EFFECT OF TRANSACTION COSTS ON SMALLHOLDER MAIZE MARKET PARTICIPATION: A CASE OF KWANZA DISTRICT, TRANS-NZOIA COUNTY, KENYA

MACHARIA MWANGI ANTHONY

A Research thesis Submitted to the Graduate School in partial fulfillment of the requirements for the award of Master of Science Degree in Agriculture and Applied Economics of Egerton University

EGERTON UNIVERSITY

NOVEMBER, 2013

DECLARATION AND APPROVAL

DECLARATION

I declare that this thesis is my original work and has not, wholly or in part, been presented for the award of any other degree in this or any other University elsewhere.

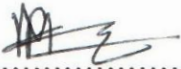...
Signature

Macharia Mwangi Anthony

Reg No. KM17/2722/10

13 TH   Nov   2013
....
Date

APPROVAL

This thesis has been submitted with our approval as candidate's supervisors

....
Signature

Dr. Patience M. Mshenga

Department of Agricultural Economics and Agribusiness Management,

Egerton University, Kenya.

14/11/013
....
Date

....
Signature

Dr. Margaret Ngigi

Department of Agricultural Economics and Agribusiness Management,

Egerton University

13ᵗʰ Nov, 2013
....
Date

ii

COPYRIGHT

DEDICATION

I dedicate this thesis to my family members and relatives who played a major role in educating me and made this work a success. Thank you for constant prayers and support both physically, emotionally and financially.

ACKNOWLEDGEMENTS

ABSTRACT

Access to marketing outlets of agricultural output is essential in commercializing smallholder agriculture in developing countries, including Kenya. This also applies to maize farming, which is a major staple food and livelihood activity for smallholder farmers in Kwanza district, Trans Nzoia County, Kenya. Majority of the farmers however have limited access to formal maize markets. It is however not clear what factors especially transaction costs limit the farmers from accessing these markets. This study therefore aimed at characterizing transaction costs faced by smallholder maize farmers in the region, determining the effect of transaction costs on smallholder decisions of selling through formal maize markets and intensity of market participation. Primary data was collected using semi structured questionnaires from 196 smallholder farmers in the region. Data was processed using SPSS and STATA computer packages. Descriptive statistics was used to characterize farmers in the district. Probit model was used to determine the effect of transaction costs on smallholder farmers' participation in formal maize markets. Tobit model was used to assess the effect of transaction costs on the extent of smallholder farmer participation in maize markets. Results of the study revealed a significant difference in mean prices between the informal and formal maize markets. Majority of the farmers (74.50%) however sold their output through the informal maize markets. This was due to various constraints and barriers that hindered their access to the formal markets. Age of household head, education level, access to credit, tent ownership and source of market information influenced smallholders' participation in formal maize markets. Waiting time at the market before selling, waiting time before receiving payment, information search costs, sorting costs and cost of rent influenced only the extent of smallholder market participation. The study recommends policies that favour emergence of institutions (collective action and agricultural credit) and those geared towards accurate and timely market information availability and access. Farmers who sell through N.C.P.B should be paid on time and marketing policies should target the relatively younger individuals, this will greatly help to commercialize the smallholder maize sector in the region.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ACRONYMS

AFC - Agricultural Finance Corporation

DAO - District Agricultural Office

FAO - Food and Agricultural Organization

FTC - Fixed Transaction Cost

NCPB - National Cereals and Produce board

OLS - Ordinary Least Squares

PTC - Proportional Transaction Cost

RoK - Republic of Kenya

SPSS - Statistical Package for Social Science

KES - Kenya Shillings

CHAPTER ONE

INTRODUCTION

1.1 Background to the study

Maize is important both as a food as well as a cash crop for many Kenyan smallholders. It accounts for the largest share of cultivated agricultural land in the country. More than half of small-scale farmers in Kenya engage in maize farming either as a pure stand or intercropped with other crops. The small and medium scale sector accounts for about three quarters of all maize marketed in the country annually. The large scale sector produces the other quarter (Alene *et al.*, 2008).

In Kenya, maize growing is mainly concentrated in the Rift Valley districts of Trans-Nzoia East and West, Wareng, Eldoret East and West, Nakuru and Kwanza, a region often referred to as the "Granary of Kenya" (Kwach., 2013). From the year 2005 to 2009, area of land under maize cultivation and prices of maize output increased steadily but its production kept on fluctuating. Table 1 shows maize production trends in Kenya from 2005 to 2009. Consumption over the 5 year period was always above production, there is therefore great market potential for smallholder farmers if only they could be integrated fully into the marketing system.

Table 1: Maize production and consumption in Kenya from 2005 to 2009

Year	2005	2006	2007	2008	2009
Area (Ha)	1760618	1888185	1615304	1793757	1885071
Production (90 kg bags)	32423963	36086406	32542143	26302219	27142475
Tons	2918157	3247777	2928793	2369569	2442823
Unit price/ bag (KES)	1363	1300	1200	2500	2614
Consumption (90 Kg bags)	32120000	33105000	34098150	36000000	36000000
Total value (billion KES)	44.2	46.9	52.3	65.8	71

Source: RoK, 2010

Market liberalization process has been the major policy affecting the maize industry in Kenya since the late 1980's. Its main aim was to increase marketing efficiency and stimulate economic growth of the agricultural sector. Liberalization was expected to improve maize producer prices,

stimulate entry of private players in the maize marketing system and improve access of smallholders to maize markets. It was also expected to improve trade between maize surplus and deficit areas therefore ensuring commercialization of the sub sector (Kirimi et al., 2011).

Commercialization of the agricultural sector necessitates improving the ability of smallholders' to participate in markets (both informal and formal ones) thereby improving their incomes and livelihoods in the long run (Jagwe et al., 2011a). As such, integrating smallholder farmers into the market mechanism through increased market participation leads to higher living standards and reduces vulnerability of farmers to marketing risks (Rhaghau et al., 2012). The principle of agricultural commercialization is more than just marketing agricultural output. It is attained when a household's product choice and input use decisions are made with the main objective of profit maximization. Participants of commercial agriculture hold considerable potential for unlocking suitable opportunities necessary for providing better incomes and sustainable livelihoods for small scale farmers (Omiti et al., 2009). Markets and improved market access for poor rural households are essential for enhancing agriculture-based economic growth and increasing rural incomes. Increased commercialization of agriculture must be based upon the establishment of efficient and well functioning markets and trading systems that keep transaction costs low, minimize risks and provide information to all actors especially those living in areas of marginal productivity and weak infrastructure (IFAD, 2003;World Bank, 2008). In most developing economies however, smallholder farmers find it difficult to participate in markets because of the numerous constraints and barriers they face in accessing both input and output markets.

Omiti et al. (2009) found out that majority of rural farmers in Kenya produce low volumes of relatively low value and less perishable marketed surpluses. They mainly sell at the farm gate and in rural markets and do not effectively participate in urban markets that offer excellent opportunities of increasing their farm incomes. The costs associated with exchange of goods and services inhibit participation of smallholder farmers and traders in markets (Pingali et al., 2005). Alene et al. (2008) noted that although market reforms have been introduced in many countries in Sub- Saharan Africa since the 1980's with a view of enhancing efficiency in markets, transaction costs in production and marketing have actually increased rather than declined. The high transaction costs lead to thin markets and in some cases market failure. This then limits the

options that smallholder farmers can use in marketing their produce thereby reducing their profitability, incomes and overall economic wellbeing.

In Kenya, smallholder maize farmers can be grouped into three categories. The largest smallholder sellers of maize that account for half of the marketed maize output, the remaining sellers that account for the other half and households that do not sell any maize during a particular marketing season. There is however a great market concentration in this sector whereby less than 5% of the smallholder farms supply more than half of the total marketed maize output from the smallholder subsector. Most of their sales go to small scale assemblers or brokers who then bulk for onward sale to large wholesalers and millers. Majority of the smallholder farmers thus sell their produce in the villages. They sell their surplus produce more through the informal as compared to formal maize markets like urban processors/ millers or the National Cereals and Produce board (N.C.P.B) (Kirimi *et al.*, 2011).

1.2 The statement of the problem

Access to marketing outlets of agricultural output is essential in commercializing smallholder agriculture. This is more so in maize farming, which is a major staple food and livelihood activity for smallholder farmers in Kwanza district, Trans Nzoia County, Kenya. Majority of the farmers however have limited access to formal maize markets (urban processors/ millers and the N.C.P.B). This derails the overall process of commercializing the sector in the region. It is however not clear what factors; particularly transaction costs limit the smallholder farmers from accessing these markets. The study was therefore geared towards filling this knowledge gap.

1.3 Objectives of the study

1.3.1 General objective

The general objective of the study was to contribute to smallholder maize farmers' commercialization process by improving their ability to efficiently participate in formal maize markets for improved incomes.

1.3.2 Specific objectives

1) To characterize transaction costs faced by smallholder maize farmers in the region.

2) To determine how transaction costs influence smallholders' decision to sell through formal maize markets.

3) To determine the effect of transaction costs on the intensity of participation of smallholder farmers in maize markets.

1.4 Research hypotheses

1) Transaction costs do not significantly differ among smallholder maize farmers in the region.

2) Transaction costs do not have a significant effect on smallholders' choice to sell through formal maize markets.

3) Transaction costs do not significantly influence intensity of participation of smallholder farmers in maize markets.

