EFFECT OF TRANSACTION COSTS ON CHOICE OF MANGO MARKETING CHANNEL AND INCOME OF SMALL-SCALE FARMERS IN MAKUENI COUNTY, KENYA

CHARITY MUKAMI MAINA

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DECLARATION AND APPROVAL

DECLARATION

I declare that this thesis is wholly my original work and to the best of my knowledge has not been presented for the award of any degree in this or any other university.

Signature: .... Date: ....

Charity Mukami Maina
KM17/3021/11

APPROVAL

This thesis has been submitted to graduate school for examination under our approval as university supervisors.

Signature: .... Date: ....

Prof. J.K. Lagat

Department of Agricultural Economics and Agribusiness Management,
Egerton University.

Signature: .... Date: ....

Prof. B.K. Mutai

Department of Agricultural Economics and Agribusiness Management,
Egerton University.

DEDICATION

I dedicate this thesis to my parents and my sisters Elizabeth Wanjiku and Nelly Nyangige for their continued support and prayers.

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ABSTRACT

Makueni County in Kenya is one of the leading producers of mango fruits. The County experiences surplus mango production that ends up being wasted or sold at throw away prices due to imperfect marketing. The marketing of fruits is liberalized giving rise to multiple channels. Given the freedom to select a channel, different transaction costs such as information cost, negotiation and contract enforcement have not been evaluated in relation to farmer's choice of marketing channel. This study evaluates what influences choice of a particular channel and the gain from trading in the channel in terms of revenue. Specifically, the study analyzed the effect of transaction costs on choice of mango marketing channel, mango revenues obtained in different marketing channels and the effect of marketing channels on farmers' income. A simple random sampling was used to select 277 households where primary data was collected using semi-structured questionnaire. Data was analyzed using descriptive statistic, multinomial Logit regression model (MNL), gross margin analysis (GMA) and Ordinary Least squares (OLS). MNL results indicated that extension visit, age, education, experience, extension, gender, trust level, search in market price, information cost, transport cost, negotiation time, group membership and market distance significantly influenced the choice of marketing channel. GMA results showed that there exist significant differences in the gross margins in all the channels as a result of variation in prices in the four channels and also the difference in transaction costs. Reducing transactions cost and improving information symmetry can be enhanced through improving social networking among the farmers. The study recommends that the stakeholders should re-evaluate the existing information dissemination pathway, and promote farmer awareness of the available technologies such as SMS services, radio, television and internet where they can access price information and formal markets for mangoes. The government should invest in rural infrastructure in order to reduce high transport cost incurred by the farmer due to bad roads accessed when transporting mango to the market. Policy implementers should promote gender awareness by empowering more women to engage in mango farming. In developing market linkages, policies in support of promoting formation of mango marketing group should be enhanced in order to promote knowledge dissemination, improve farmers bargaining power, reduce the transaction cost and increase the income of the farmers.

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FAO   Food and Agriculture Organization

Ha   Hectare

HCDA   Horticultural Crop Development Authority

IFAD   International Fund for Agricultural Development

IFPRI   International Food Policy Research Institute.

KALRO   Kenya Agricultural Livestock Research Organization

KES   Kenyan shillings

Kg   Kilogram

KNBS   Kenya National Bureau Statistic

MT   Metric ton

MNL   Multinomial Logit model

MoA   Ministry of Agriculture

NIE   New Institutional Economics

SPSS   Statistical Package for Social Sciences

SSA   Sub-Saharan Africa

CHAPTER ONE
INTRODUCTION

1.1   Background information

Access to new and better-paying markets for agricultural products is vital in enhancing and diversifying the livelihoods of poor subsistence or semi-subsistence farmers (Barrett, 2009). Assured markets have implication on producer decision with regards to choice of input as well as on the choice of marketing channel for the output. The type of marketing channel available not only has influence on producer choice of commodity but also determines relationship between processors and ultimate consumers.

1.1.1   Horticulture sub -sector

Kenya is a large horticultural producer in the world (Minot and Ngigi, 2004; HCDA, 2010). The sub-sector comprises vegetables, flowers, fruits, nuts, medicinal and aromatic plants (MAPS). Of the total value of horticultural produce, vegetables account for (44.6 %), fruits (29.6%), flowers (20.3%) while nuts, medicinal and aromatic plants account for the rest. The horticulture sector plays an important role in the socioeconomic welfare of Kenyans. The horticultural sector employs directly and indirectly about 4 million people and small scale farmers contribute over 60% of the production (HCDA, 2012). Most Kenyan horticultural farms are small units of less than two hectares (HCDA, 2010) with vegetables dominating followed by fruits and cut flowers.

In 2012, fruits contributed KES 61.5 billion accounting for 22% of the domestic value of horticultural produce. The area under fruit was 167,000 hectare (ha) with a production of 5.2 million tons. Although the area under fruits declined by 6% as compared to the previous year, the production and value increased by 46% and 1% respectively due to favourable weather. The main fruit categories grown in Kenya are the tropical and temperate fruits. The major fruit grown in order of importance are bananas (37.6%), mangoes (19.6%), pineapples (12.1%), avocado (9.8%), paw paw (5.4%), oranges (4.6%), water melon (4.2%) and passion fruit (3.7%) (HCDA, 2012).

1.1.2   Mango production and marketing

Mango (*Mangifera indica*) production has been on the increase due to enlarged demand for fruits for fresh market, processing, and health concerns. In the effort to develop a cash crop in the marginalized areas, there has been an upward trend in both production and

expansion in 2012 registering 57,021 ha and 2.8 million Metric Ton (MT), especially in North Rift and Eastern region As a result, the value increased to 13 billion from 11.9 billion in 2011. This steady increase can be attributed to marketing systems with various government and private sector initiatives across the value chain, increase in mango juice and salad consumption. In terms of value, the leading counties in mango production were, Makueni (21%), Machakos (21%), Kilifi (15%) and Kwale (13%) (HCDA, 2012).

As an export crop, mango earns the country foreign exchange while at the same time acts as a source of food and household income for resource poor farmers. There are about 32 mango varieties in Kenya grown in various parts of the country categorized as local and exotic. The latter are grafted on local mangoes and are grown for the export market. Most local varieties tend to have high fibre content, commonly referred to as "stringy", and this characteristic makes them unpopular for fresh consumption. The local mango varieties are left to grow naturally without much crop husbandry. The local varieties are *ngowe, dodo, boribo and batawi*. The exotic varieties grown in Kenya include Apple, Kent, Keit, Tommy Atkins, Van Dyke, Haden, Sensation, Sabre, Sabine, Pafin, Maya, Kenston and Gesine (Griesbach, 2003).

Approximately 98% of mangoes produced in Kenya are consumed locally or processed while the remaining 2% enter the export market in the Middle East and in some European countries (HCDA, 2012). Mangoes earned Kenya $70 million in 2010 in the domestic market, up by 25% per year from $23 million in 2005. Likewise, export earnings were $10.1 million, which was 25% higher than 2009. On average, Kenyans consume 12.7 kilogram of mangoes *per capita* per year giving a total estimated consumption of 474,608 metric tons in 2009. Currently, Kenya mango export earnings amount to roughly $10 million per year; a 31% annualized increase since 2008, when exports were valued at $5.9 million (MoA, 2012).

Research on mango has been accorded a high priority under the horticulture program (KALRO, 2005; KALRO, 2008). The development policy spells out the need to accelerate the transformation of the sub-sector from subsistence to business and market-oriented agriculture. Thus, according to Salami *et al*. (2010) one way of empowering small scale farmers is through improving access to input and output markets in order to transform the agricultural sector from subsistence to commercial production. However, the existing

constraints in post-harvest practices, disease/insect-pest management (KALRO, 2006) and inefficiencies in infrastructure and marketing systems have led to low profitability of small scale farmers (Minot and Ngigi, 2004). Poor organization of mango farmers reduces prosperity of their businesses thus, by organizing farmers there are opportunities for them to develop and gain financial resources which may lead to decreased rural poverty (IFAD, 2010). An increase in market participation in turn makes it easy for farmers to shift into commercial farming, in turn increasing economic growth (Jari and Fraser, 2009).

Past research in Kenya concentrated on introduction of high yielding varieties (Gathambiri *et al.*, 2006). Yet even with availability of high yielding varieties and absence or inefficient market structures, returns from mango farming will not be realised. Carlander and Lothigius (2011) suggested that the most suitable marketing strategy for the small scale farmers in Nyanza is to collaborate with each other and with different organizations. Collaborations bring many advantages for the farmers such as accessing financial resources, knowledge, information and larger markets, enhancing their bargaining power, and increased profits. Msabeni *et al.* (2010) indicated that the major challenges to mango value chain strengthening include weak or lack of organizational/institutional linkages and low capacities between and within the different stakeholders along the value chain. These, coupled with poor infrastructure, have significantly contributed to the poor performance of the mango industry. If these are not addressed from the ground level, the country's competitiveness will trail further beyond the current stage.

1.1.3 Small scale mango marketing and transaction costs

Most mangoes produced are consumed within the same production area or sold in local urban markets. Lack of local processing technologies to preserve it causes high wastage due to perishability nature of the fruit. A market exchange involves transactions costs which can be fixed or variable. These transaction costs are related to farmers produce, market produce, difficulty in enforcing contracts, reliability on middlemen, location in remote areas and inability to meet stringent food safety norms (Nkhori, 2004). Mango is a highly perishable commodity and due to its high frequency of exchange, transaction costs will always arise among the interaction of actors in the channels. Transaction costs are categorized into three groups namely information costs, negotiation/contract costs and monitoring/enforcement costs (Hobbs, 1996; Stanford *et al.,* 1999; Adhikari and Lovett, 2006). Transaction cost approach offers another perspective to help understand the forces

shaping channel structure (Klein *et al.,* 1990). North (2000) stated that institutions that emerge to reduce transaction costs are crucial to the performance of economies. The role of the government is also crucial in specifying property rights and enforcing contracts both of which promote specialization and reduce the costs of market exchange. The inability of societies to develop effective, low-cost enforcement of contracts is an important source of stagnation and contemporary underdevelopment in the developing countries (North, 2000). In Kenya underdeveloped rural roads and other key physical infrastructure have led to high transport costs of marketed agricultural products as well as farm inputs, which reduce farmers' competitiveness (Salami *et al*., 2010).

Mango marketing involves a number of actors as the fruit is transported from the farm to the final consumer. Farmers can market their fruit themselves or through alternative actors in the marketing channel. In Makueni, a farmer can market their mango by selling directly at the market, to brokers, local traders or through mango marketing groups. The area under mangoes in Makueni increased from 6,721 ha to 11,574 ha between 2011 and 2012 respectively. The value increased from KES 2,272 to 2,778 millions in 2011 and 2012 respectively. The quantity produced in 2011 was 60,396 tons and in 2012; 138,887 tons of mangoes were produced in the County (HCDA, 2012). Infrastructure factors such as type of road accessed by the farmers in transporting mangoes to the market determined whether the farmer will participate in the market directly or they will use middlemen. The condition of the road is also important as it will either increase or reduce the transport cost to the market. Small scale famer decision to participate in a particular channel is therefore influenced by the transaction cost incurred in the channel. Low transaction cost is an incentive for the farmer to increase production and obtain high income from the traded output.

1.2   Statement of the problem

Makueni County experiences surplus mango production from time to time. The surplus ends up being wasted or sold at throw away prices due to imperfect marketing. Though there exists various market channels, different transaction costs such as information cost, negotiation and contract enforcement have not been evaluated in relation to farmer's choice of marketing channel. This study evaluates what influences choice of a particular channel and the gain from trading in the channel in terms of revenue.

1.3   Objectives of the study

1.3.1   General objective

Contribute to transaction costs influence on choice of marketing channels and income of small scale mango farmers in Makueni County.

1.3.2   Specific objectives

1. To determine socio-economic characteristics of small-scale mango farmers.
2. To determine effect of transaction cost on choice of mango marketing channel.
3. To determine mango revenues obtained in the different marketing channels.
4. To establish the effects of marketing channels on farmers' income.

1.4   Research questions

1. What are the socio-economic characteristics of small scale mango farmers?
2. What are the effects of transaction cost on choice of mango marketing channel?
3. What revenue is derived from each marketing channel?
4. What are the effects of marketing channels on farmers' income?

1.5   Justification of the study

Kenyan Government plan to eradicate poverty through modernization of agriculture can be realized for the rural poor, when the markets are defined and certain. This can be achieved through understanding what informs farmers to sell their produce through a given marketing channel and the costs incurred while accessing that particular channel. The current structures of income and consumption among developing countries suggest that significant reductions in poverty will hinge on the collective ability of the farmers, governments and agricultural specialists to stimulate and sustain broad-based agricultural growth with strong focus on improving marketing conditions for the producers. One way of improving the market conditions in the study area, required knowledge of factors that influence transaction cost faced by small scale farmers with ultimate benefit of improved household income from farming. Farmers are expected to benefit from information obtained when making decision on the most profitable channel to market their mangoes. The information is expected to guide policy makers and both public and private stakeholders to make informed decisions in promoting mango investment in the country; given that comprehensive policy recommendations require a more detailed study on the transaction costs impact and

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determinants on the behaviour of economic agents. The study contributes to the literature on transaction cost economics.

