural access road network Lack of sustainable supply of produce lack of credit
Brokers	They are individual who do not incur any cost when doing business Very secretive on prices of the commodities	They link farmers to buyers on commission Link wholesalers to other traders and consumers	Operates mostly in imperfect market
Wholesalers	Buy and sell produce in bulk and varies in size from small, medium to large	Produce bulking, distribution and sales	Marketing costs, price instability, erratic supply of produce
Retailers	Buy and sell in small quantities and are mostly individuals including kiosk/stall owners and hawkers,	Selling in small quantities	Perishability Oversupply of produce Incapacity to source and sell in bulk
Consumers	individuals & institutions	Consumption function in the market	Fluctuation in prices

Brokers

In Kisumu West District mango value chain, brokers were noted as playing an important role in the mango sub-sector by linking producers both to the input suppliers as well as with produce markets. As the linking persons in the entire mango value chain, the distinctive characteristics of brokers in the mango sub-sector was that they supposedly do not incur costs and were only paid commission for their role in delivery of information and produce in the market.

Mango Wholesalers & Retailers

The wholesalers were identified with their inclination for bulk buying and selling of mangos in the market segment of the value chain. By the same token retailers, sometimes referred to as vendors, stood out as actors in the market segment of the chain by buying and selling mangos in small volumes. However they were distinguished as the market leaders in the chain due to their ubiquitous presence and turnover in the mango market in the project area. Retailers similarly holds the pride of place as often they are the last trader from whose hands the mango product leaves before it lands on the consumers table.

Mango Mobile Traders/ Transporters

This category of market segment actors were also found to contribute enormously in the movement of mangos between producers and the market as well as among different traders within the market. However unlike brokers, they piled their trade with an eye for an extra bag. The mobile traders/ transporters in

Kisumu West District dealing with this commodity that were interviewed.

Expectations were that consumers being the actors of last resort often play a pivotal role in mango value chain. This was demonstrated by the command they display in determining the market price for the produce through signals sent to the mango producers and traders in the form of tastes and preferences.

Mango market constraints: From the discussions with traders, farmers and transporters as well as in the focused group discussion, it was established that various constraints hamper marketing of mango produce in the district. The constraints, effects and possible interventions are summarized in the Table 7.

Marketed Volume for Mango Over the Past Four Years

The marketed volume for mango in the fourth and third years was constant at 88,500k/grams each, accounting to19% each of the total marketed volume in the past four years. That marketed in the second year was highest at 185,000k/grams making 42% of the total marketed volume and lastly the first year had 92,500k/grams, making 20% which was slightly higher than that in the third and fourth years. This information is shown in the interactive pie chart below in Figure 4.

Recommendations on the Mango Market Constraints

An important desire among actors in the Mango production and marketing sub-sector is an efficient market imbued with free flow of beneficial market information. In retrospect, both producers and traders identified several constraints which call for prudent interventions in the project area based on practical assessment of local resources and aspirations of the market segment participants. The following were some of the possible solutions recommended:

*Provision of adequate market infrastructure***:** Field observations and narratives from farmers, traders and consumers confirmed inadequacy of market infrastructure as a major concern in Kisumu West district. In all the market centers visited, except in Bungoma town, there were no market infrastructures as traders pilled their trade and ware in the open-air type of markets. The main cause of this deficiency was identified as lack of planning and resources by the relevant authorities as well as the high investment costs involved in the development of market infrastructure. The resultant effects included high losses and poor price during high seasons as well as poor environmental sanitation. It was recommended that Plan International should work in collaboration with Local Authorities, CDF, Economic Stimulus Package (ESP) and MoPW to construct adequate market infrastructures such as stalls, grading sheds, piped water, electricity and sanitary facilities in the identified locations by stakeholder during the FGDs.

Improved rural access roads: Farmers, traders and other market actors interviewed in addition to discussions and field observations indicated that the rural/trunk road networks in the remote parts of the district were mostly in pathetic conditions. According to the stakeholders in the sub-sector, the constraint was attributed to lack of development and maintenance by the relevant authorities leading to high marketing costs. In order to mitigate the impact of this constraint, it was recommended that Plan International, CDF and MoR should work jointly to Develop and rehabilitate the feeder roads and bridges identified during the focus group discussions.