1.5 Justification of the study

The economic pillar of Kenya Vision 2030 aims at promoting an innovative, commercially oriented and modern Agricultural sector by the year 2030. This will be accomplished through among other interventions, transformation of key institutions in Agriculture. Consequently this will lead to increased agricultural growth and improved market access for smallholder farmers through efficient supply chain management. To achieve this, policies that ensure a reduction of the constraints that limit smallholder farmers to market access must be implemented.

After identifying transaction cost factors affecting market participation, the study suggested policy interventions/ institutional innovations that could reduce constraints that hinder surplus

4

producing smallholder farmers from participating in high value formal maize markets. This is essential if these farmers are to move towards commercial production of maize where a large proportion of their output is produced for the market. Recommendations of this study if implemented will stimulate transition of the smallholder maize sector to commercial production thus benefit smallholder maize farmers of Kwanza district indirectly in the long run.

1.6 Scope and limitations of the study

The study was limited to small scale maize farmers of Kwanza District, Trans Nzoia County, Kenya. The major focus of the study was to assess how transaction costs shaped smallholder farmers' marketing decisions and choice of selling points for their surplus output. Unavoidable errors of omission or commission from respondents may have affected the accuracy of the results.

1.7 Operational definition of terms

Transaction costs -Refers to the costs incurred when preparing a commodity for sale, looking for a trading partner, negotiating with them, making a contract and enforcing it. It could be in terms of money spent or the opportunity cost of time spent.

Small scale/ smallholder farmers -Refers to farming households who practice farming on land holdings of less than 5 hectares.

Market participation -Refers to the proportion of maize output harvested that was sold

Marketable surplus -This refers to any quantity of output over and above the domestic consumption requirement that the smallholder farmer intends to sell in the markets

Social capital -Refers to social networks, institutions and associated norms of trust and reciprocity that underlie social relationships and resources accessible to individuals because they belong to these social structures.

Rent seeking -This refers to the act of smallholder farmers paying money either legally or illegally to induce their output to penetrate particular markets such as urban millers or the N.C.P.B.

Smallholder commercialization –This is the process of households targeting markets in their production decisions, their production decisions are based on market signals and comparative advantages in the marketing process.

Informal maize markets –This refers to farm gate, middlemen at the market centre, directly selling to consumers at the market centre and selling to local posho millers

Formal maize markets –This refers to urban processors/ millers and National Cereals and Produce Board.

Control factors –Other factors other than transaction costs that influence smallholder maize farmers' choice of selling point and intensity of market participation.

Intensity of market participation   -This refers to the proportion of maize output marketed out of the total output produced in the season

6

CHAPTER TWO

LITERATURE REVIEW

2.1 Transaction costs and smallholder farmer market participation

In the agricultural context, agricultural markets can be grouped into formal and informal. Informal markets are characterized by unofficial transactions between farmers and from farmers directly to consumers (Kherallah and Minot, 2001). Formal markets on the other hand have clearly defined grades, quality standards, safety regulations and formally set prices. Mangisoni (2006) noted that smallholder farmers usually find it difficult to penetrate formal markets due to high transaction costs, high risks, missing markets and lack of collective action.

Subsistence agricultural producers especially in Sub-Saharan Africa face several barriers that make it difficult for them to access both agricultural input and output markets. Transaction costs are among these barriers. Transaction costs are the observable and non observable costs associated with organizing for and carrying out a transaction (Holloway *et al.*, 2000). Despite the market reforms that were part of the liberalization process of the mid 1980's to promote efficiency in both input and output markets, transaction costs seems to have actually increased rather than decreased (Alene *et al.*, 2008). This is partly due to the collapse of public programs that traditionally used to provide farmers with extension services, input supply and credit support before the reforms (Jayne *et al.*, 1997).

Majority of smallholder farmers in Africa are located in remote areas with poor transport and marketing infrastructure that result in high transaction costs in accessing markets (Makhura *et al.*, 2001). The situation is aggravated by lack of reliable market information as well as information on potential exchange partners. Markets and improved market access are important in enhancing agricultural-based economic growth to the poor rural households. They improve the competitiveness of farming enterprises and rural incomes (Jagwe *et al.*, 2011b).

Fafchamps and Gabre-Madhin (2001) noted that liberalized agricultural markets in Sub-Saharan Africa are characterized by asymmetries in information, highly differentiated goods without formal standardization and informal contracts. They are also typically small and geographically dispersed leading to dispersed small scale buyers/traders. Smallholder farmers deal with a variety of traders with varying degrees of relationships and trust and with different

7

enforcement mechanisms. Grain markets in Sub-Saharan Africa thus remain risky, informal and cash-based leading to high transaction costs (Kherallah *et al.*, 2000).

Key *et al.* (2000) categorized transaction costs into fixed and proportional transaction costs. Fixed transaction costs (FTCs) mainly include the costs of: searching for a buyer with the best price or a market offering the best price; negotiating and bargaining (mostly where there is imperfect information concerning prices); screening, enforcement and supervision costs for farmers who sell their products on credit to make sure that the buyers are reliable and not likely to default. FTCs are invariant to the quantities of output traded. Proportional transaction costs (PTCs) include the costs of transferring the products traded such as transportation costs. They include per unit costs of accessing markets. PTCs lower the effective prices received for outputs by smallholder farmers. This then creates a price band within which some households find it unprofitable to sell their output to distant markets.

Among the main factors that influence small scale farmers' decision of market participation are:

Market information

This is vital for market participation behavior of smallholder farmers. It allows farmers to make informed marketing decisions that lead to supplying necessary goods, searching for potential buyers, negotiating, enforcing and monitoring contracts (Jari *et al.*, 2009). The most important information in facilitating transactions include information on consumer preferences, quantity demanded, prices, produce quality, market requirements and opportunities (Ruijs, 2002). Smallholder farmers usually have difficulties in accessing market information. This then exposes them to disadvantages in marketing hence relying on informal networks (traders, friends and relatives) for market information due to weak public information systems (FAO, 2004). The problem however is that such individuals may not have up to date and reliable market information making the usefulness of the information doubtful. Also, smallholder farmers face the risk of getting biased information due to the opportunistic behavior of more informed groups. Smallholder farmers are likely to accept low prices for their crops when the broker informs them that their produce is of poor quality and substandard (Mangisoni, 2006). They accept the low prices because they are unable to negotiate from a well informed position.

8

Organization in markets

Key and Runsten (1999) noted that smallholder farmers are usually not organized in markets. They sell their few produce surpluses individually without linking to other market actors. Individual marketing of small quantities of produce weakens their bargaining position and exposes them to price exploitation by traders. They also do not benefit from economies of scale (Kherallah and Minot, 2001). Frank and Handerson (1992) noted that lack of smallholder farmers' facilitation in the formation of producer associations or other partnerships arrangements makes it more difficult for smallholder producers to participate in formal markets. The greater the degree of organization in the market, the smaller the transaction costs are likely to be and the easier it will be to benefit from the exchange economy (Jari *et al.*, 2009).

Physical/ infrastructural constraints

These are embedded in communication links, transportation facilities and road networks (Machethe, 2004). 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.

Storage facilities

Proper post harvest handling and storage practices contribute to ensuring quality maintenance of agricultural products. Agricultural products are harvested at a specific point in time but are consumed all year round hence necessitating the need for proper storage facilities (Sasseville, 1988). Proper storage facilities have to be implemented by both farmers and traders in order to ensure availability of crops for consumption throughout the year. Storage has some advantages amongst farmers because it increases the market flexibility both in terms of time of sale and quantities sold. Households with proper storage facilities do not need to market their produce immediately after harvest when the prices are very low. They can store their produce and sell later when prices are high.

Smallholder farmers especially in Africa tend to be disadvantaged in markets due to their small size of operations, weak technical capacity, high vulnerability to risks and lack of sufficient capital (Ton, 2010). Maitre *et al.* (2011) identified the various constraints that

9

smallholders face in accessing agricultural markets. These include barriers to entry such as geographical barriers in poor remote areas, lack of economies of scale due to low resource endowment, high marketing risks and transaction costs, lack of bargaining power and lack of human and social capital. Social capital ownership can give rise to more favorable exchange terms leading to a reduction in transaction costs (Robinson *et al.,* 2002).

Institutional reforms that facilitate efficient rural service delivery, market development, development of physical infrastructure and supportive government policies are critical in propelling smallholder agriculture towards commercialization (Jagwe *et al.,* 2011a). This will ensure that smallholder farmers are able to gain market access, get timely and reliable market information, acquire market intelligence and effective farmer organization that is critical for the agricultural sector to transform towards commercialization. Meeting the challenge of poverty reduction and improving of rural incomes in Africa requires transformation of agriculture out of the semi subsistence production system to a more commercialized agricultural system (Olwande *et al.,* 2010).