1.6   Scope of the study and limitation

The study was confined to small scale mango farmers of Makueni County; other actors in mango value chain were excluded. Due to lack of farm records among farmers, the study mainly relied on the farmer's memory during data collection.

1.7　Definition of terms

Markets

Markets can be grouped into formal and informal (Jari and Fraser, 2009). Formal markets have clearly defined grades, quality standards and safety regulations and prices are formally set while informal markets embrace unofficial transactions between farmers and from farmers directly to consumers (Kherallah and Minot, 2001). In comparison to formal markets, informal markets are more common among medium and smallholder farmers.

Marketing channel

Marketing channel is defined as a set of interdependent organizations that help make a product available for use or consumption by the consumer or business user (Kotler and Armstrong, 2003). For the purpose of this study, the marketing channels used were direct sale to the market, brokers, local traders and marketing group channel.

Small scale farmers

Small scale farmers constitute a significant proportion of the rural economy and the poor in developing countries (Narayan and Gulati, 2002). For the purpose of this study, small scale farmers were farmers with less than two hectares of land.

Transaction cost

Transaction costs include costs associated with searching for a trading partner with whom to exchange, costs of screening and bargaining with the partner and then costs of enforcing the contract made with the trading partner (Kirsten and Vink, 2005).

CHAPTER TWO

LITERATURE REVIEW

2.1 Overview

The chapter begins by indicating literature reviewed on market participation decision, the determinants of marketing channel selection under transaction cost as identified by researchers in different market sectors and regions, transaction cost and socio-economic factors. The chapter ends with the review of transaction cost economic and random utility theory and finally conceptual framework.

2.2 Transaction costs and small scale farmer market participation

There are various factors that influence small scale farmers' decision to participation in the market. Various studies have indicated that uncertainty is an attribute of transaction costs which establishes whether a farmer is concerned with grade uncertainty when selling the products (Hobbs, 1997; Nkhori, 2004; Gong *et al*., 2007). Farmers face uncertainty in situation where prices are not available to them in advance prior to a transaction taking place. Therefore, the higher the degree of uncertainty, the lower the probabilities of participation in that particular marketing channel. The speed of payment which may be defined as the delay between the time when the product is sold and the time when the payment is received is also one of the important waiting costs. Nkhori (2004) and Gong *et al*. (2007) showed that higher speed of payment will increase the probability of farmers to participate in a particular channel. Good roads, transportation and communication links are prerequisites to market access especially to potential market participants that reside in rural areas because of the larger and longer distances between them and the markets (Machethe, 2004)

Socio-economic characteristics such as age, gender, education level, land and access to off farm income can influence the costs of information seeking, negotiating, monitoring, and enforcement. Further studies have also shown that the higher the level of education, the higher the probability to enter into an arrangement with a large dairy company since one is more capable to manage their farm and subsequently supply milk with higher levels (Voors, 2006; Gong *et al*., 2007). Formal education enhances managerial competence and successful implementation of improved production, processing and marketing practices (Marenya and Barret, 2007). The level of education is believed to influence acceptance and continuous use of new ideas or technologies associated with advancement in development.

The gender of the household head is expected to affect the type of marketing channel used in that female producers are expected to use direct marketing channels compared to male producers (Sserunkuma *et al*., 2010). Off farm income enables the farmer to purchase necessary inputs to meet quality requirements of the sustainable marketing channel (Marenya and Barret, 2007).

2.3   Factors that affect market participation decisions

Availability of good market infrastructure such as roads and market places, existence of extensive social capital, group participation and guidance from tradition positively influence informal marketing; implying that households are likely to shift from non-marketing to informal market participation with an increase in any one of the variables (Jagwe, 2007; Jari and Fraser, 2009). Other factors such as expertise on grades and standards and availability of contractual agreements would influence participation in either formal or informal marketing channels (Jari and Fraser, 2009; Jari and Fraser, 2012). The gender of the household head has a significant impact in the market participation decision. Male headed household are expected to have positive impact on market participation because they are resource endowed compared to their counterpart female. Jagwe *et al*. (2010) noted that, female headed households are more negatively affected by the transaction costs of searching for buyers, contracting and enforcing a sale transaction as opposed to the male headed households. Moreover, Guiterrez (2003) observed those female headed households are more likely to be resource constrained hence affecting production of marketable surplus.

Source of price information increases the likelihood of market participation for sellers (Jagwe, 2007) and output price is an incentive for sellers to supply more in the market (Alene *et al*., 2008). However, poor access to market information result in information-related problem such as moral hazard and adverse selection which increase transaction cost and discourage farmers participation in market (Fatchamp and Hill, 2005; Shiferaw *et al*., 2009). Physical distance is another determinant of market participation factor (Brewer, 2001; Blandon *et al*., 2009). Physical distance often results in targeting markets close to the farm, since geographic proximity is likely to imply more knowledge about markets and guarantees easier access to information with low travelling and transportation costs (Andersen and Buvik, 2002; Montshwe, 2006; Otieno *et al*., 2009). Alene *et al*. (2008) argued that output price is an incentive for sellers to supply more in the market.

Results by Makhura *et al.* (2001) using Heckman's two stage model to assess transaction costs and smallholder participation in the maize market in the Northern Province of South Africa showed that significant variables were land size, livestock values, pension earnings, education, ownership of a tractor or vehicle, proximity to markets and conditions of the roads. Contacts with extension officers influenced positively participation in maize markets (Makhura *et al.*, 2001) and also in vegetables, fruits and dairy markets (Olwande and Mathenge, 2010). However, the transaction cost was not quantified in the studies. Probit method was used to assess transaction costs and small holder farmers' participation in banana markets in the Greater Lakes Region. The results indicated that transaction cost related factors such as geographical location of households, market information sources and travel time to the nearest urban centre do influence participation. Other factors such as labour availability, farming experience, gender of household head, off-farm income and the asset base of the household also affect the likelihood and intensity of participation (Jagwe, 2011).

Otieno *et al.* (2009) focused on factors influencing the intensity of market participation by smallholder farmers, a case study of rural and peri-urban areas of Kenya and used the truncated regression model for analysis. Results showed that farmers in peri-urban areas sold higher proportions of their output than those in rural areas. The intensity of market participation can also be influenced by transaction cost factors: distance from farm to point of sale was identified as a major constraint to the intensity of market participation (Otieno *et al.,* 2009; Jagwe, 2011). For peri-urban farmers, the intensity of market participation is significantly increased by the household head's education level and access to formal market information channels. Better output price and market information were identified as the key incentives for increased sales. These results revealed that transactions costs had significant effects on the intensity of market participation however the studies did not quantify these costs and their effect on choice of channel.

Moyo (2010) utilized multiple regression and probit models to analyse market participation of small grains in Zimbabwe. The results indicated that transaction related factors such as previously agreed prices, confidence and trust in the buyer, difference in price knowledge and delayed payments had a significant impact on the quantity of grain sold and extent of market participation. Other transaction cost related factors such as information costs, negotiation time and transportation costs were not documented in this study.

Ownership of transport and communication equipment, membership in farmer organizations/groups, distance to tarmac road and extension service were proxies for household specific transaction cost that were used in Olwande and Mathenge (2010) on market participation among rural households in Kenya. Double hurdle model was used and the results showed that membership in farmer organizations/groups is positively and significantly associated with higher probability of participating in maize, vegetables and milk markets. Distance to tarmac road was negatively and significantly associated with the decision to participate in vegetables and milk markets.

Results of Jagwe (2007); Olwande and Mathenge (2010) showed that ownership of communication equipment such as radio, television and phone is positively and significantly associated with a greater likelihood of participating in vegetables, fruits and milk markets. Ownership of transport equipment is significantly associated with the decision to participate in the market (Key *et al.,* 2000; Makhura *et al.*, 2001; Olwande and Mathenge, 2010). Although results revealed that transactions costs had significant effects on market entry and intensity, these costs were not quantified in the study.

2.4   Transaction costs and choice of marketing channel among small scale farmers

Speed of payment, grade uncertainty and distance to market negatively influenced the probability of selling to a particular market channel (Nkhori, 2004; Ogunleye and Oladeji, 2007). Smallholder farmers before choosing a marketing channel, consider the costs associated with transportation, profits, level of trust among the available brokers and familiarity of the markets (Makhura *et al.,* 2001). Time of payment, mode of payment and price of product influenced cocoa farmers of Osun state, Nigeria to participate in the market channel. Majority of the farmers patronized itinerant buyers, cocoa merchant, other farmers and cooperative society store in that decreasing order (Ogunleye and Oladeji, 2007). The study concluded that delay in payment discouraged farmers from the choice of a channel. Hence, delay between when produce are sold and when payment are made is an important negotiation cost that influenced the choice of a channel for cocoa farmers. However, ranking of farmers based on assigned scores presented inconsistencies because of generalization.

The impact of transaction costs on choice of cattle markets in Botswana, using probit model Nkhori (2004) found that herd size and access to market information were positive and significantly influenced the probability of selling to Botswana Meat Commission (BMC).

Although the results showed that transactions costs had significant effects on choice of cattle markets in Botswana, these costs were not quantified to show revenues from different channels.

Zuniga-Arias and Ruben (2007) showed four major factors in their analytical framework when investigating determinants of market channel choice for mango producers in Costa Rica. The factors were farm household (farmer's experience, risk attitude and trust); production system (farm size and production scale); price attribute and market context (having or not a written contract, geographical location and distance to urban markets). Farmers' bargaining power is important in marketing channel decision and has to be taken into account when explaining actors' marketing decisions (Kabeer, 2002; Gong, 2007; Zuniga-Arias and Ruben, 2007).

Nyaupane and Gillespie (2010) used probit model on crawfish market decision. The results showed that farmers chose a market channel considering its convenience and economic profitability. The results also showed that most farmers chose wholesale markets compared to selling directly to consumers, retailers and producers. The farmers' demographics that were significant were age, gender, marital status and education level. However, in this study, the variable distance to major market was omitted in the regression yet it bears vital importance in channel choice (Vijay *et al*., 2007) and the sample size used was too small to support such an econometric framework as was ascertained by the researchers.

Logit model was used by Mburu *et al*. (2007) on determinants of smallholder dairy farmers' adoption of various milk marketing channels in Kenyan highlands. The results revealed that, dairy cooperative channel was the only significant channel (P<0.05). The itinerant traders channel such as hawkers, neighbours and hotels were non-significant (P > 0.05). Land leased, average milk price KES/Kg, total number of cow milked and farm acreage negatively influenced farmers' adoption of milk marketing. The upper midlands, lower highlands, hired permanent labor, household head worked off-farm, average milk production per cow (Kg/day), dairy cooperative as a source of animal production information, and availability of credit services had positive influence. However, the study did not evaluate the effect of channel selection factors on revenues that dairy farmers received from the enterprise.

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Results on factors influencing cowpea producers' choice of marketing channels in Zambia using probit model showed that price, inventory, mechanization and transport were significant determinants of producer market participation decisions. Cowpea producers sold to a particular channel as long as it presented a ready market to the seller. Markets were the only significant factor. The farmers who owned some form of transport were about 7% more likely to sell cowpeas than those who did not have any transportation implements. This can be attributed to the fact that those who owned transportation implements were able to travel further distances in order to sell cowpeas to markets that offered higher prices than the homestead markets (Mzyece, 2010).

Chirwa (2009) analyzed the determinants of marketing channels among smallholder maize farmers in Malawi using multinomial Logit regression. Chirwa observed that the education level of a farmer is an important determinant of market channel choice. On the contrary, those who possessed a post primary qualification did not statistically influence the choice of a marketing channel. Size of plot under cultivation and price was insignificant. Maize commercialization, repeated transactions, perceptions on price offered, farmer's belief about prices, contractual arrangements, and infrastructure services were significant.

Jari and Fraser (2009) provided an insight into the institutional and technical factors that influence agricultural marketing channel choices among smallholder and emerging farmers in Kat River Valley. The institutional factors that influence agricultural marketing channel choices included transaction costs, market information flow and the institutional environment which encompasses formal and/or informal rules, the use of grades and standards, organization in the markets and the legal environment. The fewer the physical infrastructure constraints, the less the transaction cost of taking products to potential end users and this encourages farmer participation in markets. Although the study observed that an appropriate institutional environment reduces transaction costs for traders, socio-economic factors was not considered in the analysis instead only technical and institutional factors were considered as factors affecting channel choice.

Distance to the market was also identified to be an important variable in analysing market participation channel choice decisions. Road infrastructure and transport availability have an influence on smallholder market participation, especially if they are located at a distance from the consumption centers (Gabre-Madhin, 2001, as cited in Jari and Fraser,

2009). One of the most important constraints facing agricultural markets throughout sub-Saharan Africa is transport infrastructure (Bachmann and Earles, 2000). Therefore, transport cost need to be reduced since, majority of the smallholder farmers are in the rural areas and are served by an inadequate and poorly maintained road network (Montshwe, 2006).