Table 6: **Constraint analysis for the mango market segment in Kisumu west District**

| Constraints	Cause	Effect	Intervention	Opportunity
Poor physical markets and market infrastructure	Inadequate investment in physical market and market infrastructures	Poor market infrastructure and uncondusive market conditions	Construction of modern physical markets and market infrastructures	Conducive market conditions leading to improved sales and income
Lack of organized commodity marketing groups	Lack of knowledge and awareness of the benefits of group marketing	Poor produce price leading to low market margins	Training and capacity building on group formation and management	Increased bargaining power leading to premium commodity prices
Lack of knowledge and skills for marketing research	Lack of training and capacity building on market research	Poor marketing strategies leading to low sales volume Low income	Regular training and capacity building on market research	Increased sales volume Increased incomes
High transport costs	Poor rural access road networks. High fuel levies and prices.	Higher product sales price leading to low demand and sales volume	Construction and rehabilitation of rural access roads Lobby for fair fuel levies	Fair transport costs leading to increased market margins and income
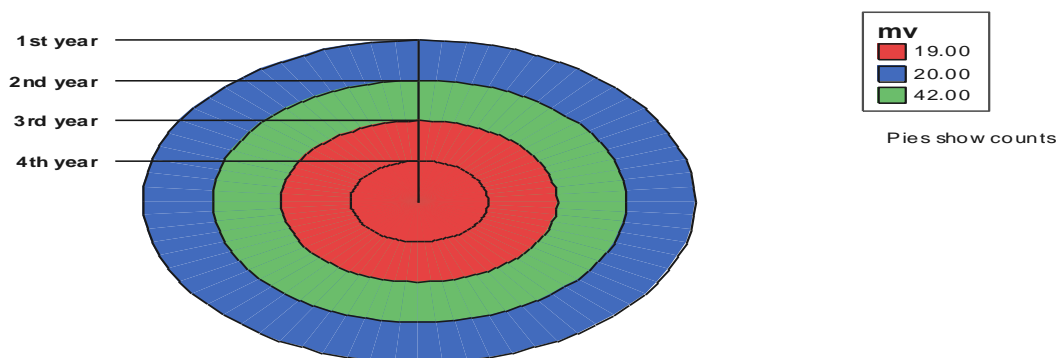
Figure 4**: Marketed volume for mango over the last four years**

Facilitate the formation of Producer Marketing Groups/Associations: Discussion with farmers and interview with traders established that there was lack of sunflower marketing groups in the project area. This was as a result of lack of knowledge and awareness of the potential benefits associated with group marketing. The subsequent impact of this constraint included poor produce prices leading to low market margins. It was therefore recommended that in lieu of the negative impact linked to this constraint, Plan International in collaboration with other relevant stakeholders including MoCDM, Ministry of Gender and Social

Services (MoGSS), VI-Agro forestry, Agricultural Marketing Kenya (AGMAK) and Kenya Agricultural Commodity Exchange (KACE) to support the formation and Operationalizing the commodity marketing groups.

Socio-Economic Determinants

<u>Mango Income Distribution in Kisumu West District</u>

Income distribution is an important consideration in the adoption of new technologies and farm practices in the agricultural sector development. That is, farmers with higher income are more likely to purchase modern farm inputs than those with low income. Figure 5 below shows the income distribution among mango value chain actors in Kisumu West district. Among farmers as Actor in the mango value chain, about 50% of respondents indicated earning an estimated income of less than KES