2.1.1 Selected studies on the role of transaction costs on market participation

Jagwe *et al.* (2011a) studied the role of transaction costs on the participation of smallholder farmers and intermediaries in banana markets of the Great Lakes region and noted that for agriculture to play its role in Sub-Saharan countries, it needs to be commercialized to enable smallholders to participate in markets effectively. The study adopted a non separable household model that incorporated both fixed and proportional transaction costs in the function of maximizing utility subject to resource constraints. The Heckman model was used to determine factors affecting the discrete choice of smallholder farmers on whether or not to sell and the respective quantities sold while catering for selection biases. Probit analysis was used to determine the farmers' choice of selling point while the OLS model was used to analyze the extent of market participation of traders. Results of the study indicated that both fixed and proportional transaction costs distinctly affected the participation of smallholder farmers in markets, belonging to farmer groups facilitated information exchange that reduced fixed transaction costs therefore increasing the likelihood of farmers participating in markets. Household size, distance to the market and ownership of transport means that are linked to proportional transaction costs influenced the extent of participation in markets. The choice of

selling point was significantly influenced by household size, gender of household head, off farm revenue, access to price information and extent of remoteness of the household. The study proposed interventions geared towards supporting associations for farmers. This would facilitate information exchange and enhance bargaining and contracting skills that reduce transaction costs. Methodologically, the above study was almost similar to this. It was however different in that to measure the extent of market participation, Tobit model was used instead of Heckman. It also did not capture the effects of other factors like quality of the produce and cost of rent seeking that may also discourage smallholder maize farmers from participating in formal maize markets.

Jagwe et al. (2011b) in another study analyzed the determinants of discrete decisions of a household on whether or not to participate in banana markets of the great Lakes region using a bivariate Probit model. The continuous decision on how much to buy or sell was analyzed by establishing the supply and demand functions while accounting for selectivity bias. Results indicated that transaction cost related factors such as geographical location of households, sources of market information and travel time to the nearest urban centre do influence participation in markets. Other factors like labor availability, farming experience, gender of household head, off farm income and the asset base of the household also affected the likelihood and intensity of participation. They recommended policies guiding central and local governments towards increased investments in rural infrastructure (feeder road networks, trunk roads, telecommunication services and establishment of market places to help reduce transaction costs therefore improving participation of smallholder farmers in markets. The study also suggested that policies supporting group formation could lead to improved economies of scale and flow of information amongst farmers which may increase market participation.

Makhura (2001) on analyzing the transaction costs that smallholder farmers face when marketing their produce in the northern province of South Africa used Heckman two stage model. The study found out that transaction costs differed between households due to asymmetries in access to assets, market information, extension services and remunerative markets. It also found out that, access to assets and market information together with other household characteristics such as household size and off farm income were important determinants of market participation. A reasonable area of arable land tended to encourage

11

participation in markets. Pensions were found to discourage participation in high value commodity markets since they were viewed as an alternative cash income. The study suggested policy interventions to reduce transaction costs by enhancing information access and providing endowments to farming households, it suggested direct policy measures i.e. those dealing with land reform, extension services, education and legal reforms.

Alene et al. (2008) assessed the effects of transaction costs relative to price and non-price factors on smallholder marketed surplus and input use in Kenya. The study used a selectivity model that accounted for the effects of transaction costs, assets, technology and support services in promoting input use and generating a marketable surplus. The results showed that while transaction costs indeed had a significant negative effect on market participation, institutional innovations such as group marketing could reduce the cost of accessing markets. Output prices had no effect on output market entry and only provided incentives for increased supply by sellers. The study also revealed that transaction costs had significant negative effects on market entry and intensity of participation. Rising information and related costs in the input and output markets could explain the low use of purchased inputs and limited output response following market reforms. The transaction costs of acquiring farm inputs and selling farm outputs can be reduced through improved information access, transportation infrastructure and promotion of institutional innovations such as marketing cooperatives. Finally, the study suggested that other policy options rather than price policies should be used to promote input use and agricultural surplus in Kenya. Higher prices were likely to benefit sellers only imposing costs on the buying households. In the face of the food price dilemma facing many Sub-Saharan countries, policies that reduce transaction costs are thus an important alternative to price policies in promoting marketable surplus and input use.

Barrett (2008) studied smallholder market participation in Eastern and Southern Africa. The study found out that factors that affect transaction costs like geographical location of households, market information sources and travel time to the nearest urban centre influenced smallholder market participation. Other factors not related to transaction costs like farming experience, gender of household head, off farm income and the asset base of the household also affected the likelihood and intensity of smallholder market participation. The study suggested interventions aimed at facilitating smallholder organization, reducing costs of intermediary commerce and

improving poorer household access to improved technologies and productive assets as being central to stimulating smallholder market participation.

Jari *et al.* (2009) studied the factors that demoralized smallholder and emerging farmers in the Kat River valley from effective use of output markets. They used a multinomial logistic regression model to test the factors that influenced the probability of choosing either formal or informal marketing channel choices. The results showed that access to market information, expertise on grades and standards, availability of contractual agreements and good market infrastructure influenced their choices on channels used, they suggested policy proposals of encouraging collective action, promotion of contract farming and ensuring availability of market information to all farmers.

From the literature reviewed above, the decision of smallholder farmers to participate in markets was influenced by both transaction and non transaction cost related factors such as: geographical location of the household, distance to the market, source of market information, transportation costs, land per capita, off farm income and household sizes. The studies reviewed above mostly focused on the quantities of output sold the previous harvest time to determine the extent of participation in markets. This study considered barriers other than output prices not included in the above studies that may prevent smallholder maize farmers from accessing formal maize markets. These barriers include quality of the produce, time spent before payment is received and rent seeking behavior. These are assumed to affect transaction costs especially when selling maize to high value formal markets like urban processors and the N.C.P.B therefore discouraging the smallholder farmers from participating in the markets.

2.2 Theoretical and conceptual framework

2.2.1 Theoretical framework

Transaction cost theory embedded in the New Institutional Economics framework serves as a useful framework for understanding agricultural marketing in Sub-Saharan Africa especially after the liberalization of agricultural markets (Chirwa, 2009). New Institutional Economics uses the neoclassical framework but takes transactions as the unit of analysis. It relaxes the assumption of perfect information but emphasizes on the importance of institutions as a means of reducing high transaction costs (Williamson, 2000). In the agricultural context, transaction costs

are assumed to be specific to each seller. Each household faces a different price rather than a single market price when selling. The presence of high transaction costs thus leads to thin markets with low participation or even markets fail completely (Maltsoglou *et al.*, 2005). The theory focuses on the costs of accessing markets. Although it is not argued that transaction costs alone justify a household's choice of marketing outlet. The buying and selling decisions made by a household depend on the differences between the market price and the actual costs faced by the household in accessing markets. The household therefore becomes a net seller only in cases where the differences between prices and marketing costs are positive. This study therefore assumed transaction costs to be specific to each seller. The household therefore decides to market through either informal or formal maize markets based on the transaction costs faced to market through each of the market. The household chooses to market surplus output in the outlet with the highest positive differences between the prices offered and cost of accessing the market.

2.2.2 Conceptual framework

The decision of smallholder farmers on whether or not to participate in informal or formal maize markets was assumed to be influenced by transaction cost as well as other factors not related to transaction costs. After deciding on the market outlet to sell through, the household then decided on how much to sell. Intensity of market participation was captured by the proportion of total output harvested marketed by the farmer in that particular season. Market participation was finally assumed to have an impact on household income and economic welfare in general. The relationship was as shown in Figure 1.
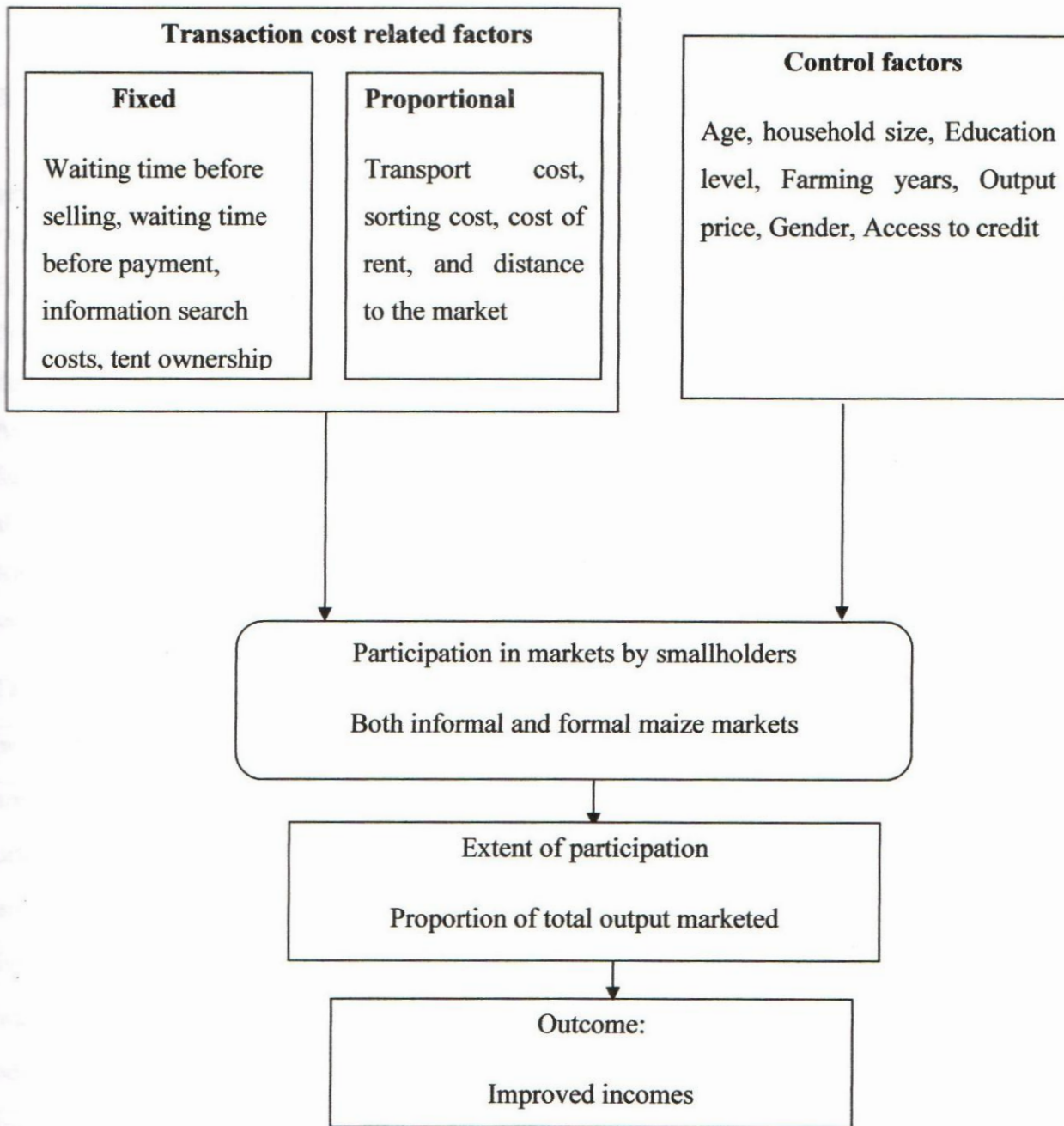
Figure 1: Conceptual framework.