A farmer choice of cattle marketing channel is influenced by a number of transaction cost variables, but may also be influenced by the socio-economic characteristics of the farmer or farm. Gong (2007) in a study of transaction costs and cattle farmers choice of marketing channel in China, found that the probability of selling through spot market is negatively influenced by bargaining power and positively influenced by payment delay, farm specialization and grade uncertainty. Producer characteristics that influenced positively the probability of selling through spot markets include ownership, age and education level and negatively by experience. However the study did not quantify transaction costs and relate these costs to revenues farmers received.

Marketing portfolio choices by independent peach growers through application of the Polychotomous Selection Model showed that in selecting a marketing channel for fresh peach sales, Georgia commercial peach growers choose the channel after accounting for buyers' preferences for quality attributes. Both external and internal quality attributes were essential factors influencing the choice of a marketing channel and the share of the crop marketed. Orchard characteristics and the variety-determined fruit maturity were the other factors that influenced the choice and the volume sold in each marketing channel (Wojciech *et al*., 2003).

Hobbs (1997) employed two-limit tobit model to measure the importance of transaction costs in cattle sector affecting the choice between live-ring auction and direct-to-packer sales. The result showed the major transaction factors influencing the proportion of cattle sold through the auctions were grade uncertainty surrounding direct-to-packer sales (positively), the risk of non sale at auctions, the time spent at the auction and adequacy of the packer procurement staff (negatively). Analysis of transaction costs as key factors for processors selection of supply channels in United Kingdom meat processing sector showed monitoring costs arising from traceability are important to the choice of vertical coordination; pressures for greater traceability increases the demand from downstream firms to move towards closer forms of vertical coordination (Hobbs, 1996). Zaharieva *et al*. (2001) investigation on the choice of supply channels by Bulgarian wine makers identified four

types of channels which differed in the costs of using them and effectiveness of information transmission from processors to growers. Results revealed that despite the difficulties created by the underdeveloped market and barriers in finding investment financing, the expected long-run benefits of vertical integration offered sufficient incentives to firms to pursue alternative ways of accomplishing this initiative.

2.5   Theoretical framework

This study was based on transaction cost economics and theory of random utility.

2.5.1   Transaction cost theory

Transaction cost economic is part of the New Institutional Economics – NIE (North, 1990). The NIE helps provide an understanding of economic institutions to facilitate economic outcomes that are more applicable in the agricultural sector. Traditional neoclassical economics offers little insight on how such economic relationships are structured. Their focus is on perfect market where price and quantity are the main variables. The concept of transaction costs was first introduced by Coase (1937) and has been widely used agricultural economics studies and related fields in developing countries (Fafchamps, 2004; Fafchamps and Hill, 2005; Jaffee, 2005; Okello and Swinton, 2007). Kirsten and Vink (2005) defined transaction costs to include costs associated with searching for a trading partner with whom to exchange, costs of screening and bargaining with the partner and costs of enforcing the contract made with the trading partner.

Hobbs (1996; 1997) classified transaction costs into three main areas: information, negotiation and monitoring cost. Information costs are the costs of obtaining information about products, process, suppliers and customers. Transaction costs are also viewed as the observable and non-observable costs associated with exchange and they are the reason why the resource poor are not able to access markets (Coase, 1937; Holloway *et al*., 2000; Makhura *et al.,* 2001). Transaction cost are cost incurred before entering a market exchange and include the costs of obtaining market price information and identifying a suitable trading partner (Getachew and Nuppenau, 2009). Farmers who need to sell produce have to search for buyers and screen-off unreliable or opportunistic ones thus incurring search and screening costs. Negotiation costs occur during transaction and arise since the farmer has to negotiate the terms of sale. While monitoring costs arise after the transaction has been negotiated and are the costs of ensuring that the transactions are adhered to by the other party. Most

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transaction costs are hidden costs hence the concept of opportunity cost is usually used to capture them (Kirsten and Vink, 2005). To measure these cost directly is difficult and as a result proxy variables are used to capture the transaction costs (Hobbs 1997; Nkhori 2004; Voors 2006; Gong *et al*., 2007).

2.5.2   Random utility theory

The rational choice theory assumes that individuals rank mutually exclusive alternative marketing channel in order of utility. The decision maker aims at maximizing expected utility of profits. O' sullivan *et al*. (2006) pointed out that it is difficult to measure utility directly. Therefore, it is assumed that households make choices depending on the option that maximizes their utility. Farmers then choose the channel with maximum expected utility given their socio-economic characteristics and relevant transaction costs embedded in each channel. Random Utility Maximization model (RUM) can be used to conceptualize farmer choice of marketing channel since it is appropriate for modelling discrete choice decisions such as between marketing channels. It is an indirect utility function where an individual with specific characteristics associates an average utility level with each alternative marketing channel in a choice set.

Small scale mango farmers were mapped into four mutually exclusive channels: direct sales to the market, local traders, brokers, and sales through producer marketing groups. Let decision-maker *i* choose from a set of mutually exclusive alternatives, j = 0, 1, 2…, J. The decision-maker obtains a certain level of utility U*ij* from each alternative. Since the discrete maximizes his utility. The producer makes a marginal benefit-marginal cost calculation based on the utility achieved by selling to a market channel or to another. Famers' utility is not observed but instead observe some attributes of the alternatives as faced by the decision-maker. Hence, the utility is decomposed into deterministic (V*ij*) and random (ε_{ij}) part:

$$u_{ij} = v_{ij} + \varepsilon_{ij} \ \forall ij \in N \tag{1}$$

Since ε_{ij} is not observed, the decision-makers' choice cannot be predicted exactly. Instead, the probability of any particular outcome is derived. The utilities (or the difference between benefit and cost) cannot be observed directly but the choice made by the producer

reveals which one provides the greater utility (Greene, 2002). A producer selects market channel j=1 if

$$u_{ik} > u_{ij} \quad \forall j \neq k \tag{2}$$

Where U_{ik} denotes a random utility associated with the market channel j=k, and V_{ij} is an index function denoting the producer' average utility associated with this alternative. The second term ε_{ij} denotes a random error which is specific to a producer's utility preference (McFadden, 1976).

2.6   Conceptual framework

A farmer's choice of mango marketing channel is influenced by a number of transaction cost variables, but may also be influenced by the socio-economic characteristics of the farmer. Socio-economic characteristics that were postulated to influence choice of marketing channel in this study were age, gender, education level, land size planted with mangoes, off farm income and farm experience. Transaction cost variables expected to influence choice of marketing channel include: information cost about prices, product and buyers. The more time and energy spent searching for market information, the higher the information costs. Bargaining power refers to whether farmers passively accept transaction prices or negotiate against their buyers.

Distance to a reliable market was postulated to have effect on the channel that farmer chose. The further away the nearest market is, the less likely it will be for farmers to sell to the market but instead choose to market through other alternative channel such as farm gate. Transport cost increase with increase in distance from the farm to the market. Transport costs and distance to markets were observable factors used to explain transaction costs. Infrastructure factors such as mode of transport, transport ownership, type of road, and condition of the road can influence transaction cost and choice of marketing choice. Ownership of transport means facilitates easy movement of produce from the farm to the market. Roads that are poorly developed/ in bad condition, hinder movement and make it difficult to transport fresh produce within the required time limit due to the perishability nature of mangoes. Institution factors such training and extension service provided to the farmers is also hypothesized to influence choice of marketing channels. The conceptual framework hypotheses that given different choice of marketing channels, the farmer will

choose that which reduces transaction cost and maximizes his/her profits. When profits are maximized the household will have increased household incomes.

Infrastructure factors	**Institutional factor**
Mode of transport, transport ownership, type of road, condition of the road	Access to extension service, training contact, group membership, Contractual arrangement

Socio-economic factor
Age, gender, education level, land size planted with mangoes, off-farm income, market experience

Choice of marketing channel

- Direct sale to market
- Local traders
- Brokers
- Marketing group

Transaction cost factors

Information cost, search for market price, bargaining power, distance to market, negotiation time, transport cost

Improved household income

⎯⎯⎯► Direction of influence

Figure 1: Conceptual framework

Source: Own conceptualization

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CHAPTER THREE

RESEARCH METHODOLOGY

3.1   Description of the study area

The study was carried out in Makueni County which is located in the southern end of Eastern region of Kenya (Figure 2). It covers an area of 8,009 km², population of 884,527 and an annual population growth rate of 2.4% (KNBS, 2009). It is comprised of nine sub-counties (Makueni, Kilungu, Mukaa, Kibwezi, Kathonzweni, Makindu, Mbooni East, Mbooni West, and Nzaui). The poverty rate in the County is estimated at 64.1%. The paved roads in Makueni County constitute 3.2% and good/fair roads constitute 51.1% of the total roads (County fact sheets, 2011). It lies between Latitude 10º 35´ and Longitude 37º10´ and 38º 30´East. Temperatures range between 12º C to 28ºC while rainfall average is 150mm-650mm. There is bimodal rainfall pattern; the long rains (March/April) and short rains (November/December). The major crop grown is maize, which is the staple food in the County. Other crops grown in order of importance are cow peas, beans, pigeon peas and green grams. Fruits grown are mangos, pawpaw and watermelons.

3.2   Sampling procedure

Wote division in Makueni County was purposively selected due to large concentration of mango farming. A source list containing names of small scale mango farmers in Makueni County was accessed from the district agricultural officer. Systematic random sampling was used, where the first respondent was selected at random and subsequent respondents were selected by taking every k^{th} name from the list and 'k' refers to the sampling interval or sampling ratio.

$$k = \frac{N}{n}$$
(3)
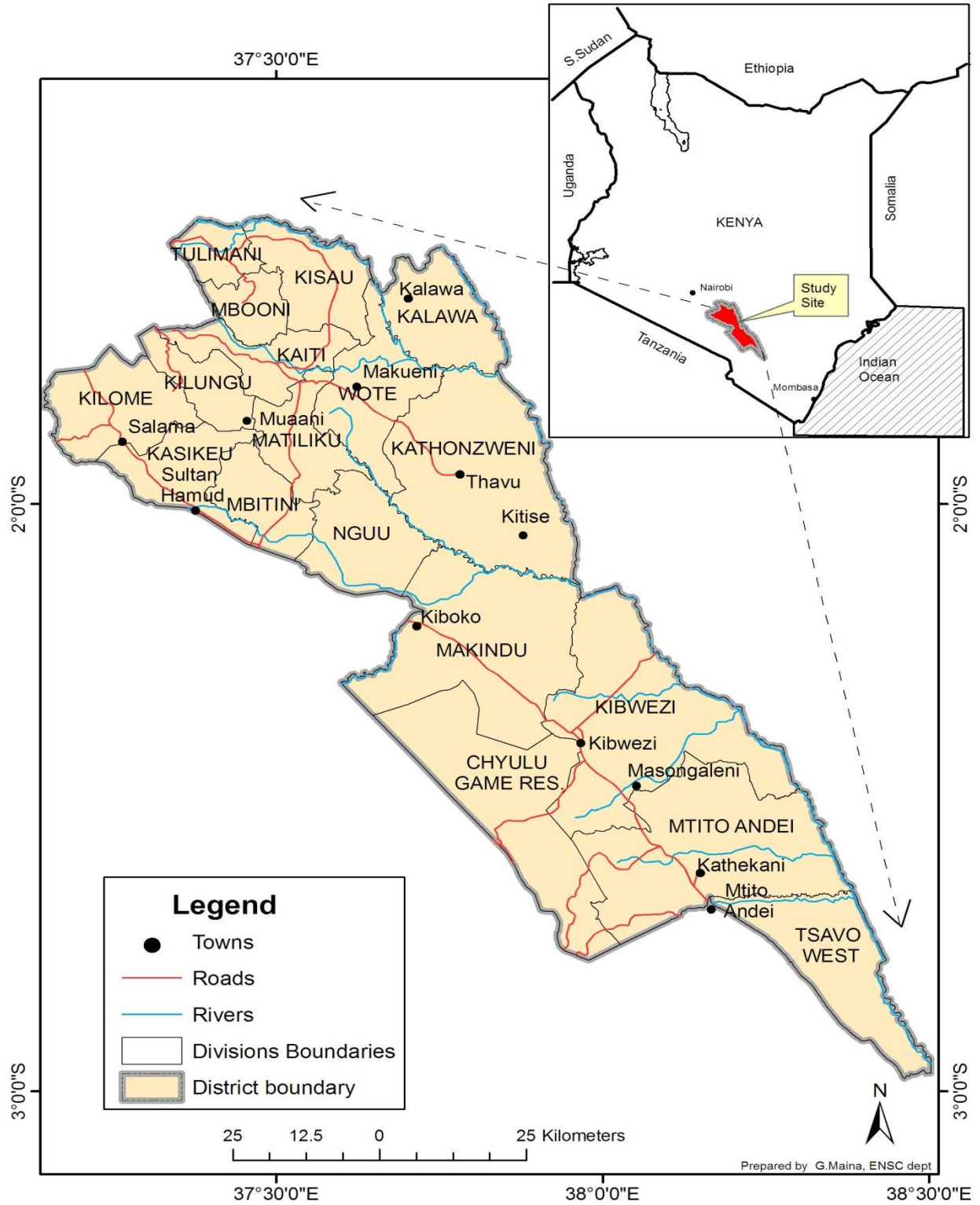
Figure 2: Map of Makueni County

Source: (World Resource Institute, 2013)

The study used the following formula for determining sample size as adopted by Kothari (2004).

$$n = \frac{z^2.p.q.N}{e^2(N-1)+z^2.p.q}$$ (4)

Where n = sample size, p= Population proportion with the characteristic of interest, q = (1-p), N = Size of the population, e = margin of error, Z = critical value at the desired confidence interval. Given a population of approximately 2,000 small scale mango farmers in the study area who have the characteristics of interest, and assuming that the acceptable error should be within a range of ± 5 % of the population mean with 95% probability, the sample size was calculated as follows:

$$n = \frac{1.96^2 * 0.5 * 0.5 * 2,000}{0.05^2(2,000-1)+1.96^2 * 0.5 * 0.5} = 322$$ (5)

Using finite population correction, the sample size (n$_o$) was adjusted using the following equation

$$n = \frac{n_o}{1+\frac{n_o-1}{N}}$$ (6)

$$n = \frac{322}{1+\frac{322-1}{2,000}} = 277$$ (7)

3.3   Data collection

The study used both primary and secondary data. Pre-testing of questionnaire was done prior to data collection. Semi structured questionnaire was used for primary data (Appendix 3) and farmers were interviewed by trained enumerators. Secondary data was synthesized from literature review, Ministry annual reports, HCDA report and other relevant sources.