10,000/= over the last production cycle. This was followed by those who earned between KES 10,000 and 30,000/= with about 40% of respondents identifying with that income category. The least mentioned income category was that of more than KES 30,000/= with only about 4% of mango farmer respondents indicating belonging to that income category. The other actors in the mango value chain and their income distributions are as shown in Figure 9 below. The figure shows that overall, the most prevalent income category among Actors in the mango sub-sector were earning less than KES 10,000/=. This would mean that all categories of Actors from input suppliers, farmers and traders were mostly in the lower income category and would be the groups in greatest need of assistance. However, interventions that require monetary indulgence from them would be a challenge to the group.
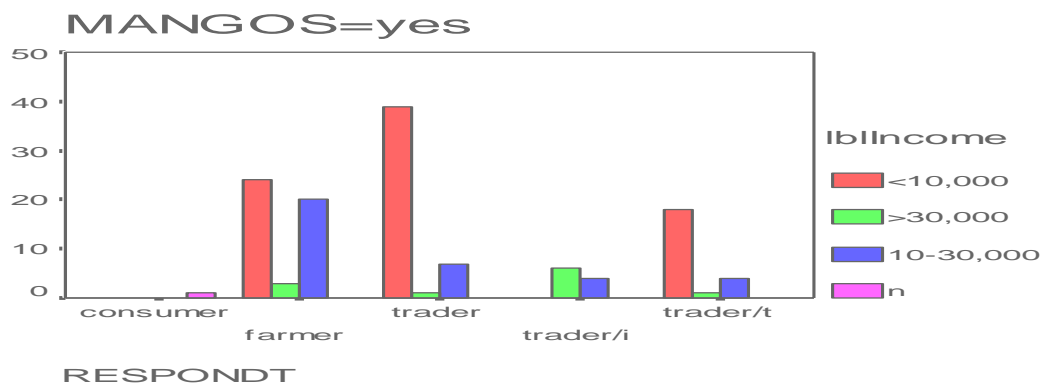

Figure 5**: Income ranges for actors in the mango value chain**

<u>Levels of Education distribution by Actors in the Mango value chain</u>

As a socio-economic variable, level of education is believed to influence acceptance and continuous use of new ideas or technologies associated with advancement in development. Figure6 below shows the distribution of levels of education among the various Actors in the mango sub-sector in Kisumu West district. Traders comprising of Wholesalers and Retailers as Actors in the mango value chain, reported the highest (75%) of respondents with primary level of education in comparison with all actors in

the chain as shown in figure 10 below. Across the board, the second most reported educational level was secondary education with Farmers as a category of Actors indicating 45% among the respondent farmers had secondary level of education. Post-secondary level of education was the least mentioned category of education among the different Actors in the mango value chain with farmers again posting the highest percentage at only 2 percent among the farmer respondents having attained that level of education. These results indicate that with the exception of mobile traders

(transporters), within each actor category, the majority of respondents had relatively low levels of education, that is, primary education or none at all. The implication is that interventions requiring information synthesis and interpretation would be inappropriate to the various Actors in the mango value chain in Kisumu West district.
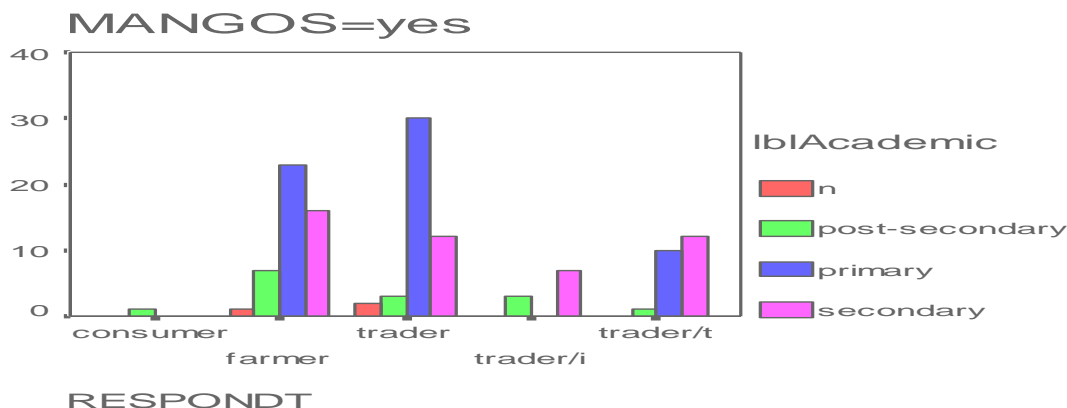

Figure 6: **Level of education of the actors in the mango value chain**

Farm size/operation
Farm size Among Mango Farmers In the context of economic perspectives, the size of agribusiness enterprise have a definite bearing on the optimal operation and ultimate economic vitality as expressed in both gross and profit margin entitlements enjoyed.