Source: Authors conceptualization

CHAPTER THREE

METHODOLOGY

3.1 Study area

Kwanza is an administrative district of Trans Nzoia County, Kenya. It is generally flat with gentle undulations rising steadily towards Mount Elgon in the North West and the foot of Cherangani hills to the East. The study area is located in the upper Midland Agro- Ecological Zone (UMZ) and is endowed with brown red and clay soils derived from volcanic ash (DAO, Trans Nzoia annual report, 2010). The economic mainstay of the district is agriculture. The district is famous for its potential production of maize. A few private farmers and the Agricultural Development Corporation (ADC), a government corporation, practice large scale farming in the region while the rest of the population is composed of small scale farmers. ADC also practices large scale dairy and beef farming while the majority of the residents are small scale dairy farmers who keep goats and sheep too. The general information of the population is as shown in Table 2.

Table 2: Description of Kwanza district

Kwanza district	Characteristics
Farming households	46721
Surface area (km^2)	425.9 km^2
Rainfall	800-1000 mm/yr
Divisions	Number of farming households
Kwanza	28784
Endebess	17937

Source (DAO, 2010)
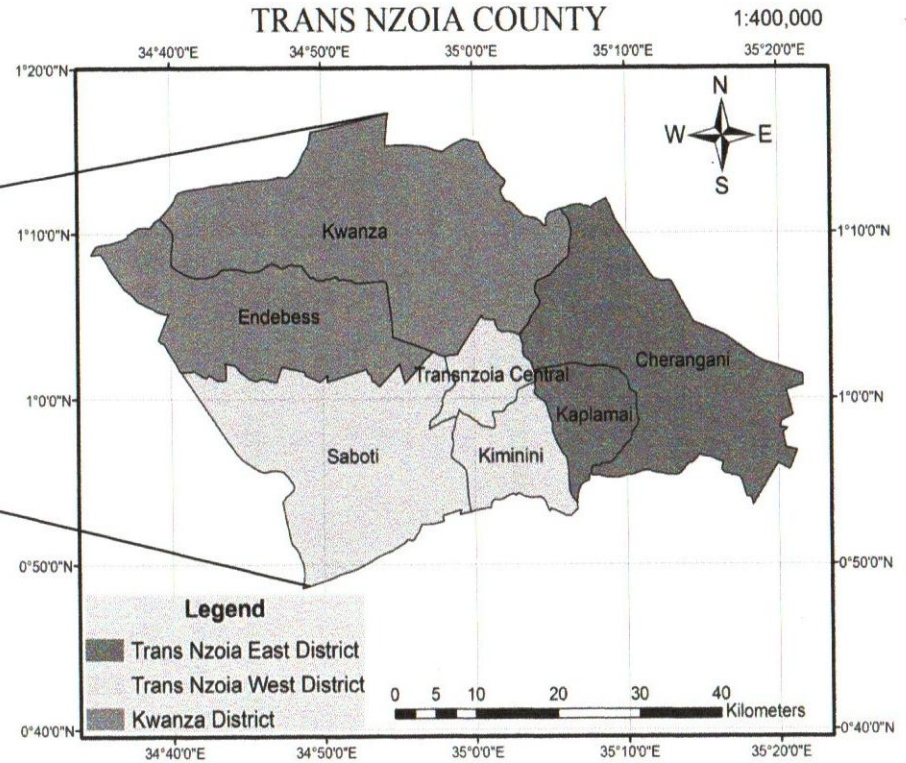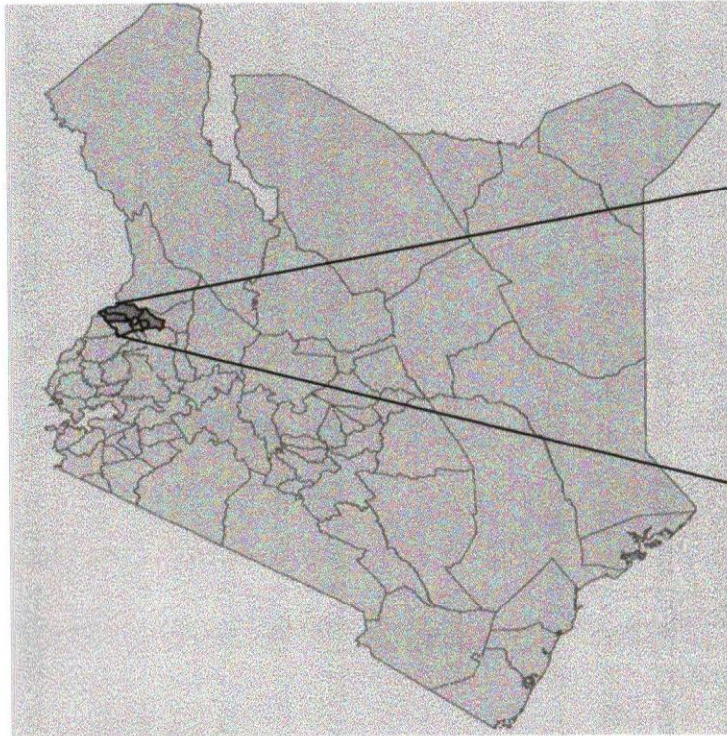
Source: www.nri.org

Figure 2: Map of Kwanza district, Trans Nzoia County, Kenya.

3.2 Research design

The study was a survey on smallholder maize farmers of Kwanza district, Trans Nzoia County, Kenya.

3.2.1 Target population

The target population of the study was smallholder farmers of Kwanza district, Trans Nzoia County, Kenya. The sampling frame was composed of all smallholder maize farmers in the region while the sampling unit was individual smallholder maize farming households.

3.3 Sampling design

3.3.1 Sampling procedure

Multistage sampling design was used. Kwanza District of Trans Nzoia County was selected purposively because of the large number of smallholder maize farmers in the district. Kwanza district has two divisions, Kwanza and Endebess which were all selected. Kwanza division has 5 locations while Endebess division has 3 locations. The study was done in 5 locations based on availability of resources and accessibility of the areas. 3 locations in Kwanza and 2 in Endebess were selected proportionate to the size of the district. The locations to be sampled were selected randomly. In every location, three villages were randomly selected. Smallholders to be sampled from each village were selected through systematic random sampling proportionate to the size of the location. This gave a total of 72 farmers from Endebess and 124 from Kwanza district. The required sample size was determined by proportionate to size sampling methodology by (Anderson *et al.*, 2007) specified as:

$$n = \frac{pqz^2}{E^2} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots(1)$$

$$n = \left[\frac{(0.5)(0.5)(1.96)^2}{0.07^2} \right] = 196 \; smallholder \; farmers$$

Where n = sample size; Z = confidence level (α= 0.05); p = proportion of the population containing the major interest (smallholder formal vs. informal maize market participants); q = 1-p; E = allowable error. Because the ratio of smallholder formal maize market participants to informal maize market participants in the population is not known, it is assumed that P = 0.5, q = 1- 0.5 = 0.5, z =1.96 and E = 0.07. This resulted to a sample of 196 respondents.

3.4 Methods of data collection

The study used both primary and secondary data. A semi structured questionnaire was used for primary data collection for both qualitative and quantitative data. The questionnaire was administered to the respondents through well trained enumerators. Secondary data was obtained through review of existing literature and other relevant materials.

3.5 Data analysis

To analyze data, descriptive statistics including frequencies, percentages and means were used for the first objective. Probit model was used for the second while Censored Tobit model was used in the third objective. Data analysis was done with the help of SPSS and STATA computer programs.