3.4   Data analysis techniques

Descriptive statistics and econometric analysis were used for the analysis. Data was analysed using SPSS and STATA software.

3.5 Empirical framework and model specification

Objective 1: Social economic factors of small-scale mango farmers

Descriptive statistics such as graphs, means and percentage were used to address objective one.

Objective 2: To determine effect of transaction cost on choice of mango marketing channel

The Multinomial Logit model was used to analyse the factors influencing choice of marketing channel among small scale mango farmers in Makueni County. The model was preferred because it permits the analysis of decisions across more than two categories in the dependent variable; unlike the binary probit or logit models which are limited to a maximum of two choice categories (Maddala, 1983; Woodridge, 2002). The MNL was also preferred because it is simple to compute than its counterpart, the multinomial probit model (Hassan and Nhemachena, 2008). Logistic regression does not assume linear relationship between the dependent variable and independent variables, but requires that the independent variables be linearly related to the logit of the dependent variable (Gujarati and Sangeetha, 2007). The model allows for the interpretation of the logit weights for the variables in the same way as in linear regression (Pundo and Fraser, 2006). In this study small scale farmers are faced with four choices on the marketing channel to use, which are: selling direct to the market, local traders, brokers and producer marketing groups. The decision was based on the option, which maximized their utility, subject to transaction costs associated with each channel.

The MNL model was expressed as follows:

$$p(y = j/x) = \exp(x\beta_j) \Big/ \Big[1 + \sum_{h=1}^{J} \exp(x\beta_h)\Big], \; j = 1,2...J \tag{8}$$

Where, y denotes a random variable taking on the values (1, 2…, J) for a positive integer J and x denote a set of conditioning variables. X is a 1xK vector with first element unity and βj is a K×1 vector with j = 2…, J. In this study, y will represent the mango marketing channels and x will be smallholder farmer characteristic and transaction cost characteristics of small scale mango. The response probabilities $P(y = j/x)$, $j = 1, 2 …, J$ is therefore determined by the change in smallholder and transaction cost characteristics. However, since the probabilities must sum to unity, $P(y = j/x)$ will be determined once the probabilities for $j = 1, 2 …, J$ are known.

In order for the parameter estimates of the MNL model in Equation 8 to be unbiased and consistent, the Independence of Irrelevant Alternatives (IIA) was assumed to hold (Deressa *et al*., 2008). The IIA assumption requires that the probability of using one marketing channel by a given mango farmer must be independent of the probability of choosing another channel that is; *Pj/Pk* is independent of the remaining probabilities. The model parameters are estimated by the maximum likelihood estimation. The dependent variable need not be normally distributed under the maximum likelihood estimation since the estimates remain consistent. The model for the study can thus be summarized as below:

$$Y_{i=1,2...j} = X_i \beta_k + Z_i \alpha_k + e_{ik} \tag{9}$$

Where Y_i is a vector of the marketing choices (j = 1 for direct sales to the market 2= local trader channel, 3 for broker channel and 4 for producer marketing groups) of *i* th farmer, X_i is a vector of transaction cost characteristics, Z_i are socio-economic characteristics of farmers ,β_k and α_k are parameters to be estimated, and e_{ik} *is* the error term assumed to have a distribution with mean 0 and variance 1.The estimated coefficients give the role of transaction costs characteristics and socio-economic factors in selecting a marketing channel. However according to Greene (2002) the coefficients of multinomial regressions only provide the direction of the effect of the independent variables on the dependent variable; thus the estimates represent neither the actual magnitude of change nor the probabilities. Instead, the marginal effects are used to measure the expected change in probability of a particular technique being chosen with respect to a unit change in an independent variable from the mean. The marginal effect was computed by differentiating the coefficients at their mean as shown in equation 10.

$$\frac{\partial p_j}{\partial x_k} = p_j \left(\beta_{jk} - \sum_{j=1}^{J-1} p_j \beta_{jk} \right) \tag{10}$$

The empirical specification for examining the influence of explanatory variable on choice of marketing channel as described in table 1 is given as follows:

$$Y_{i=1,2...j} = \beta_0 + \beta_1 Age + \beta_2 Gender + \beta_3 Educ + \beta_4 Mtree + \beta_5 Exper + \beta_6 Extv + \beta_7 Trainc +$$
$$\beta_8 Mktserch + \beta_9 Infor \cos t + \beta_{10} negtim + \beta_{11} trustlv + \beta_{12} Distmkt + \beta_{13} traspt \cos t +$$
$$\beta_{14} grpm + \varepsilon_i \tag{11}$$

Table 1: Description of variables used in the multinomial logit model

Variable code	Variable description	Unit measurement	Expected sign
	Dependent variable		
Choice of marketing channel: 1= Direct sale to market 2=Local trader 3= Broker 4= Mango marketing group			
	Independent variables		
Gender	HH gender	Years	+/-
Age	HH age	Years	+/-
Educ	Education level	Years	+/-
Mtrees	Mango trees	Number	+/-
Exper	Experience	Years	-
Extv	Number of extension contact accessed	Continuous	+/-
Trainc	Number of training sessions attended	Continuous	+/-
Mktserch	Market search cost	Hours	+/-
Inforcost	Information cost	KES	+/-
Negotim	Negotiation time	Hours	+/-
Trustl	Trust level	1=high	+/-
Grpm	Group membership	1=yes 0=no	+/-
Distmkt	Market distance	Kilometer	+/-
Transptcost	Transport cost	Kenya shillings	+/-

Objective 3: To determine mango revenues obtained by small scale farmers in different marketing channels

The Gross Margin Analysis was used to address the third objective. Gross margin analysis is useful in analyzing the costs that go into production and the revenue generated hence profitability of an enterprise. Kay *et al.* (2004) defined gross margin as a difference between gross income and all variable costs. In this study, the gross margins from the four mango marketing channels was calculated by obtaining the output and price at which the mangoes were sold and deducted the total variable costs as illustrated by the formula in equation 12.

The computation of gross margin was given as;

$$\pi_j = \left[(P_y)Q_y\right]_j - \sum_{i=1}^{n}\left[(P_{XI}X_I)+TC\right]_j \tag{12}$$

Where;

π_j is the gross margin of the jth farmer

$[(P_y)Q_y]_j$ is the total revenue for the jth farmer

$[(P_{xi}X_i)+TC]_J$ is the total variable costs of the jth farmer

TC is the transaction costs

P_y is the output price received by the jth farmer

Q_Y is the output of the jth farmer

Where P_x is the input price paid by the jth farmer for the ith input and X_{ij} the quantity of ith input used by the jth farmer.

Objective 4: To determine the effect of marketing channels on farmers' income

OLS was used to measure objective four. Linear regression model (also known as Ordinary least squares regression (OLS) is the most widely used modelling method for data analysis and has been successfully applied in most studies (Montshwe, 2006). The method is also useful in analysing data with a quantitative dependent variable.

OLS can be specified as below;

$$Y = \alpha + \beta X + \varepsilon \tag{13}$$

Where Y is the dependent variable, X represents explanatory's variables and is the error term. Direct sale to the market, broker and local channel were used as dummies where D=1 or otherwise 0. The equation below represents the empirical model specified and used to estimate the relationship between farmers income and marketing channel.

$$income = \alpha + \beta_1 local + \beta_2 broker + \beta_3 group + \beta_4 age + \beta_5 educ\_years + \beta_6 gender + \beta_7 Extn\_visits + \beta_8 training + \varepsilon_i \tag{14}$$

CHAPTER FOUR

RESULTS AND DISCUSSIONS

This chapter presents results on descriptive statisticson socio-economic factors of small-scale mango farmers in Makueni County. Empirical results on the transaction costs factors influencing choice of marketing channels and gross margins on mangoes sold in various channels are also discussed. The study considered farmers growing local mango variety since majority had planted the *ngowe* v5ariety.

4.1 Descriptive results

This section presents the descriptive results of the study. Socio-economic, institution, infrastructure characteristics and transaction cost incurred when marketing the mango were analyzed and discussed in relation to the choice of marketing channel.

4.1.1 Socio-economic characteristic of small-scale mango farmers

Table 2 presents the summary of the socio-economic characteristics of the farmer such as age, experience, land size and number of mango trees. A comparative analysis of the socio-economic variables that influence farmer choice for a particular mango marketing channels showed that the age of the household head was significant at 1% and farming experience at 10% (Table 2). The other variables, land size and number of mango trees in the farm were not significant in their effect on choice of marketing channel.

The mean age across the channels was 40 years. Household head using broker channel were oldest at 43.4 years followed by farmers selling directly at the market, local traders and marketing group had a mean age of 39.4 years, 38.1 years and 37.8 years respectively. Belleremare *et al*. (2006) noted that younger farmers participated more in the market because they are receptive to new ideas and are less risk averse as compared to older farmers.

The mean marketing experience of mango farmers was 12.6 years. Farmers who sold to brokers had mean experience of 15.9 years, followed by direct sale to market, marketing group and local traders with 13.6, 13 and 9.4 years respectively. It appears that the more experience the farmers are the more likelihood they avoid groups and sell directly to individuals. It is likely that

the older and more experienced farmers know the market price and therefore less likely to be cheated. Marketing experience not only captures the aspects relating to social networks but also links the marketing players, which accrue over time. It is such links which helps reduce transaction cost related to searching for market information, negotiating and enforcing contracts with trading partners.

Table 2: Socio-economic characteristics of small-scale mango farmers

Variable	Marketing channel used					ANOVA by channel	
	Direct sale to market	Local trader	Broker	marketing group	Overall Mean	F/value	p-value
Age of head(years)	39.4	38.1	43.4	37.8	40	6.4	0.000***
Experience (years)	13.6	9.4	15.9	13	12.6	22.7	0.068*
Land size (Ha)	1.7	3	2.8	2.8	2.7	14.2	0.628
Mangtrees(number)	75.3	66	56.7	59.8	64.1	2.4	0.168

 **significant at 1%, significant at 10%

The gender and education distribution of farmers across the channels was analyzed and presented in Table 3. The results reveal that 64.6% were male and the rest (35.4%) female. This is corroborated in Chikuvire *et al*. (2006) who found that women in SSA are disadvantaged in marketing due to unequal distribution of resources as well as cultural barriers. Cunningham *et al*. (2008) also noted that men are likely to participate and sell more produce than women because of their acumen in bargaining, negotiating and enforcing contracts.

The choice of channels indicates that, direct sale to market was dominated by 60% of women while men were prominent in the other three channels. Sserunkuma *et al*. (2010) noted that women participate more in direct marketing as compared to their male counterparts because of their ability to sell produce in small quantities. Therefore, with larger quantities being handled by men, and with their ability to enforce deals/contracts, they can handle more risk and thus deal with brokers and local traders.

In terms of educational status of the household heads, the result indicates that majority 45.1% of the farmers had attained secondary education, 37.2% primary education, 14.8% tertiary education and 2.9% had no education. When farmers' education was analyzed based on choice of marketing channels, the results in Table 3 shows that 53.2% of farmers who sold to local traders had secondary education, 37.8% primary education, 7.2% had not obtained any education and a

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few (1.8%) had tertiary education. In the broker channel, 20.2% had tertiary education, primary education (52.8%) and secondary education (27%). With regards to marketing group, 77.8 % had tertiary education, primary education (14.8%) and secondary education (7.4%). This reveals that the more educated farmers chose to market their produce through direct marketing as well as marketing groups. The result tally with Marenya and Barret (2006); Jari and Fraser (2009) findings that higher level of education gives farmers ability to interpret and respond to new information much faster than their counterparts with lower or no education.