The principles of economies of scale points to the fact that for profit maximization, even among small scale farms, there is a level below which profit cannot be obtained. Data analyzed show that 50% of the respondents had orchards of less than 1 acre in size in Kisumu West district. This was followed by those who had orchards of between 1 and 5 acres constituting about 38% of respondent farmers as depicted in Figure 7 below. About 1% of respondent mango famers in Kisumu West district had more than 5 acres. These results indicate that most of mango farmers in the district were operating mango orchards which are unlikely to attain optimal levels to break-even in the mango enterprise.
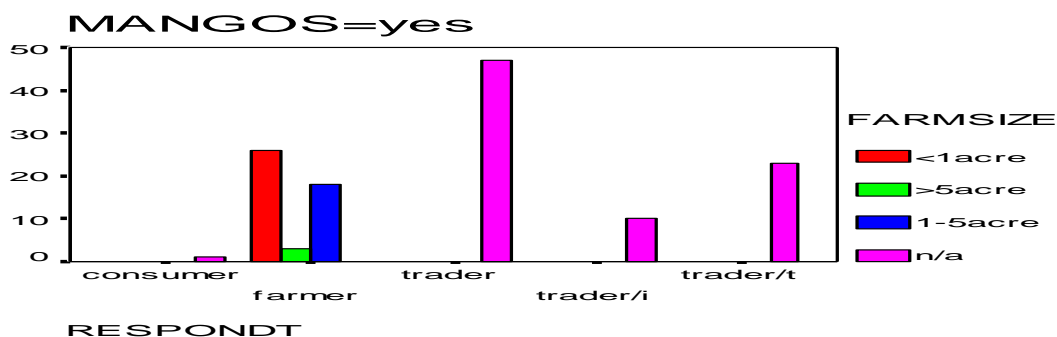

Figure 7: **Graph showing the farm sizes of the mango producers in Kisumu West District**

Size of Trade operation among Mango trader in Kisumu West District

Mango traders, like their producer compatriots in the chain, depends solely on the size of their operations reflected in volume of trade to determine business turn-over and eventual market and profit margin. This is crucial in harnessing business stability and predictable income streams. Results in Figure 8 show that the less than KES 10,000/= was the most reported (80%) business operation size among the respondent traders in Kisumu West district.

Traders running business operations of more than KES 10000/= were merely close to 4 percent of respondent traders. This implied that most of mango traders would fall in the Small and Micro Enterprises (SMEs) typically characterized as family businesses of the one person show type. This means there is a potential to nature this category of Actors into pre-eminent medium and large size mango entrepreneurs.
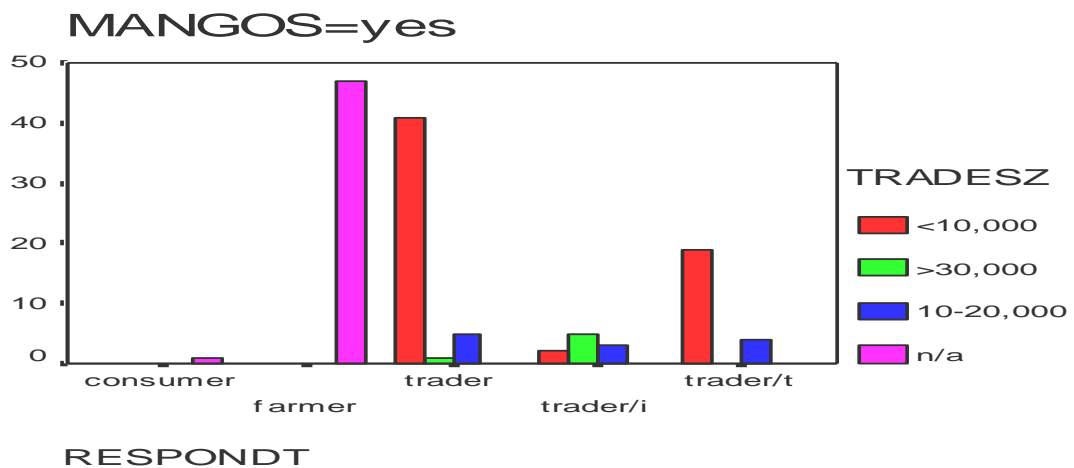