3.5.1 Descriptive analysis:

Objective 1: Frequencies, percentages, means and graphs were used to characterize the various transaction costs faced by smallholder maize farmers in the region

3.5.2 Empirical methods
Probit model: Objective 2

The framework as used in Jagwe *et al.* (2011a) was adopted. Farmers are faced with the challenge of deciding on whether to sell their produce through the informal maize markets or formal ones. This decision is based on the margins obtainable while taking into account the costs involved in each stage. Three scenarios were thus expected to guide the choice of selling point assuming that farmers were to minimize costs and maximize gains. The first scenario is when prices offered at the formal maize markets less producer prices and transaction costs incurred in selling the commodity exceed the prices offered at the informal markets less producer prices and transaction costs incurred in selling the commodity. Farmers therefore opted to sell their surplus output through the formal maize markets. The 2nd scenario is where the formal maize market prices adjusted for producer prices and transaction costs were less than the adjusted informal maize market prices, farmers therefore were better off by selling through the informal maize markets. Case 3 is where the farmer was invariant between the two decisions since the prices were equal in both cases. The choice of selling point y was therefore a function of prices offered at the formal maize market, informal maize markets, transaction costs incurred and other

factors like the institutional and environmental factors represented by z. The relationship was thus depicted as:

$$y = f\left(p_{fmkts}, p_{infmkts}, TC_{fmkts}, TC_{infmkts}, Z\right) \dots\dots\dots\dots\dots\dots\dots\dots\dots(2)$$

The third case then collapsed into either scenario 1 or 2. The situation y=1, represents scenario 1 whereby farmers opted to sell their produce through formal maize markets. Y=0 represents the 2nd scenario whereby farmers opted to sell their produce through the informal maize markets. The econometric specification problem thus followed a latent regression model specified as:

$$y^* = \beta_1 TC + \beta_2 Z + e \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots(3)$$

Where y^* is a latent variable that is unobserved. The dummy variable y is what is observed and is defined by:

$$y = 1 \; if \; y^* > 0 \; and \; y = 0 \; otherwise \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots(4)$$

B_1 was parameter estimates for variables capturing transaction costs; B_2 was parameter estimates for variables capturing other factors affecting the choice of selling point e.g. the institutional environment. Since transaction costs are mostly difficult to observe, the decision made by a farmer about the selling point is linked to factors capturing the costs incurred in the choice made and other institutional factors that may affect the choice. Marginal effects for the model were then specified as:

$$\frac{\partial}{\partial TC_{ik}} \emptyset(TC_i \beta_i) = \emptyset(TC_i, \beta_i)\beta_k \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots(5)$$

$$\frac{\partial}{\partial z_{ik}} \emptyset(z_i \beta_2) = \emptyset(z_i \beta_2)\beta_k \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots(6)$$

Model specification

The Probit model was thus specified as:

$Y_i(0,1)=\alpha_0+\alpha_1(AGE)+\alpha_2(HHOLDSIZE)+\alpha_3(EDUCATION)+\alpha_4(TRANSPORTCOST)+\alpha_5(SORT PRODUCE)+\alpha_6(TENTOWNERSHIP)+\alpha_7(CREDITACCESS)+\alpha_8(OUTPUTPRICE)+\alpha_9(MARK ETINFORMATIONSOURCE)+\mu_i \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots(7)$

Table 3: Variables used in the Probit model

Code	Variable	Description and Measurement	Expected sign
		Dependent	
(Participate)	If farmer participates in either informal/ formal markets	Informal markets=0,Formal markets=1	
		Independent	
Age	Age of the household head	Years	_
Householdsize	Size of the household	Number of household members	+/_
Education	Years of schooling for the household head	Years	+
Marketinfo	Source of market information	informal sources=0, Formal sources=1	+
Outputproduced	Output produced	90 Kg bags	+
Sortproduce	If the farmer sorts produce before selling	No=0, Yes=1	_
Creditaccess	If the farmer accessed credit the previous season	No= 0 ,Yes=1	+
Outputprice	Last price of maize output/ 90 kg bag	KES	+
Tentownership	If farmer owns tents used for drying maize	No=0, Yes=1	+

Tobit model: Objective 3

Majority of the smallholder farmers in Kwanza district, Trans Nzoia County, Kenya practiced maize farming both for food and as a source of income. A large proportion of farmers therefore participated in maize markets. The degree of participation is what varied much between the different households. This then made it difficult to analyze the problem using two step procedures like the Heckman or the double hurdle model because of the few non participants in maize markets. The Tobit model developed by Tobin (1958) thus came in handy because of its ability to censure those farmers who did not participate in maize markets in the specified period. Tobit interprets all the zero observations as corner solutions, the household was thus assumed to be a maize seller with zero sales. The model also assumed that the decision to sell and the actual sales level were determined by the same variables and the variables that increased the probability of selling also increased the total amount of maize output sold. The decision to participate in maize markets and the intensity of participation were thus jointly determined (Sindi, 2008). To address the problem of endogeneity of transaction costs in behavioral choice models, the Tobit model data was split into three. These were informal maize market participants, formal maize market participants and the last for the pooled data. The dependent variables for all the three regressions were the proportion of total output harvested that was sold in that particular season. The proportion ranged between 0 and 1 with 0 being the lower limit and 1 the upper limit. Therefore:

$$y_i^* = x_i'\beta + \varepsilon_i, \varepsilon_1 \sim N(0, \sigma^2) \dots\dots\dots\dots\dots\dots(8)$$

$$y_i = 0 \ if \ y_i^* \le 0 \dots\dots\dots\dots\dots\dots(9)$$

$$y_i = y_i^* \ if \ y_i^* > 0 \dots\dots\dots\dots\dots\dots(10)$$

Where y_i^* was the proportion of total output sold by a farmer and took a continuous value between 0 and 1 and x_i' is a vector of factors explaining values of the dependent variable.

The log likelihood function for the Tobit model was then specified as:

$$Ln\ L = \sum_0 Ln\phi\left(-x_i'\beta/\sigma\right) + \sum_+ Ln\left\{\sigma^{-1}\phi\left[(y_i - x_i'\beta)/\sigma\right]\right\} \dots\dots\dots\dots\dots(11)$$

The Tobit model was specified as:

$$Y_i^* = B_0 + B_1(AGE) + B_2(GENDER) + B_3(HHOLDSIZE) + B_4(EDUCATION) + B_5(WAITIMEBFORESELLING) + B_6(WAITIMEBFOREPAY) + B_7(TRANSPORTCOST) + B_8(SORTING) + B_9(CREDITACCESS) + B_{10}(OUTPUTPRICE) + B_{11}(RENT) + B_{12}(INFOSEARCH) + B_{13}(TENTOWNERSHIP) + \varepsilon_i \dots \dots (12)$$

Table 4: Variables used in the Tobit model.

Code	Variable	Description and Measurement	Expected sign
		Dependent	
MarkProp	Proportion of output marketed out of the total harvested	0 to 1	
		Independent	
Gender	Gender of the household head	Female/ male	+/−
Age	Age of the household head	Years	−
Household size	Size of the household	Number of household members	+/−
Education	Years of schooling for the household head	Years	+
WaiTmeBforeSelling	Waiting time before selling produce	Hours	−
WaiTimeBforePay	Waiting time before payment	Days	−
SortingCost	Cost of sorting maize/ 90 kg bag	KES	−
InfoSearch	Cost of information search	KES	−
Rent	Cost of rent/ 90 kg bag	KES	−
TransportCost	Transport cost/ bag	KES	−
Credit access	If the farmer accessed credit the previous season	No= 0 ,Yes=1	+
Output price	Last price of maize output/ 90 kg bag	KES	+
Tent ownership	If farmer owns tents used for drying maize	No=0, Yes=1	+

3.6 Apriori Hypothesis

Age of household head: The probability of smallholder farmers to participate in maize marketing is expected to decline with age. This is due to the risk aversion nature of older individuals who may not be willing to invest in new production technologies therefore reduce their probability of producing surplus for the market (Alene *et al.*, 2008). Age is thus expected to reduce the marketed proportion by individual households.

Household size: This shows the family labour supply for production and household consumption levels (Alene *et al.*, 2008). A positive sign shows that larger households provide cheaper labour that produces more output for the market. The proportion sold thus remains higher than the proportion consumed. A negative sign on the other hand means that a larger household is labour inefficient such that it produces less output but consumes a higher proportion, leaving smaller and decreasing proportions for sale (Omiti *et al.*, 2011).

Access to credit: This is expected to have a positive influence on market participation because credit worthy farmers can afford modern production technologies enabling them to produce for the market and also cover for the variable costs associated with marketing (Alene *et al.*, 2008).

Tent ownership: This is expected to increase the probability of smallholders participating in markets because of the role that tents play in ensuring produce quality as a result of facilitating drying. Tents assist in ensuring minimum moisture content required for access of high value markets e.g. millers and the N.C.P.B.

Sorting costs/ bag: This is hypothesized to reduce the probability of both market participation and intensity of participation by smallholder farmers. The high cost of sorting is presumed to discourage farmers from participating in markets because of its tiresome nature and the cost involved.

Education level: The variable represents human capital. It is expected to positively influence smallholder farmers' market participation. An increase in years of schooling is expected to increase a household's understanding of market dynamics. This then can help in increasing the amount of output sold in the market (Makhura *et al.*, 2001).

Gender of household head: This is expected to have either a positive/ negative influence on market participation. It shows the difference in market orientation between female and male headed households. Men are likely to sell more grain early in the season while women prefer to store more output for household self sufficiency (Cunningham *et al.*, 2008).