Table 3: Gender and education level of the farmers

Variable	Category	Direct sale to market	Local trader	Broker	Produce marketing group	Overall	χ^2	p-value
Gender	Female	60.0	30.6	32.6	18.5	35.4		
	Male	40.0	69.4	67.4	81.5	64.6		
	Total	100.0	100.0	100.0	100.0	100.0	149.7	0.036
Education	Non	0.0	7.2	0.0	0.0	2.9		
	Primary	20.0	37.8	52.8	14.8	37.2		
	Secondary	80.0	53.2	27.0	7.4	45.1		
	Tertiary	0.0	1.8	20.2	77.8	14.8		
	Total	100.0	100.0	100.0	100.0	100.0	18.0	0.024

Occupation of the farmers was categorized in four groups: Farming, pensioners, formal and informal employment. Majority of the farmers (69%) practised farming, formal employment (19%), informally employed (8%) and pensioners (4%) as shown in figure 3. The result indicates that formal employment level of the households is low and majority of the household relied on farming for their source of income.
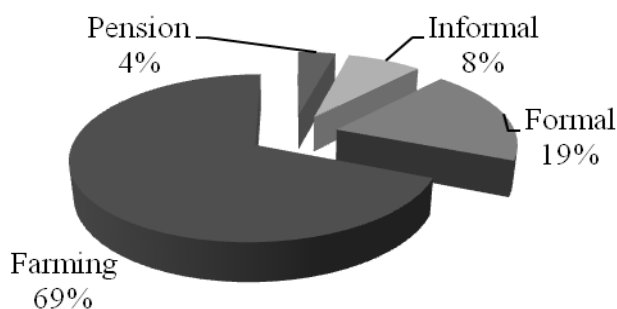
Figure 3: Occupation of the household head

Sources of income that contributed to the total annual cash flow of the farmers are presented in figure 4. Sale of mangoes contributed 60% of the annual income indicating its importance in income generation of farmers. This was followed by sale of other crops (19%), livestock (11%) and income from remittance was negligible at 3%. Performance of the fruit sector is therefore crucial to the welfare of most households in Makueni. Off farm income was the fourth source contributing 10%. Such income not only help farmer to purchase farm inputs but also meet household requirements. The result conform to Marenya and Barret (2006) findings that, off farm income enables farmers to purchase necessary inputs to meet quality requirements of the sustainable marketing channel.
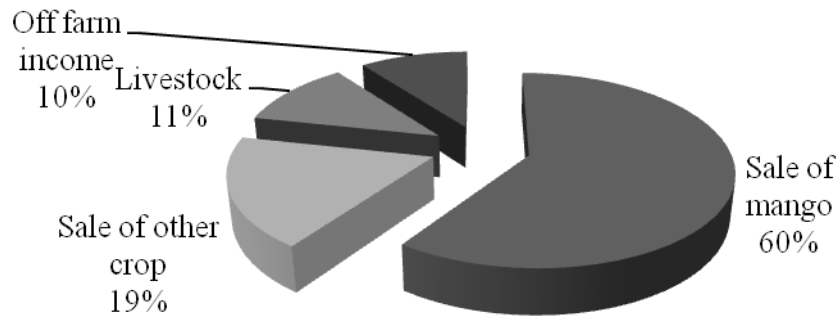
Figure 4: Sources of income of the household head

4.1.2   Institutional characteristics

The result in figure 5 indicates that 88% of the household head were not members of any group, while only 12% belonged to a marketing group. This implies that group marketing in the study area is still low.
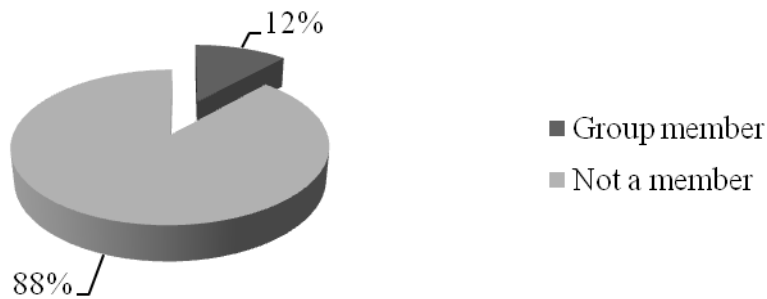
Figure 5: Group membership of the household head

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Marketing in a group is essential because it facilitates information exchange among the members which reduces the transaction cost incurred in marketing of produce. The results are consistent with Shiferaw *et al.* (2011) who found that marketing group has a potential role in enhancing the market opportunities for the poor and facilitating contracts with market agents along the value chain.

In order of priority, collective marketing (43.8%), access to market information (25%), collective purchase of inputs (6.3%), training on mango production (12.5%) and group lending (12.5%) were cited as benefits of being members of a marketing group (Table 4). Marketing groups enable small-scale farmers to attain better bargaining power Kabeer (2002); Poulton *et al.* (2006); Zuniga-Aris and Reuben (2007) as well as economies of scale and reduction in transaction costs (Kirsten and Vink, 2005).

Table 4: Benefits of being a group member and reasons for not being a member

	Activities	Overall %
Benefits of being a group member	market information	25
	collective marketing	43.8
	training on production of mango	12.5
	group lending	12.5
	collective purchase of inputs	6.3
Reasons for not being a member	High subscription fee for membership	18
	Not aware of any existing group	57.1
	Lack of commitment by members	10.6
	No time for group meetings and activities	14.3
	High subscription fee for membership	18

Majority (57.1%) of the farmers did not belong to any group because they were not aware of any existing marketing group, 18% were discouraged by high membership subscription fee, 14.3% had no time for group meetings and 10.6% cited lack of commitment by members (Table 4). Therefore, there is need for capacity building to educate mango farmers on the awareness and subsequent benefits of collective action. The result is consistent with Moyo (2010) findings that majority of the farmers revealed that they did not belong to any group because they were not aware of group existence.

In terms of contractual arrangements majority of the farmers (79%) did not have contract with their buyers, only 21% were under contract (Figure 6). Contractual arrangements are important for farmers because they guarantee a regular market for their produce, reduce the costs of searching for new markets and screening new buyers (Jari and Fraser, 2009; Jari and Fraser, 2012). Of the farmers in contract arrangement 64.8% were under verbal contract and 35.2% under written contract. This showed that a large number of the farmers were inclined towards informal contract as result of stringent requirements that pertain to contract arrangements.
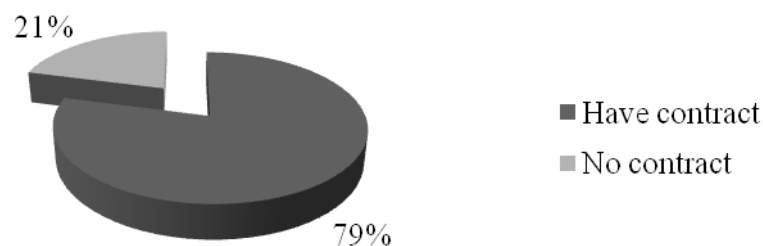
Figure 6: Contract arrangement of the household head

There were various reasons given by the farmers for not being in any contract arrangement with majority (40.2%) citing uncertainty. The plausible explanation is that they feared commitment due to unforeseen circumstance that may render them disadvantaged if price of produce increase or reduce in future. Stringent contract requirement was cited by 32.6 %. This might be as a result of heavy penalty charged in case a member does not meet the terms of contract or defaults to deliver the required quantity of produce. Lack of trust was reported by 27.2 % as the other reason for not participating in contract arrangement.

Extension service was captured in terms of the number of visits the farmers received from extension providers and had a significant effect on choice of marketing channel at 5 % (Table 5). The mean number of extension visits across the channels was low at 1.1 visits per year. Farmers in marketing group received highest number of extension visits of 3.9 followed by farmers who sold to brokers, local traders and directly at the market had 1.2, 0.8 and 0.3 numbers of visits respectively. This indicates that members in a marketing group had higher access to extension service compared to households selling in the other three marketing channels. The importance of access to extension service is to empower farmers with skills of improved agricultural inputs,

better methods of production and market information. These findings concur with those of Zuniga-Arias and Ruben (2007) and Jagwe (2011) which showed that farmers in producer groups have better access to extension services.

Table 5: Extension and training accessed by the household

	Marketing channel used					ANOVA by channel	
Variable	Direct sale to market	Local trader	Broker	marketing group	Overall Mean	F/Value	p-value
Extension visit	0.3	0.8	1.2	3.9	1.1	55.9	0.052**
Training (contact)	0.3	0.9	1.3	4	1.2	39.7	0.427

** Significant at 5% level

The mean number of training contact across the channels was low at 1.2 per year. Farmers in marketing group had highest training contact of 4 per year followed by farmers who sold to brokers, local traders and directly at the market had 1.3, 0.9 and 0.3 training contact respectively. The Anova analysis result showed that training contact was statistically insignificant (Table 5). The reason behind this might be that training received was not in relation to mango and therefore had no impact on the fruit performance.

4.1.3 Marketing of mango

In marketing mangoes, aspects considered were choice of marketing channel used by the farmers and access to market information. Figure 7 shows the different channels used by the farmers when marketing their mangoes. Majority (40%) of the farmers sold their mangoes to local traders, followed by brokers (32%), direct sale to the market (18%) and marketing groups (10%). Indicating that majority still rely on traditional channel such as brokers and local trader.
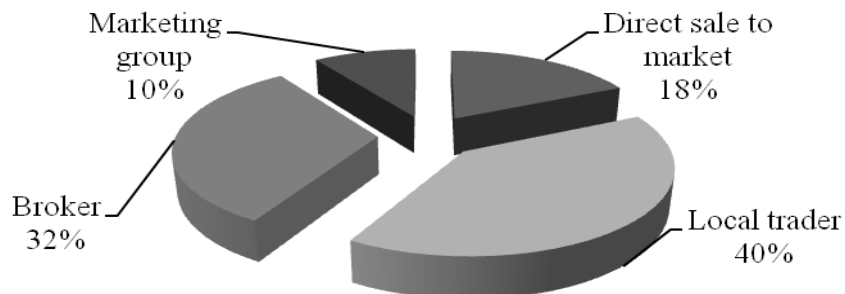
Figure 7: Marketing channels used by small scale mango farmer

Various reasons were cited for choosing a particular channel (Table 6). Of the farmers selling direct to the market 48% cited they received immediate payment, (34%) higher prices and (18%) availability of buyers. The preference for local traders was due to different sets of reasons: About 69% preferred this channel because of cash payment, 23% incurred no transport cost, 4.5% and 4.5% cited proximity and availability of buyers respectively.

Broker channel was selected by farmers due to immediate payment expected (49.4%); no transport cost (30.4%) and fetched higher prices (20.2%). It is evident that selling through a marketing group fetches higher prices as cited by 70.4% and 29.6% find the channel having readily available buyers for their mangoes. The overall implication is that farmers choose channel that offered cash on delivery of produce. This is probably due to the immediate need for cash to use in other activities and lack of institutionalized mindset.

Table 6: Reasons for using a particular channel

Reasons of using a particular channel	Direct to the market	Local trader	Broker	Marketing group	Overall %
Receive higher prices	34	0	20.2	70.4	19.5
Immediate payment	48	68.5	49.4	0	52
Availability of buyers	18	4.5	0	29.6	4.7
Proximity of buyers	0	4.5	0	0	5.1
No transport cost	0	22.5	30.3	0	18.8

Market information

Market information is vital to market participation behaviour of smallholder farmers (Jari and Fraser, 2009; Otieno *et al.,* 2009). It allows farmers to make informed decisions and the source of market information determines its accuracy especially where it is costly to acquire. Figure 8 shows majority (48%) of the farmers obtained market price information from other farmers/friends. This source could be unreliable and makes it difficult for them to make informed decision to sell through alternative channels basing on such information. Which concurs with Jagwe *et al*. (2010) that majority of farmers' main source of market information were their neighbours and were not likely to participate in banana markets. Farmers who relied on middlemen were 21%, market place (17%), farmers' organization (10%) while a small proportion (2%) and (2%) obtained their information from the media and extension officers

respectively. The findings are an indication that majority of the household relied on informal source of information when marketing their mango.
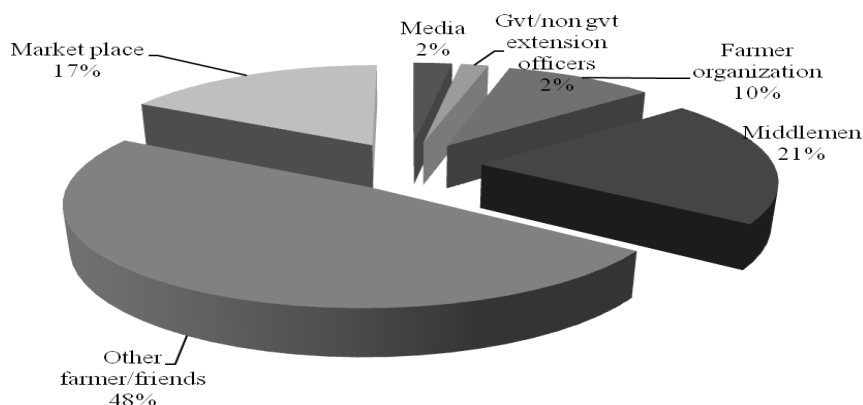
Figure 8: **Source of market price information among the farmers**

Further analysis as presented in table 7 showed that (30%) of farmers who sold directly at the market obtained information from the farmers/friends while (70%) heavily relied on the market place and this could be attributed to close proximity of farmers to the selling point. Of the farmers who sold to local traders (36.9%) and (52.3%) obtained information from middlemen and other farmers/friends respectively. Of the farmers who sold to brokers, 18% and 68.5% obtained information from middlemen and other farmers/friends respectively. The importance of farmers/friends as source of price information demonstrates the significance of farmer-farmer knowledge pathways (Moyo, 2010).