Figure 8**: Trade size ranges in mango value chain**

Gender Distribution among Mango value chain Actors in Kisumu West district

Social studies indicate that gender disparity is an important variable likely to influence the pace of innovation-decision making with the postulation that female Actors in the chain were more likely to take longer innovation-decision periods relative to the male Actors in the chain. On the basis of the results obtained from data analysis, female respondents dominated traders (75 percent) as a category of Actors in the mango value chain while male farmers were the majority (63 percent) among farmers as a category among the Chain Actors (figure 13). As a whole, among all the other Actors in the mango value chain in Kisumu West district, the gender disparity was titled towards the male respondents. This means that interventions targeting female Actors would

only be confined to traders where female respondents were the majority in the mango chain.

The most prevalent age categories among mango traders in Kisumu West district were those less than 35 years of age with a presence of 59%. Those between 35years and 60 years comprised of 35% with the least mentioned age bracket being that of more than 60 years at 6% in that order as shown in Figure 9 above.

The implication of these results when looked at together with findings from Figure 10 on the main actors' age distribution was that the mango market segment of the chain was a preserve of relatively the young who were more often than not, women traders.
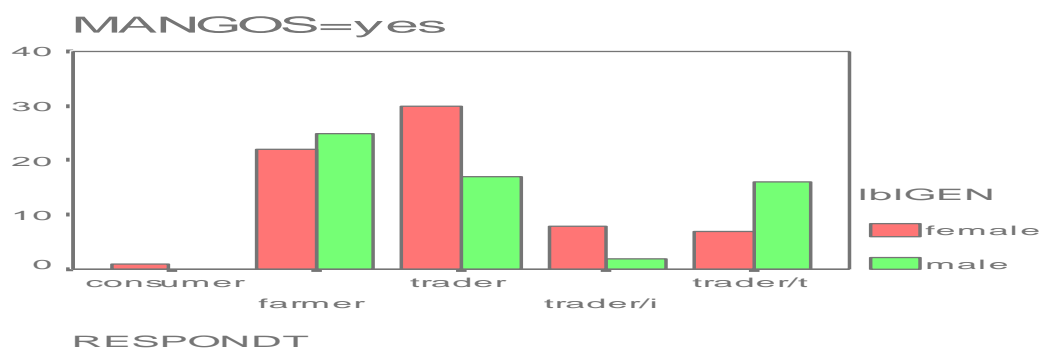
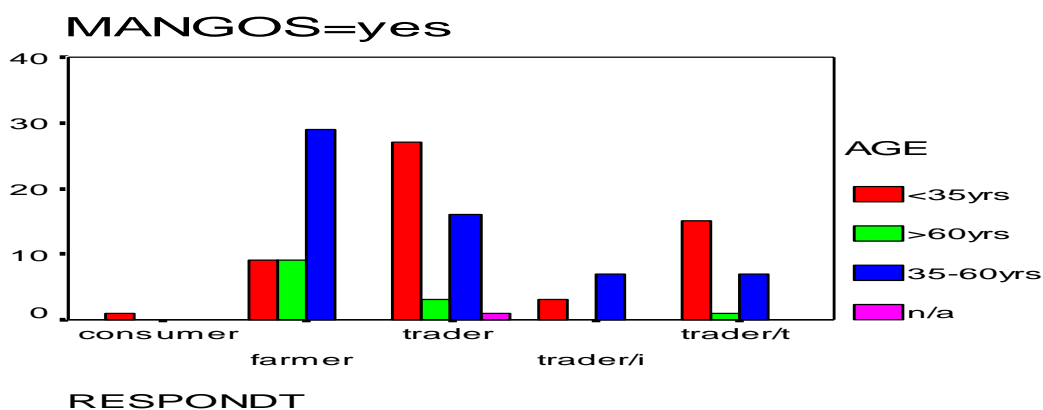Figure 9**: Graph showing the gender disparity of the main actors in Mango chain**