Waiting time before payment: Smallholder farmers are expected to participate more in markets that offer cash for products delivered than those that buy on credit terms. The volume of output sold in the market is expected to reduce with an increase in this waiting time. Smallholder farmers are assumed to be rational and will shift towards production of crops that are sold for cash on the spot.

Source of marketing information: A positive coefficient here would mean that formal sources of information (mobile phones, radios and public or private institutional channels) are more effective for providing relevant market information that increases the proportion of output sold. On the other hand, a negative sign would mean that informal sources (neighbours, friends and local middlemen) are more effective for providing market information that then increases the intensity of market participation (Omiti *et al.*, 2011).

Cost of information search: This are considered to be fixed transaction costs that influence market entry decisions (Vance and Geoghegan, 2004). It is expected to have a negative influence on the proportion of maize marketed in the season by smallholder farmers.

Rent: Market participation is hypothesized to decrease with increase in the cost of rent in a particular market. The proportion of maize marketed by the household is thus expected to decrease as the cost of rent increases.

Transport cost per bag: This variable is directly related to distance to the market and condition of the road used since maize output is voluminous in nature. Alene *et al.* (2008) found out that white maize supply tends to decline with distance to the market. Farmers located far from maize markets supply less output to the markets than their counterparts who leave near this markets. This variable is thus expected to influence the proportion of total output marketed by an individual negatively. A negative relationship is expected between marketed proportion and increase in transport cost per bag.

Output produced: This is expected to increase the marketed proportion out of the total harvest. Omiti *et al.* (2011) suggested that surplus output is essential in meeting both household consumption requirements and the market demand.

Output price: This is expected to increase the proportion of output sold out of the total harvested. Alene *et al.* (2008) held the notion that output price serves as an incentive for sellers to supply more in the market.

Farming experience: The proportion of output produced for the market is expected to increase with increase in years of farming. Experience is assumed to equip the farmer with necessary orientation of the marketing process. It is thus easy for the highly experienced farmers to view agriculture as businesses thus produce more output for the market.

CHAPTER FOUR

RESULTS AND DISCUSSIONS

This chapter presents findings of the study from both descriptive and econometric models. Descriptive statistics include an analysis of the distribution of smallholder farmers between the formal and informal maize markets. A comparison between the informal and formal maize market participants was also done to find out how various transaction costs as well as other factors varied between the two market categories. Finally, empirical estimates on the effect of transaction costs as well as other factors on smallholder choice of marketing and intensity of market participation were done.

4.1 Smallholder farmers and characteristics of maize market outlets: A descriptive analysis

4.1.1 Distribution of smallholder farmers in the different maize markets.

The distribution of smallholder farmers in the different maize markets was analyzed and the results presented in Table 5.

Table 5: Distribution of smallholder farmers in the different market outlets

Market sold	Frequency	percentage
Farm gate	106	54.08
Middlemen (Market centre	6	3.06
Consumers (Market centre)	3	1.53
Local *posho* millers	13	6.65
Urban processors/ millers	28	14.28
National cereals and produce board	22	11.22
Non participants	18	9.18
Total	196	100.00

Source: Field survey, May 2012

Of all the farmers surveyed in the region, 54.08% sold their produce at the farm gate, 25.50% sold through formal maize markets (Urban processors/ millers and the N.C.P.B) while 9.18% of the respondents did not participate in maize markets at all. The other 11.24% were distributed between middlemen at the market centre, consumers at the market centre and local *posho* millers. This shows that most smallholders preferred to sell at the farm gate. The result concurs with Kirimi *et al.* (2011) who found out that smallholder maize sales go largely to small scale assemblers/ brokers who mostly buy at the farm gate. This was probably due to the few transaction costs as well as other constraints faced when selling produce at the farm gate as compared to the other marketing channels.

4.1.2 Mean difference of various continuous variables between the informal and formal maize market participants

A *t*-test was done to find out the mean differences of various continuous variables between the informal and formal maize market participants. The results were presented in Table 6.

There was a significant difference in age of household head between the informal and formal maize market participants. The mean age of farmers who sold through informal markets was 53.72 years while that of those who sold through the formal markets was 32.97 years. Mean age for the pooled data was 50.08 years. This was statistically significant at 1% level. These results show that as farmers' age increases, their probability of selling through informal markets also increases. Programs from both the public and private sector players to encourage commercialization of agriculture should thus focus more on the relatively younger individuals. They are likely to accept change faster than older individuals. The results tallied those of Ayuya (2010) who found out that older farmers tended to be conservative in their approach of doing things.

Differences in mean prices of maize between the two market categories were also significant at 1% level. The mean price in informal markets was KES 2576.19 per 90 kg bag while that of formal markets was KES 3031.67 per 90 kg bag. The pooled data mean was KES 2651.97 per bag. This was a difference of KES 455.48 per bag between the informal and formal maize markets. Holding all other factors constant, this difference was large enough to make every farmer want to sell through the formal maize markets. This was not the case however, probably because of other costs involved in searching for markets and facilitating transfer of commodities

to the market. This may be the reason why a majority of smallholder farmers still preferred to sell their commodities through informal markets despite the price difference.

Table 6: Mean differences of various continuous variables between the informal and formal maize market participants

| Variable | Informal markets=128 | | Formal markets=50 | | Pooled data=178 | | t-value |
	Mean	Std dev	Mean	std. dev	mean	std. dev	
Age	53.72	8.98	32.97	5.94	50.08	11.62	(12.12)***
Household size	8.21	6.05	5.33	1.09	7.97	6.12	(1.40)
Output price	2576.19	561.26	3031.67	435.79	2651.97	566.14	(-4.19)***
Output produced	110.99	68.33	150.27	105.99	100.12	85.70	(-1.82)
Rent per bag	12.09	3.74	53.53	11.28	18.03	16.02	(-36.24)***
Cost of sorting maize per bag	38.85	16.71	122.58	47.16	45.26	48.69	(-17.04)***
Transport cost to the market	14.14	14.39	129.83	11.26	33.62	45.59	(-41.48)***
Distance to the market	0.67	1.87	24.84	7.23	4.73	9.68	(-35.46)***
Waitingtime before selling	2.64	0.86	16.53	5.97	9.99	15.46	(-10.57)***
Waiting time before payment	1.50	0.66	23.42	21.52	5.49	13.14	(-12.46)***
Cost of information search	116.67	29.31	401.67	70.08	164.97	114.11	(-36.36)***

***, **, * Significance at 1, 5 and 10% respectively

Source: Field survey, May 2012

There was also a significant difference between the mean costs of rent in the two markets. Mean cost of rent on selling through informal markets was KES 12.09 per bag while that of selling through formal markets was KES 53.53 per bag. Mean cost of rent for the pooled data was KES 18.03 per bag. The KES 41.44 difference in the cost between the two markets might

have been one of the reasons that discouraged the farmers from selling through formal maize markets.

Mean difference in the cost of sorting produce to meet the required market standards was also significant at 1% level. The mean cost of sorting produce to meet the informal market conditions was KES 38.85 per bag while that of formal markets was KES 122.58 per bag. This was probably because formal maize markets require high quality standards for produce to be accepted in them. Farmers thus have to invest more in sorting just to meet the required market standards. This might be one of the factors hindering smallholder farmers from actively participating in formal markets. The mean cost of sorting for the pooled data was KES 45.26 per bag.

The mean difference in cost of transporting maize output to the market per bag was also significant at 1% level. The mean transport cost to the informal markets, formal markets and the pooled data was KES 14.14, KES 129.83 and KES 33.62 per bag respectively. This was a KES 115.69 difference in cost between the informal and formal maize markets. The high cost of transporting produce to the formal maize markets may act as a hindering factor for smallholder farmers to participate in these markets. Siziba et al. (2011) found out that most cereal consumption centers in Sub-Saharan Africa are in urban areas where prices are relatively high. Farmers located in remote areas however had less likelihood of participating in these markets because of high costs of accessing the markets.

The mean difference between distance to the informal and formal maize markets was also significant at 1% level. The mean distance of travelling to the informal markets was 0.67 Kms while that of travelling to the formal markets was 24.82 Kms and 4.73 Kms for the pooled data. This difference in actual distance between the informal and formal maize markets and probably most roads in rural areas being in poor and dilapidated conditions may act as a discouraging factor for smallholder farmers to participate in the formal markets. The government can thus introduce collecting centers in rural areas for farmers to deliver produce to N.C.P.B through. This will greatly reduce the effect of distance to markets in smallholder market participation. Policies aimed at construction of more marketing outlets in rural areas increase market participation by enhancing meeting of trading partners at a common place and lowering transaction costs (Jagwe et al., 2011a).

The mean difference in time farmers had to wait in the market place before selling their produce was also significant at 1% level. The mean waiting time smallholder farmers had to wait in the informal markets before selling their output was 2.64 hours while that of waiting in the formal markets and the pooled data was 16.53 and 9.99 hours respectively. Smallholder farmers thus preferred to sell their produce through markets that had less waiting time because of the indirect costs like opportunity cost of waiting rather than doing other things. This cost may be the reason why most smallholders preferred to sell their produce through the informal maize markets.

The mean difference in waiting time before payment was received by farmers after selling their produce was also significant at 1% level. The mean waiting time for smallholder farmers who sold through informal markets, formal markets and the pooled data was 1.5 days, 23.42 days and 5.49 days respectively. Most smallholder farmers especially in Sub- Saharan Africa are cash constrained therefore require immediate payment for their produce to cater for other expenses. The delay in payment in formal markets may influence farmers' preference for informal markets where they receive prompt payment for produce sold.