Table 7: Percent distribution of source of price information in different marketing channel

Source of market price information	Marketing channel used				
	Direct sale to the market	Local trader	Broker	Marketing group	Overall %
Govt/NGO extension officers	0	0	5.6	0	1.8
Farmer organization	0	0	0	100	9.7
Middlemen	0	36.9	18	0	20.6
Other farmers/friends	30	52.3	68.5	0	48.4
Media	0	0	0	0	2.5
Market place	70	10.8	7.9	0	17

All farmers in the produce marketing group obtained the information from the group and were likely to incur minimal cost in searching for the price and market information (table 7).

This is because group marketing enables farmers to pull their resource together and take advantage of economies of scales in marketing. The results conform to Jagwe (2011) findings that farmer groups are good platforms for enhancing exchange of information and linking farmers with buyers at a lower cost, thereby lowering the fixed transaction costs of participating in the market.
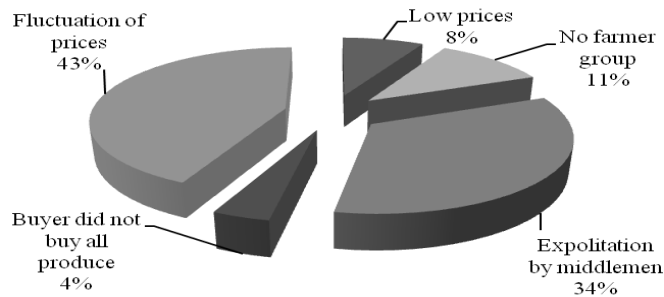
Figure 9: **Marketing problems encountered by small-scale farmers**

Various problems were encountered by farmers when marketing their mangoes (Figure 9). About 43% reported fluctuation of prices as one of the problem, followed by exploitation by middlemen (34%), lack of farmer groups (11%), low prices (8%) and buyers did not buy all produce (4%).

4.1.1 Infrastructure factors

The infrastructure factors considered were type of transport used and ownership status; the road accessed when transporting the mango from the farm to the market. Transport links the farmers and the final consumers; therefore it is viewed as an important attribute in agricultural marketing especially perishable produce such as vegetables and fruits. The condition in which the produce is delivered to the market is dependent on the type and availability of transport. Ownership of means of transport to some extent ensures timely delivery of produce to the market and access to transport equipment reduces transport costs (Key *et al*., 2000).

The result on figure 10 indicates that majority (58%) of the farmer relied on the buyer means of transport. About 19% of the farmers hired means of transport as a group with implication of spreading cost of transport among themselves while 15% hired the vehicles individually. A few (7.6 %) of the farmers used their own vehicles. Lack of own transport may have hindered farmers staying far from market from selling mango directly to the market. Instead they were inclined to sell at the farm gate where the cost of transport is catered by the buyers,

even though this decision might affect their bargaining power on the prices offered to them. This finding is consistent with Mzyece (2010) findings that farmers who owned means of transport were able to travel further distances in order to sell cowpeas to markets that offered higher prices as compared to homestead markets. Therefore, lack of ownership of means of transport increased the cost of transport to the market (Makhura *et al.*, 2001; Olwande and Mathenge, 2010) prompting farmers to opt for alternative market channels such as farm gate sale or through group marketing.
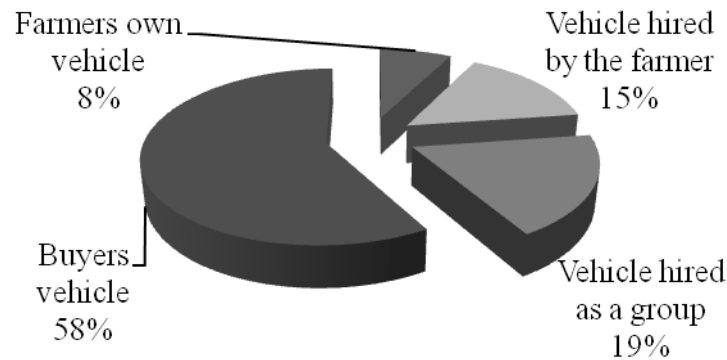
Figure 10: Vehicle ownership status of the household head

Various constraints to transport were reported; lack of transport was mentioned by 56.3% of the farmers as the major constraint hindering them from selling produce to the market. Approximately 30% reported high transport cost which may be attributed to bad condition of the road.

Table 8 shows the type of road infrastucture used in mango marketing. The result indicates that about 67.5% of the road infrastructure accessed by farmers was made of earth surface, 19.2% tarmac road and 6.7% was combinations of both tarmac and earth surface. This implies that the road infrastucture in the study area is still poor. Poor roads are perceived to increase transport cost and therefore make it costly for farmers to take their produce to the market or acquire source of information.

Long distance from the farm to tarmac road discourages the farmers from selling mangoes to the market. Mangoes are highly perishable and the condition in which they are delivered to the market is highly dependent on accessibility of the road to ensure timely delivery of the produce and in good quality. Olwande and Mathenge (2010) reported that distance to

tarmac road was negatively and significantly associated with the decision to participate in vegetables and milk markets.

Table 8: The road infrastructure used in mango marketing

	Variable	Percent accessed by farmers
Type of road used	Both	6.7
	Earth surface	67.5
	Tarmac	19.2

4.1.2 Transaction cost incurred by mango farmers

Transaction costs do have an influence on the choice of selling point. The influence is mostly related to search for potential trading partners and gathering information on price offers, terms of payment, quality and quantity requirements of the buyers. This analysis captures these aspects through a set of variables which relate to the transaction costs. The transaction costs identified in the study were: hours spent in search for market price information, cost of acquiring the information, hours spent when negotiating with buyers and as costs of transporting the mangoes to the market. In traditional marketing analysis transportation costs are considered as marketing costs, however they can be considered as transaction costs if they are specific to a particular channel (Hobbs, 1997; Getachew and Nuppenau, 2009).

The summary of transaction cost characteristics is presented in table 9. A comparative analysis of the mean and proportion of the transaction cost variables in the different mango marketing channel showed that, there exist significant differences in three variables. Transport cost at 5%, time spent searching for market price information, information search cost and negotiation time at 1% significant level. Farmers who sold directly to consumers in the market spent on average 1.6 hours to enquire mango price information and incurred search cost KES 0.03/Kg. Since majority of farmers selling in this channel relied on market place as a source of price information, this might have contributed to less search cost as compared to cost of searching for market information incurred by farmers who sold to the other channels.

Moreover, when compared to the other channels, farmers selling directly to the market spent the least time 0.4 hours when negotiating with the buyer. The plausible explanation could be farmers were selling to their regular buyers who are knowledgeable on the prevailing mango

sell price. However, farmers incurred the second highest transportation costs when selling directly to a consumer which was an average of KES 0.2/Kg of mangoes sold. The results conform to Fafchamps and Hill (2005) findings which illustrated that farmer who travel to the market to sell their produce incur high transportation costs.

In the local trader channel on average, farmers spent 1.3 hours searching for buyer and price information. They incurred search cost of KES 0.26/Kg which could be attributed to many calls made to secure a trader offering a favourable price for the produce. Also due to availability of large number of local traders, farmers are likely to spend more hours enquiring the trader who is ready to buy the mangoes. Highest negotiation time of 4.2 hours was experienced by the farmers selling through this channel. Since the price was not set prior to the transaction, the farmers tried to bargain for better prices which the local traders were unwilling to pay. These results concur with the findings of Getachew and Nuppenau (2009) which showed that banana farmers in Ethiopia spent a lot of time negotiation before finally agreeing on a suitable price. Famers selling at the farm gate in most cases incur minimal or no transportation cost. However, this was not the case in this study since the farmers on average spent KES 0.3/Kg to transport the mangoes to the main road where it would be accessible to the buyer a reflection of poor road access in rural areas.

In the broker marketing channel, farmers spent an average of 0.7 hours in searching for market price information and search cost of KES 0.23/ Kg in making phone calls. About 1.3 hours was spent negotiating with buyers and completing the transaction. Farmers selling to brokers at the farm gate incurred neglible or no cost since most of the mangoes were sold at the farm gate.

Farmers selling through marketing groups spent on average 0.7 hours searching for market price information while cost incurred in searching for this information was neglible as a result of cost being spread across the members. This implies that marketing groups reduce the time and cost of searching for buyer and price information. Individual farmers do not search for information instead specific persons are assigned task of getting the information on behalf of the group which is then relayed to the other members. Nkhori (2004) found that access to market information influenced positively the probability of selling to Botswana Meat Commission

(BMC) and source of animal production information influenced positively decision to sell through dairy cooperative (Mburu *et al*., 2007). These findings indicate access to market price information through marketing group reduced time spent by the farmers in search for the information.

In group marketing channel an average of 0.7 hours was spent negotiating with the buyer. This could be mainly screening the produce delivered by the farmer, to ensure the grade and weight of the mango conforms to the requirement of selling through the group. Farmers selling to the groups incurred minimal transport cost of KES 0.10/Kg. This was attributed to collective transportation of the mangoes and collective sharing of transport among the members.

Table 9: Percent distribution of transaction cost variables in different marketing channel

Transaction cost variables	Marketing channel				ANOVA by channel		
	Direct sale to market	Local trader	Broker	Marketing group	Overall	F/Value	p-value
Time spent searching price information (Hrs)	1.60	1.30	0.70	0.69	1.0	125.4	0.000***
Information search cost KES/Kg	0.03	0.26	0.23	0.0	0.2	5.624	0.001***
Negotiation time (Hrs)	0.40	4.20	1.30	0.70	2.3	349.8	0.000***
Transport cost KES/Kg	0.20	0.30	0.0	0.10	0.2	3.801	0.011**

 **significant at 5%, * significant at 10%

4.2   Effect of transaction cost on choice of marketing channel

Farmers were to choose one major channel in which they market their mango. There were four marketing channels; direct sale at the market, local traders, brokers and marketing group. All the independent variables that were hypothesized to influence choice of marketing channel were checked for the existence of multicollinearity problem using variance inflation factor (VIF) and they had a value of less than 10 which showed there was no multicollinearity (Appendix 1).The Multinomial Logit model was used to analyse the factors influencing choice of marketing channel among small scale mango farmers in Makueni County. Appendix 3 present results of multinomial logit model while table 10 presents the marginal effects. It is shown that 12 out of 14 variables used in the model were statistically significant at 1%, 5% 10% level (Table 10). The

chi-square value of 121.46 showed that likelihood ratio statistic are highly significant (p<0.0000) and the model has a strong explanatory power. Pseudo-R square was 0.6038 an indication that explanatory variable explained about 60% variation in the choice of mango marketing channel.

Age of the household head significantly influenced the likelihood of choosing local traders and brokers at 1% and 10% significant level respectively. An increase in age by one year increased the probability of choosing broker by 5.71% but decreased the probability of choosing local trader by 5.71% (Table 10)**.** An explanation behind this is that the older people prefer direct transaction like that offer by broker at farm gate; unlike, young people whose zeal to tap and venture new market make them more risk takers. The study result conforms to Zegeye *et al.* (2001) that young farmers might have a longer planning horizon and might be more willing to take risks. On the other hand, older farmers appear not to trust traders instead prefer brokers because they may have formed a long term relationship (Adegbola and Gardebroek, 2007; Sall, Norman, and Featherstone, 2000). Zaharieva *et al.*, (2001) also noted that older farmers do not trust traders on wholesale market and wholesaler and they preferred stable business relationships provided by marketing cooperatives and producer organization to riskier connections.

Education level of the household head significantly influenced the likelihood of choosing local traders and marketing group at 1% and 10% significant level respectively. One year increase in household head's education increased the probability of choosing marketing group by 48.6% but decreased the probability of choosing local trader by 22.34%. This can be explained by the fact that as individuals access more education they are empowered with marketing skill and knowledge that enables them sell mangoes in lucrative market with high end returns. Such markets are marketing group that offer high prices for produce delivered and sold through the group.

Household head marketing experience significantly influenced the likelihood of choosing direct marketing, local traders and brokers at 10%. An increase in farming experience by one year decreased the probability of choosing direct sale at the market and local trader by 1.09% and 3.35% respectively but increased the probability of using broker channel by 3.35%. The marketing experience has direct relationship with the farmer's level in bargaining prowess and marketing network. The long term relationship formed over the years between the farmer and the

broker may have contributed to farmers preferring broker channel over selling directly at the market. This concurs with findings of Gong (2007) where market experience reduced the probability of selling cattle to spot market.