Figure 10**: Main actors in the mango chain by age**

Transportation; a means of transport of choice among the 5 selected commodities value chain was dominated by motorcycles as shown in Figure 11 below. The interpretation is that there is a dire need for prudent investment in the transportation sub-sector across the board in the 5 selected commodities value chains for more appropriate means of transport.
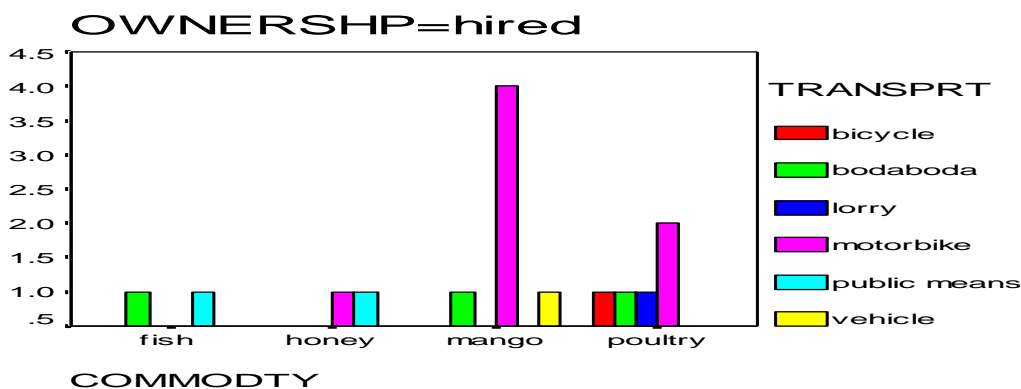

Figure 11**: Means of transport used in the mango value chain**

Conclusion and Recommendations

On the basis of data analyzed, it was concluded that most actors in the mango value chain had low level of education which hamper new agricultural technology adoption particularly those requiring sourcing and interpreting information.

Women dominated the retail market segment of the mango value chain in the district while men had an upper hand in the production segment implying gender disparity in the various segments. As a whole, among all the other Actors in the mango value chain in Kisumu West district, the gender disparity was titled towards the male respondents. This means that interventions targeting female Actors would only be confined to traders where female respondents were the majority in the mango chain.

The results indicated that overall, the most prevalent income category among Actors in the mango sub-sector were earning less than KES 10,000/=. This showed that all categories of Actors from input suppliers, farmers and traders were mostly in the lower income category and would be the groups in greatest need of assistance. However, interventions that require monetary indulgence from them would be a challenge to the group.

Farm sizes or business operation in the district were generally too small for profit maximization or commercialization of the mango enterprise in the district.

Cross-cutting constraints that hinder the revitalization of the mango sub-sector in the district included lack of access to credit facilities, poor market infrastructure; and inadequate quality assurance.

The study recommendations included emphasis on collaboration between Plan International and other development partners, service providers and relevant stakeholders in addressing the constraints identified.

References
FAO. 2008. Policies to Support Agricultural Value Chains Value Chains Approach and Value Chains Development.

Kaplinsky Raphael .2004. Spreading the Gains from Globalization: What Can Be Learned from Value-Chain Analysis? Problems of Economic Transition.

Melle, C., O. Coulibaly, and K. Hell. Agricultural Value Chain Development in West Africa. Methodological Framework and Case study of Mangos in Benin.

Msabeni, A.; D. Muchai; G. Masinde; S. Matoke and V. Gathaara. 2009. sweetening the mango: Strengthening the value chain. An analysis of the organizational linkages along and within the mango value chain in Mbeere district, Eastern province, Kenya.

Tineke voor den Dag. 2003. Export chain of French beans from Kenya. MSc Thesis: Development Economics Group, Marketing and Consumer Behaviour Group. Wageningen University.

Tschirley, D.; M. Ayieko; M. Hichaambwa; J. Goeb; and W. Loescher .2010. Modernizing Africa's Fresh Produce Supply Chains without Rapid Supermarket Takeover: Towards a Definition of Research and Investment Priorities. MSU International Development Working Paper No 106