Mean difference in the cost of searching for information between the two markets was also statistically significant at 1% level. The mean cost of searching for information in informal markets was KES 116.67. These included costs of physically travelling to the market places and calling through mobile phones to inquire about market prices and quality required of the produce. The mean cost in formal markets was KES 401.67 while that of the pooled data was KES 164.97. This cost difference between the two markets could also serve to discourage smallholder farmers from participating in formal maize markets.

4.1.3 Price movement of farm gate prices in the year 2011-2012

2 months moving averages of prices were computed and results presented in Figure 3 to show the movement of farm gate maize prices for the whole season in the region. This was because most smallholders in the region sold their output at the farm gate. There was a large variation in farm gate prices between the harvest time at around October where price was around KES 2500/ 90 kg bag and around July when prices were peak at KES 3600 per 90 kg bag.
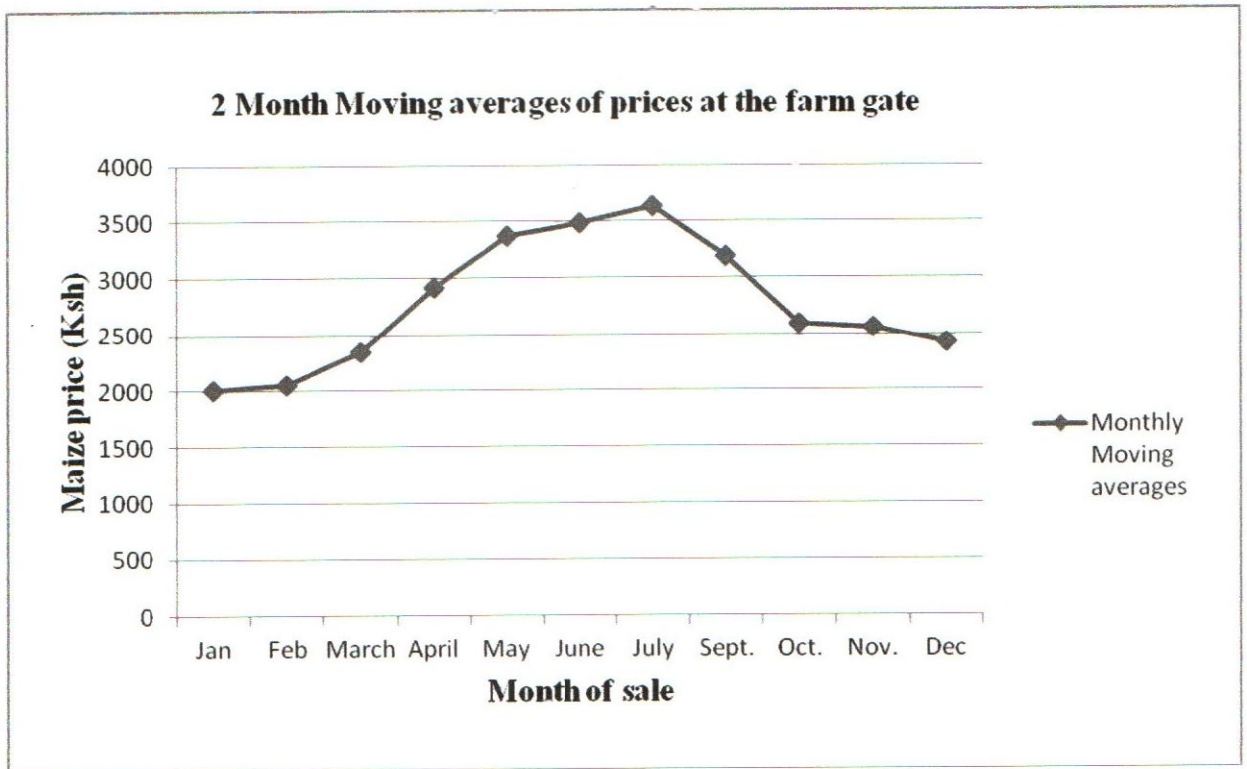
Figure 3: 2 month moving averages for monthly prices at the farm gate.

Source: Field survey, May 2012

4.1.4 Number of smallholder farmers selling at the farm gate each month

On the other hand, 2 month moving averages were also computed for the total number of farmers who sold their maize output each month and the results presented in Figure 4.
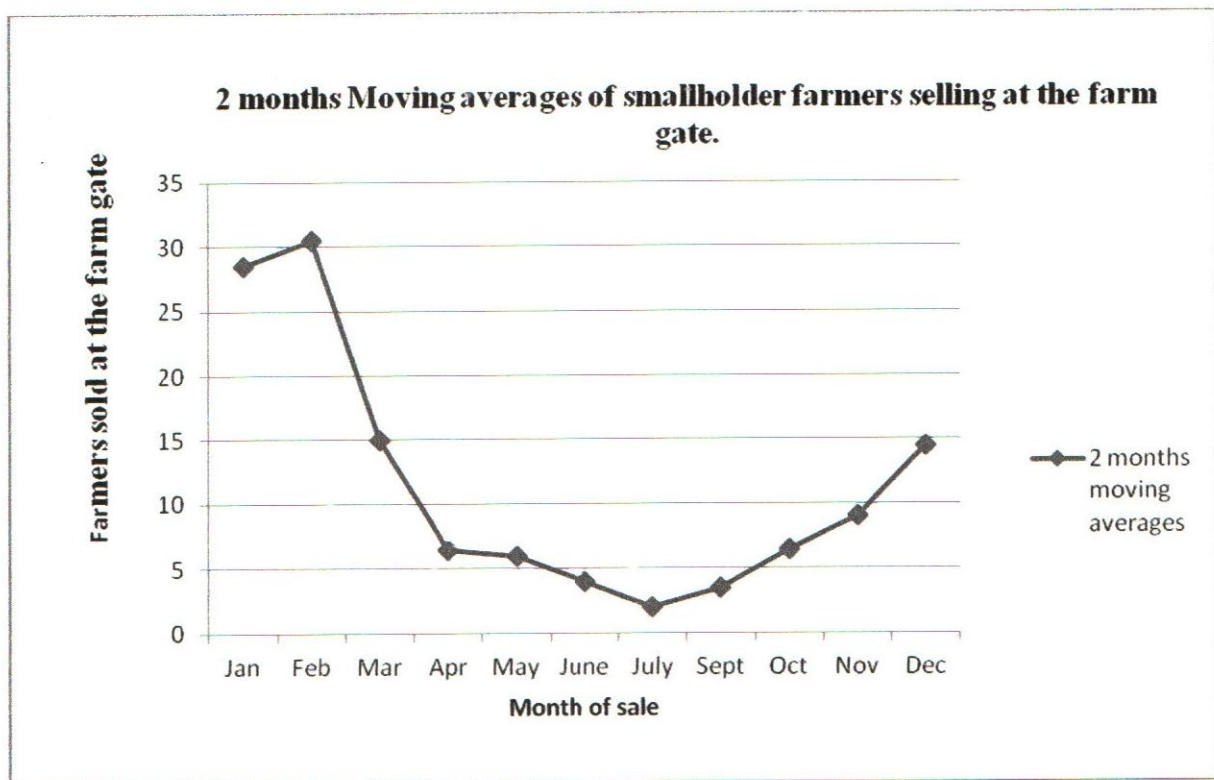
Figure 4: 2 month moving averages of the number of smallholder farmers who sold maize during each month at the farm gate

Source: Field survey, May 2012

From the results, it was clearly found out that most farmers sold their surplus output between January and March with the figures rising steadily from around October which was the harvest time. Results from Figure 3 showed that prices were lowest from around October to March and this was when most smallholders sold their surplus output. This implies that smallholder maize farmers in the region were not maximizing the market potential, they sold when prices were lowest thus reaping less than the maximum they could acquire from the marketing process. After harvesting, smallholder farmers depend on the output harvested for their daily expenses, including financing Christmas festivities, school fees in January when schools and colleges open and also land preparation and acquisition of inputs for the next season. This forces them to sell their output between October and March. The prices are lowest during this period because almost

all farmers sell their produce at around the same time flooding the market. Farmers that reap highly from the marketing process are those that store their produce to around April when prices start rising again.

4.1.5 Smallholder marketing costs between the informal and formal maize market participants

Marketing costs for both informal and formal maize market participants were calculated to find the real prices received by farmers after adjusting for marketing costs. The results were presented in Table 7.

Table 7: Smallholder marketing costs between informal and formal maize market participants

Variable	Informal markets		Formal markets	
	Cost (KES)	Revenue (KES)	Cost (KES)	Revenue (KES)
Average sales price per bag		2576.19		3031.67
Less: variable costs				
Average cost of rent per bag	12.16		53.23	
Average cost of sorting per bag	38.83		122.58	
Average transport cost to the market per bag	16.69		122.07	
cost of cess (1% of sales price	0.00		30.31	
Total variable costs of marketing	67.78	67.78	328.19	328.19
Real sales value		**2508.51**		**2703.48**

Source: Field survey, May 2012

The average prices received by farmers after adjusting for direct marketing costs was KES 2508.51 for informal market participants and KES 2703.48 per 90 Kg bag of maize for the formal maize market participants. This was a KES 194.97 price difference between the two market categories. Adjusting the price difference further for fixed transaction costs and other indirect costs associated with selling maize output through formal market outlets reduces the prices further. This further discourages the farmers from traveling to formal markets to sell their produce. Consequently, farmers choose to sell their output through informal markets (farm gate,

middlemen at the market centre and directly to consumers at the market centre) at a slightly lesser price than selling through formal maize markets. This may be the reason why most smallholder farmers preferred to sell their output through informal marketing outlets as compared to the formal ones.