The number of extension visit had a negative influence on choice of local trader at 5% significance level. An increase in extension contact by one visit decreased the probability of choosing local trader by 25.22%. This might have been as a result of information obtained by the farmer may have suited the use of other channels and thus disadvantaged use of local trader channel. Agricultural extension agents provide different information and alternatives depending on prevailing activities which impacts farmers differently and they are expected to choose an option that suits them best (Baethgen et al., 2003).

Gender of the household head had a significant effect on the choice of local traders and brokers at 1% level. Male headed household had a higher probability of selling to a broker by 95.15% but had a lower probability of selling to a local trader by 96.05%. This implies that male headed households possess more marketing network due to interaction capabilities with more buyers unlike women who are in most cases restricted to household chores. This contradicts the result of Jagwe (2011) that male household had high   probability of selling its produce at the market and not at the farm gate. This can be attributed to their ability to engage in negotiations and their experience in trade which is positively linked to gender.

Trust level significantly influenced the likelihood of choosing local traders and brokers at 1% and marketing group at 5% level. An increase in trust level increased the probability of choosing local trader and marketing group by 89.99% and 55.19% respectively. However, it decreased probability of choosing local trader by 59.39%. Farmers consider contracts made under marketing group reliable since whatever has been signed on the contract has to be enforced. Unlike local trader channel where contract is mostly informal through verbal and one party can easily forfeit the terms of contract. Farmers who have high trust in buyers are likely to spend less time screening their transacting partners or following up on payments and these factors are prominent especially for marketing group where contracts are formal.

The search for market price information had significant influence on the channel choice of direct sell at the market, local trader and broker channel. An increase in search for market

price information by one hour decreased the probability of using the channel of direct sale at market and broker by 11.09% and 15.70% respectively; but increased the probability of using the local traders channel by 57.12%. This implies that a farmer who sold through local market channel spent a lot of hours searching for the buyers. Farmers who sold at the market spent fewer hours because buyers are readily available in the market. On the other hand, farmers selling through brokers spent less time since the brokers are entirely in charge of responsibility of searching for the end buyer.

The cost of information significantly influenced direct sale at the market and brokers at 5% and 1% respectively. An increase in information cost by one shilling increased the probability of selling to brokers by 78.83% but decreased the probability of selling direct to market by 76.27%. The justification is that using broker channel is prohibitive in terms of information search cost because farmers use a lot of airtime while negotiating for a premium price with the broker.

The cost of a single trip to the market had a positive and significant influence on choice of local traders and brokers at 1% and marketing group at 5%. An increase in transport cost by one shilling increased the probability of choosing local traders, brokers and marketing group by 88.87%, 88.76% and 10.56% respectively. The reason for this outcome is that with increased transport cost, farmers opted to sell at the farm gate where they will not incur any transport cost. Also the channels were suitable for farmers who did not have transport equipments to facilitate easier and cheaper cost of transporting mango to the market.

Table 10: Marginal effects from the multinomial logit on the choice of marketing channel

Explanatory Variables	Direct sell at marke dy/dx	P-value	Local traders dy/dx	P-value	Brokers dy/dx	P-value	Marketing group dy/dx	P-value
Age	0.0294	0.827	-0.0571***	0.002	0.0571*	0.062	0.2212	0.742
Education (Years)	0.0766	0.750	-0.2234***	0.000	0.2227	0.103	0.4860*	0.081
Experience (Years)	-0.0109*	0.072	-0.0335*	0.073	0.0336*	0.073	0.1824	0.606
Extension (Visits)	-0.0235	0.819	-0.2522**	0.019	0.2524	0.319	0.9988	0.833
Training (Contacts)	-0.0106	0.836	-0.0676	0.345	0.0677	0.344	0.5049	0.690
Gender (1=male)	0.0904	0.689	-0.9605***	0.000	0.9515***	0.000	-0.3368	0.783
Mango Trees (Number)	0.0455	0.743	-0.0028	0.373	0.0028	0.377	-0.0465	0.446
Trust Level (1=High)	-0.0600	0.733	0.8999***	0.001	-0.5939***	0.001	0.5519**	0.018
Market Price Search (Hours)	-0.1109**	0.046	0.5712***	0.000	-0.1570***	0.000	0.7022	0.703
Information Cost (KES)	-0.7627**	0.020	-0.0255	0.918	0.7883***	0.009	0.2484	0.775
Transport cost (KES)	-0.0122	0.765	0.8888***	0.000	0.8876***	0.000	0.1056**	0.009
Negotiation time (Hours)	-0.0228*	0.078	0.4307**	0.017	0.4405**	0.017	-0.4136	0.680
Group Membership (1= Member)	-0.0803	0.778	0.3013	0.545	-0.9742***	0.000	0.1051**	0.047
Market Distance (KM)	-0.0967**	0.044	-0.4058	0.374	0.4048	0.376	0.4655***	0.002

Notes: ***, **, * = significant at 1%, 5% and 10% level respectively   Number   of   observations   =277;
Wald chi2 (72) = 357.41; Prob>Chi2 = 0.0000; Pseudo R2 = 0.6038; Log pseudo likelihood = -121.46.

The result is in line with Mzyece (2010) findings that farmers who owned transportation implements were able to travel further distances to sell cowpeas to markets that offered higher prices than the homestead markets. Farmers who sold to marketing group incurred lower transport cost because the cost was spread among the members. Key *et al.* (2000); Makhura *et al.* (2001) and Olwande and Mathenge (2010) also indicated that ownership of transport equipment is significantly associated with the decision to participate in the market. Increase in probability of selling to group marketing by 10.56% could be attributed to collective action in transport cost.

Negotiation time significantly influenced the likelihood of choosing direct sale to market at 10%, local trader and brokers at 5% level. An increase in negotiation time by one hour increased the probability of using the local traders and brokers channel by 43.07% and 44.05% respectively and decreased the probability of selling directly at the market by 2.28%. The results indicates that selling directly at the market involved less bargaining process because prices are controlled by market forces. Those who operate under broker and local trader channel were forced to negotiate to arrive at agreed price. The result concurs with the findings of Gong (2007) that bargaining power negatively influenced the probability of selling cattle's through spot markets.

Group membership had a positive influence on choice of marketing group at 5% and negatively influenced broker channel at 1% significance level. Farmers belonging to a group had a higher chance of using marketing group by 10.51% but had a lower chance of using broker channel by 97.42%. In essence group membership provided platform of collective marketing and a ready market which reduced the farmers' costs associated with searching for potential buyers. For this reason, the farmers opt to sell to marketing group in order to incur zero or minimal transaction cost as a result of economies of scale. The findings is line with Njuki *et al.* (2009) who stated that besides reducing transaction costs; collective marketing empowers farmers to negotiate for better trade terms and prices. Jagwe (2011) also noted that the membership in groups exposes farmers to a wide range of ideas and thus gives farmers the opportunity to have better access to information through training and extension services.

Market distance from the farmers' homestead influenced negatively the choice of direct sale at the market at 5% significance level and positively choice of produce marketing group at 1%. An increase in market distance by one kilometre increased the probability of

using marketing group by 46.55% and decreased the probability of using direct sale at market by 9.67%. This implies that as the distance to market increases, farmers opt to choose the channel that minimise transport costs. The finding is in line with argument by Jari and Fraser (2009), who stated that the farmers who participate in group have ability to reach a distance market because they are able to share information and broaden social capital within their groups. On other hand, farmers disregard channel that leads to high transport cost like direct sale at the market. The reason could be as distance increases, the cost of transporting mango to the market increased and therefore with increased marketing cost it hindered farmers from selling to the market. This conforms to the findings of Nkhori, (2004); Ogunleye and Oladeji (2007) and Chalwe, (2011). The study results concurs also with observation made by Fafchamps and Hill, (2005) and Andersen and Buvik, (2002) that the shorter distances imply more knowledge about markets and guarantees easier access to information with low travelling and transportation costs involved in enforcing and monitoring the purchase and sales contracts.

However, Jagwe (2011) contradicts this results as he observed that the more remotely located a household was, the greater the probability that the household would travel to the market to sell their commodities. The plausible explanation was that the urgent need for cash revenue outweighed the opportunity cost of time especially for the remotely placed households such that to gain the revenue meant they were willing to travel long distances. An increase in farm distance by one kilometre increased the probability of selling to marketing group by 46.55% and the reason would be farmers opt to sell to other market alternatives such as group marketing where there is a minimal transport cost because the cost is spread across the members.

4.3   Gross margins analysis for mango sold in different marketing channel

Crop farming in Makueni and Kenya at large involves intercropping several food and tree crops and the recommended spacing is hardly observed. Only a few farmers engage in pure stand farming using the correct spacing while the majority uses incorrect spacing. This situation makes hectare computation from recommended spacing not an appropriate standard measure for establishing the size of land under mango in any given area. As a result, calculations of total variable cost and the revenue were therefore based on per Kilogram of mango sold. The gross margin was calculated by getting the output and price at which the

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mango was sold and deducting the total variable costs which included the production and transaction costs. The results are shown in table 11.

Farmers who sold mangoes to groups had the highest gross margin of KES 68/Kg. The high gross margins could be attributed to high prices for each piece of mango sold through the group and the large volumes of mangoes produced by farmers because of guaranteed market. Total variable cost was KES 0.9/Kg which was however low compared to other channels. The profitability of the channel was high when compared to other channels.

Gross margin of farmers who sold direct to the market was KES 39/Kg. The total variable cost was KES 0.33/Kg and the lowest compared to other channels. The reason would have been majority of the farmers were located near the market and therefore spent less transaction cost in terms of cost of transporting the mango to the market. This coupled with less cost incurred in search for market price information since most relied on market information obtained from other farmers selling at the market place.

Table 11: Mean farmers gross margins of mangoes per kg for each marketing channel

| | Marketing channel | | | | Anova by channel | |
	Direct sale to market	Local trader	Broker	Marketing group	F value	P-value
Total variable cost/Kg (Shs)	0.33	1.57	2.07	0.9	4.34	0.005***
Revenue/Kg (Shs)	39.18	23.25	16.86	68.89	72.76	0.00***
Gross margin/Kg (Shs)	38.85	21.68	14.78	67.99	74.64	
						Mean difference 7.0430*1-2) 9.8797*1-3) 11.9594*1-4) 19.0024*2-4) 21.8391*3-4)

*** Significant at 1 %,*significant at 10%

Small scale farmers who sold to local traders had gross margin of KES 22/ Kg which was more compared to KES 15/Kg of the farmers who sold to brokers. Both local traders and broker channel had the lowest gross margins as compared to group marketing channel. In addition local traders and broker channel incurred high total variable cost of KES 2 and KES 2/Kg respectively as compared to group marketing channel. This could have attributed to

high transaction cost incurred while looking for the convenient trader or broker offering a good price for the produce and phone call cost incurred when negotiating with them.

The results indicated that selling to groups is profitable and therefore small scale mango farmers should strive to be in groups and enjoy the benefits of collective action. To determine whether there was a statistically significant difference in gross margins from mangoes sold though the different channels; multiple comparisons were carried out using the Tukey test in one-way ANOVA. The results showed that there was significant difference in gross margin for farmers selling through channels at 10 % significance level. The plausible explanation for this difference could be as a result of variation in prices offered to farmers selling in the four channels and also transaction costs which differ across the four channels.

4.4   Effect of marketing channels on farmers' income

Ordinary least squares regression (OLS) was used to determine whether marketing channel choice actors have a considerable bearing on farmers' income and results shown in table 12.

Table 12: OLS analysis on effect of marketing channels on farmers' income

Income	Coefficient	Standard Error	T	P>t	[95% Conf.	Interval]
Local	-0.3292***	0.076045	-4.33	0.000	-0.4790	-0.17952
Broker	-0.3318***	0.052818	-6.28	0.000	-0.4368	-0.22781
Group	0.2187***	0.063826	3.43	0.001	0.0931	0.344395
Age	0.0140**	0.006152	2.27	0.024	0.0018	0.026073
EducYears	0.0179	0.019223	0.93	0.351	-0.0199	0.055796
Gender	-0.1191	0.110519	-1.08	0.282	-0.3367	0.098449
ExtnVisits	-0.0874	0.082461	-1.06	0.290	-0.2497	0.074967
Training	0.0899	0.067625	1.33	0.185	-0.0433	0.222994
_cons	11.0908***	0.402025	27.59	0.000	10.2993	11.88234

Notes: *** = significant at 1% level   base outcome=Direct sale at the market
Number of observations =277; F (8,268) = 17.05; Prob> F = 0.0000; R-squared = 0.3372;
Adj R-squared= 0.3175

A linear regression established that marketing channels used statistically and significantly predicted farmers overall income, $F (8,268) = 17.05$, $p = 0.0000$ and accounted for 32% of the explained variability in farmers overall income. Farmers who sold through the local and broker channel had significantly lower overall farm income of KES 33. On the contrary, farmers who sold through group marketing channel had significantly higher overall

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farm income of KES 22. An indication that farmers selling through groups have higher returns as a result of benefits associated with the groups. Contrary to local and broker channels, where farmers are manipulated by middlemen and spillover effect of low price offered to them subsequently reduces famers' returns.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATION

5.1   Conclusions

The study revealed that mango production is a major source of income for small scale farmers in Makueni County, contributing more than 50% of their annual income. This indicates its importance in income generation of small-scale famers. The performance of the fruit in the market is therefore, crucial to the welfare of most households in the region.

Socio economic factors such as age, education level, gender of the household head, farming experience, group membership, number of extension visits and training had significant effects on the marketing channel used by small scale mango farmers.

The transaction costs variables that significantly influenced the choice of the marketing channel were: hours spent searching for market information, cost of acquiring information, transport cost incurred and negotiation time. These costs were relatively lower in group marketing as compared to the other three channels. Other significant transaction costs were trust in buyer and distance to the market.

The use of local trader marketing channel emerged as the predominant choice among the small scale mango farmers. However, group marketing channel was found to be more profitable than direct sale at the market, local trader and broker channel. Based on the results of this study, group marketing has made positive contribution in minimizing the transaction costs faced by small-scale mango farmers and this could be attributed to benefits of economies of scale.

5.2   Policy recommendations

Farmer transaction cost has been identified as very critical in shaping farmer decision to use a particular channel in marketing their mangoes. Based on the results of the study, the following recommendations are necessary for the reduction of transaction costs among small-scale mango farmers.

Affirmative action should be undertaken to promote gender awareness by empowering more women to engage in mango marketing. implementers should thus focus on women involvement in the mango farming enterprise. Measures should be put in place to

improve education levels of farmers which will encourage use of formal markets such as group marketing.

Price information informs the farmer on prevailing pricing condition and lack of price knowledge was a major source of transaction cost. The study recommends that the stakeholders should re-evaluate the existing information dissemination pathway, and promote farmer awareness of the available technologies such as SMS services, radio, television and internet where they can access price information and formal markets for mangoes. This will help reduce cost incurred in searching for market prices. Moreover, exploitation due to information asymmetry between the farmers and buyers will be minimised during the transaction.

In promoting farmer extension service delivery, awareness should be made on the readily accessible practical extension services aired in various television programmes while others are broadcasted on the radio with advantage of listening to the content in local vernacular station.

To reduce the high transport cost incurred by the farmer due to bad roads accessed when transporting mango to the market, the government should invest in rural infrastructure to ease conveyance of mango from the farm to the market.

In developing market linkages, the stakeholders should promote formation of mango marketing group. As attributed to positive contribution in minimizing transaction cost, increasing income, improving bargaining position of mango farmers and promoting knowledge dissemination among the farmers.

5.3   Suggestions for further research

The study was only undertaken in Makueni County, and since mango farming is practiced in other regions in Kenya, further research should be carried out in those areas. Marketing channels had negative effects on income distribution. However, the extent to which this is so was not determined in this study. Therefore, a study needs to be done to evaluate the extent. The study recommends further analysis on effect of collective action on farmers' market participation and the factors influencing women participation in mango marketing.

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APPENDICES

Appendix 1: Variance inflation factor (VIF) multicollinearity test results for the multinomial logit of market channel choice

Variable	VIF	1/VIF
Extension visits	6.58	0.15
Training	5.78	0.17
Group member	3.20	0.31
Experience(Years)	2.42	0.41
Age	2.33	0.43
Information cost	2.24	0.45
Market information search (Hours)	2.16	0.46
Education (Years)	1.80	0.56
Trust Level	1.66	0.60
Gender	1.50	0.67
Negotiation (Hours)	1.47	0.68
Distance (Km)	1.43	0.70
Mango Trees	1.22	0.82
Transport cost	1.14	0.87
Mean VIF	2.49	

Appendix 2: Multinomial regression results

Marketing channel	Coef.	Std. Err.	Z	P>|z|
Direct sell at the market				
Age	0.3128	0.3456	1.89	0.0160
Education (Years)	0.7033	0.4213	2.11	0.0050
Experience (Years)	-0.1022	0.1122	-1.33	0.6090
Extension (Visits)	0.5549	0.8543	0.67	0.6520
Training (Contacts)	0.0509	0.2213	1.92	0.9720
Gender (1=male)	0.6777	0.9351	1.45	0.0140
Mango Trees (Number)	0.1156	0.7324	0.76	0.0050
Trust Level (1=High)	-0.9648	0.6653	-2.56	0.0180
Market Price Search (Hours)	-0.2944	0.3247	-0.76	0.0120
Information Cost (KES)	-0.6681	0.9872	-1.06	0.0030
Transport cost (KES)	-0.5998	0.8732	-1.87	0.0000
Negotiation time (Hours)	-0.4177	0.1178	-2.07	0.3910
Group Membership (1= Member)	-0.4901	0.8234	-0.06	0.0010
Market Distance (KM)	0.9448	0.3245	1.26	0.3540
Local trader	Base outcome			
Broker				
Age	0.0763	0.9877	2.90	0.972
Education (Years)	-0.4498	0.3245	-1.76	0.003
Experience (Years)	0.2906	0.4432	0.49	0.111
Extension (Visits)	0.8613	0.4677	0.22	0.389
Training (Contacts)	0.3288	0.2972	0.44	0.827
Gender (1=male)	-0.8716	0.7354	-1.41	0.140
Mango Trees (Number)	-0.0997	0.6653	-0.77	0.032
Trust Level (1=High)	1.4280	0.0943	1.23	0.130
Market Price Search (Hours)	0.4741	0.7372	0.97	0.500
Information Cost (KES)	1.1268	0.5632	2.34	0.001
Transport cost (KES)	0.6106	0.3456	0.97	0.145
Negotiation time (Hours)	-0.0564	0.5432	-1.77	0.981
Group Membership (1= Member)	0.1424	0.9876	2.04	0.538
Market Distance (KM)	-0.6676	0.8884	-1.44	0.760
Produce marketing in group				
Age	0.0619	0.7653	0.96	0.6750
Education (Years)	0.6311	0.0853	1.33	0.0000
Experience (Years)	0.3136	0.1125	2.45	0.0470
Extension (Visits)	1.2399	0.4329	1.67	0.1320
Training (Contacts)	0.6523	0.9090	1.43	0.3380
Gender (1=male)	0.1712	0.8632	0.87	0.0160
Mango Trees (Number)	-0.0114	0.5543	-0.43	0.7640
Trust Level (1=High)	-0.8991	0.0197	-0.88	0.0230
Market Price Search (Hours)	-0.0201	0.9875	-1.22	0.0020
Information Cost (KES)	-0.2124	0.7752	-2.78	0.5390
Transport cost (KES)	-0.4382	0.6532	-1.22	0.0000
Negotiation time (Hours)	-0.7078	0.4432	-1.17	0.0000
Group Membership (1= Member)	0.2675	0.6569	0.34	0.0030
Market Distance (KM)	-0.9545	0.8740	-1.34	0.0120

Number of observation = 277; Wald chi2 (72) = 357.41; Log likelihood = -121.46; Prob>chi2 = 0.0000 ; Pseudo R^2 = 0.6038

Appendix 3: Questionnaire

I am a student from Egerton University carrying out a study on effect of transaction costs on choice of mango marketing channels among small scale farmers in Makueni County, Kenya**.** The information provided will assist in formulation of policies and programs that will help improve mango marketing. The information collected will be treated with strict confidentiality

Questionnaire Identification

Date of interview   ....

Name of Enumerator ....

Name of respondent   ....

Respondent phone no ....

County   ………………………………………….

District   ………………………………………….

Division   ....

Location   ....

Sub-location   ....

Village   …………………………………………..

SECTION A: DEMOGRAPHIC CHARACTERISTICS OF HOUSEHOLD MEMBER

A.1   Fill the table below

Member ID	Relation to HH (code a1)	Name of HH	Age of HH	Gender of HH 1=male 0=female	Marital status of HH (code a2)	Main Occupation (code a3)	Farm labour Participation (code a4)
1(head)							
2(spouse)							
3							
4							

Relation to HH (code a1)	Marital status (code a2)	occupation (code a3)	Farm labour participation (code a4)
1=head 2=spouse 3=own child 4=others	1 Single 2 Married 3 Divorced 4 Widowed	1=Farming (crop + livestock) 2=Salaried employment 3=Self-employed off-farm 4=Casual labourer on/off-farm	1=Full time 2=Part-time 3=Not a worker

A.2   Highest education level of the household head

Education level	Primary	Secondary	Tertiary
Years of education			

A.3   What is the land tenure system?   [   ]

1=owned w/ deed   2=owned w/out deed   3=rented   4=owned by parent/ relative

5=government/ communal/co-operative

A.4   What is the size of your land (Hectare)? [   ]

A.5   Did you lease land for farming? YES [   ]   NO [   ]

A.6   If YES, how much did it cost to lease land last planting season?   KES [   ]

A.7   Did you lease out your land to other people? YES [   ]   NO [   ]

A.8   If YES, how much did it cost to lease out land last planting season? KES [   ]

A.9   What is the number of mango producing trees in your farm? [   ]

A.10   How many years of mango marketing experience do you have?   [   ]   Years

A.11   Please indicate household income from the following sources in the last one year

Source	Amount /month	Total /year
Formally employed		
Informal employed		
Sale of other crops		
Sale of livestock products		
Other (Specify)		

SECTION B: MARKETING

B.1   Which major market did you sell your produce in the last cropping year?

       1= Direct sale at the market   2=Local traders   3=Brokers

       4= Mango marketing group

B.2   Please fill the table below for information on use of channel chosen

Channel	Benefit 1	Benefit 2	Benefit 3	Revenue			Variable cost	
				output	Output unit 1=carton with 6pieces 2= Carton with 10 pieces 3=A piece	Price/ unit	Transport cost	Production cost and other cost

B.3   Did you attend farmer trainings on either farming or marketing of produce in the last cropping year? YES [   ]   NO [   ]

B.4   How many times did you attend training in the last cropping year [   ]

B.5   Are you a member of any marketing group? 1=Yes [   ]   0=No [   ]

B.6   If **Yes** please fill in the following details.

Member group	Activities undertaken by the group			Activity code
Member	act1	act2	act3	1=market information 2= collective marketing 3= training on production 4=group lending 5=collective purchase of inputs 6=other (specify)

B.7   If not a member, what are the reasons?

1= Not aware of any existing group 2=Lack of commitment by members 3= No time for group meetings and activities 4= High subscription fee for membership

B.8 Did you have any contractual agreements or a guaranteed/ ready market with any buyer? Yes [ ] No [ ].

B.9 If yes, how did you enter the agreement?

1=By signing a written agreement 2= Word of mouth 3= Other (specify)

B.10 If no, give reason?

1=price uncertainty 2= Stringent contract requirement

3= lack of trust in the buyer

B.11 How far is the marketing point from your farm? [ ] Km

B.12 How much did you pay per trip to the market? [ ] KES

B.13 How did you transport your mango to the marketing point?

	Mode of transport				
Type of transport	Cart	Motorcycle	Trucks	Car/van	Other specify
Farmers own transport					
Hired vehicles(by the farmer)					
Hired vehicles(group)					
The buyers own vehicle					

B.14   Transport cost

Type of transport	Mode of transport							
	Cart		Motorcycle		Car/ van		Truck	
	Cost (KES)	Unit (C1)	Cost (KES)	Unit (C1)	Cost (KES)	Unit (C1)	Cost (KES)	Unit (C1)
Own								
Hired (by the farmer)								
Hired (group)								

C. Market information

C.1   Did you have access to market information? 1=Yes [   ]   2=No [   ]

C.2   What kind of market information did you seek mainly?

   1=Buying prices offered by the market   2=The quality demanded 3=Terms of payment 4=Others (Specify)

C.3   Where did you get the source of market price information for mango?

   1=Govt/ Non-government extension officers   2=Farmers organization   3=Middlemen

   4=Friends/other farmer   5=Market place 6=Media

D. Infrastructure

D.1   What type of road did you access when going to the market?

   1=Earth road   2=Tarmac road   3=Earth and tarmac road

D.2   How can you rate   the condition of the road? [   ]   1=Good   0= Bad

D.3   What problems did you experience when transporting your produce to the market?

   1= lack of transport   2=High transport cost

   3= spoilage of mangoes on the road because of bad roads.

E. Extension services

E.1   Did you have access to extension service in the last cropping year?

   1=Yes [   ] 0=No [   ]

E.2   How many times did get extension service in the last cropping year [   ]

E.3   What services were provided by the extension officers?

　　　1= Market information 2= Available markets 3= Record keeping   4= others (specify)

E.4   What major problem was faced in contacting extension officers?

　　　1= Never available　　　　　2= Available sometimes

　　　3=Always available   4=others (specify).

F. Transaction cost

F.1   Please fill the table below for information on transaction cost

Channel	Level of Trust with the trader 0=Low 1=High	Time spent searching mkt price (hr)	Incur inform search cost 1=yes 0=No	If yes how Much (KES)	Time spent transacting with buyer (Hrs)	How many times negotiate before agree on price 1=<2 2=2-5 times 3=> 5times

THANK YOU FOR YOUR TIME