4.2 Probit estimates for the effect of transaction costs on farmers' choice of selling through formal maize markets

This section presents the results of the Probit model. It shows the effect of a set of independent variables on the probability of either selling through the informal markets or formal maize markets. The dependent variable took a value of either 0 or 1 in the model. 0 represented households that sold their output through the informal maize markets whereas 1 represented individuals who sold their output through the formal maize markets. Results of the model are as shown in Table 8. The log pseudolikelihood of the model was -25.61.

Table 8: Probit estimates for the effect of transaction costs on smallholders' choice of selling through formal maize farmers

Variables	dy/dx	Coef.	Std. Err.	z
Age	-0.007	-0.028	0.013	-2.15**
Household Size	-0.009	-0.034	0.035	-0.98
Education level	0.033	0.126	0.040	3.13***
Access to credit	0.181	0.726	0.300	2.42**
Sort produce	0.189	0.698	0.293	2.38**
Tent ownership	0.166	0.661	0.293	2.26**
Market information source	-0.055	-0.210	0.071	-2.96***
Output price	0.001	0.001	0.001	1.31
Output produced	0.034	0.132	0.152	0.87

Number of obs = 178; Wald chi2 (10) = 56.28; Log pseudolikelihood = -25.61; Prob> chi2 = 0.0000; ***,**,* Significance at 1, 5 and 10% respectively

Source: Field survey, May 2012

Age of household head in years was used as a proxy to marketing experience. It had a negative coefficient that was statistically significant at 5% level. Increase in age of household head by 1 year reduced the probability of participating in formal maize markets by 0.70%. This was probably due to the high risk averse nature associated with older individuals as compared to the relatively younger individuals. This result contradicted that of Jagwe *et al.* (2011a) who found out that increase in age increased the probability of farmers participating in distant markets than selling at the farm gate because of negotiation skills acquired over time.

Education level of a household head had a positive coefficient and was statistically significant at 1% level. This shows that the more the number of years the household head spent in school, the higher was the probability of participating in high value formal maize markets. An increase in education level by 1 year from the mean increased the probability of participating in formal maize markets by 3.30%. This result concurred with those of Sharma *et al.* (2009) who found out that relatively less educated farmers used traditional channels of marketing like neighbours and farm gate rather than selling to distant formal markets.

Access to credit increased the probability of participating in formal maize markets and was statistically significant at 5% level. Having access to credit increased the probability of participating in formal maize markets by 18.1%. This may be attributed to trainings offered by credit institutions on transforming agriculture into viable businesses, provision of market information by the institutions and also relaxation of the strain on cash to meet marketing costs therefore giving them ample time to look for high value formal markets for their output. These results concur with Okoye *et al.* (2010) who found out that those households who had access to higher credit volumes had a higher probability of selling off farm (through formal markets) rather than on farm.

Sorting produce before selling positively influenced the probability of selling through high value formal maize markets. Sorting produce increased the probability of participating in high value formal maize markets by approximately 18.9% and was statistically significant at 5% level. This was probably due to the fact that urban millers and the N.C.P.B (formal) require high quality standards as compared to the informal markets therefore forcing farmers to go an extra step of sorting their produce in order to ensure their produce was accepted in these markets.

Owning tents used for drying maize increased the chances of participating in high value formal maize markets by about 16.6% and was statistically significant at 5% level. This was probably due to the fact that formal maize markets have a minimum moisture content they allow before purchasing farmers' produce. Tents influence the quality of farmers' produce by ensuring that grains are not discolored due to drying maize on bare ground or develop mould as a result of grain being stored while still moist. Programs can thus be put forward by both public and private institutions like A.F.C, N.C.P.B and commercial banks for provision of tents to farmers with produce delivered to N.C.P.B or through the warehouse receipt system serving as collateral.

The coefficient on source of market information was negative and statistically significant at 1% level. This meant that informal sources of market information like friends, neighbours and other non institutional sources were more effective in providing market information to farmers. Farmers who do not have easy access to formal sources of market information mostly obtain the information from neighbours, village mates and traders (informal sources). From the results, obtaining information from informal sources reduced the probability of participating in formal markets by 5.50%. These results concurred with those of Jagwe *et al.* (2011a) who found out that those households who received market information from village mates, neighbours and traders were less likely to travel to distant markets to sell their bananas. The information was mostly distorted therefore discouraging farmers from participating in the high value formal maize markets.

4.3 Tobit estimates for the effect of transaction costs on the extent of smallholder maize market participation

The censored Tobit model was used to assess the effect of transaction costs on the proportion of total maize output sold through the informal markets, formal markets and on the pooled data. The log likelihood for the fitted model was -183.9355, -72.0748 and -219.3639 for the informal markets, formal markets and the pooled data respectively. The Pseudo R^2 for all the three categories were above the statistical threshold of 20% showing that the proportion of total output marketed was attributed to the variables considered in the model. Results of the analysis were presented in Table 9. They showed transaction costs to have varied effects on households depending on the market they sold to.

Table 9: Tobit estimates for the effect of transaction costs on the extent of smallholder maize market participation

Variables	Informal maize markets		Formal market participation		Pooled data	
	dy/dx	Coef.	dy/dx	Coef.	dy/dx	Coef.
Gender	-0.0066	-0.0066(0.0133)	-0.0235	-0.0235(0.0151)	-0.0057	-0.0057(0.0123)
Age	0.0016	0.0016(0.0009)*	-0.0319	0.0319(0.0086)***	-0.0016	-0.0016(0.0008)**
Household Size	-0.0133	-0.0133(0.0015)***	-0.0003	-0.0003(0.0052)	-0.0127	-0.0127(0.0067)*
Education Level	-0.0003	-0.0003(0.0019)	0.0006	0.0006(0.0020)	-0.0014	-0.0014(0.0019)
Access to Credit	0.0445	0.0445(0.0145)***	0.0487	0.0487(0.0237)**	0.0426	0.0426(0.0137)**
Waiting time before selling	-0.0048	-0.0048(0.0120)	-0.0166	0.0166(0.0080)**	-0.0140	-0.0140(0.0053)**
Output price	0.0100	0.0100(0.0250)	0.0129	0.0129(0.0037)***	0.0111	0.0111(0.0059)*
Transport cost	-0.0404	-0.0404(0.0274)	-0.0167	-0.0167(0.0061)***	-0.0084	-0.0084(0.0045)*
Waiting time before pay	-0.0500	-0.0500(0.0354)	-0.0226	0.0226(0.0109)**	-0.0022	-0.0022(0.0011)**
Sorting cost	-0.0138	-0.0138(0.0038)***	-0.0218	0.0218(0.0053)***	-0.0050	-0.0050(0.0020)**
Rent	-0.0011	-0.0011(0.0007)	-0.0141	-0.0141(0.0065)**	-0.0119	-0.0119(0.0046)**
Information search cost	-0.0015	-0.0015(0.0018)	-0.0171	-0.0171(0.0079)**	-0.0105	-0.0105(0.0061)*
Tent ownership	0.0023	0.0023(0.0124)	0.0294	0.0294(0.0144)**	0.0108	0.0108(0.0038)**
	Number of obs=128; LR chi2(15)= 311.18; prob>chi2=0.0000; pseudo log likelihood= - R2 = 0.485; log likelihood= 183.9355; Left C. = 0 ; Right C. = 0		Number of obs = 50; LR chi2(15) = 247.50; Prob > chi2 = 0.0000; Log likelihood = -72.0748; Pseudo R2 = 0.2394; Left C. = 0 ; Right C. = 0		Number of obs = 196; LR chi2(15) =610.72; Prob<chi2 = 0.0000; log likelihood = -219.3639; Pseudo R 0.3550; Left C = 18 ; Right C. = 0	

*, **, *** Significance at 1, 5 and 10% respectively, Standard errors in parenthesis

Age of household head in years had varied effects on informal and formal maize market participation. A 1 year increase in age of household head from the mean increased the proportion of output marketed through informal markets by 0.16%, the variable was significant at 10% level, it however reduced the proportion of output marketed through formal maize markets by 0.03 and 0.002 for the whole sample. This shows that, as the farmer's age increased, the probability of producing more for the market declined in the long run. The result concurred with Bahta *et al.* (2012) who found out that smallholder market participation declines with age. Older farmers tend to be risk averse and reluctant to adopt technology hence their inability to produce more for the market.

Household size had a negative effect on the proportion of output sold through the informal markets and on the pooled data. Increase in household size by 1 member reduced the proportion of maize output marketed through both the informal markets and the pooled data by 0.013. It negatively influenced marketed proportions probably because maize is used as food by a large proportion of the population therefore the larger the household size, the smaller the quantity of output marketed. This negative influence was probably because of larger households being labor inefficient thus producing less output but consuming a higher proportion leaving smaller and decreasing proportions for sale (Alene *et al.*, 2008) and (Omiti *et al.*, 2009).

Access to credit had a positive and significant influence on the proportion of output sold through each of the market categories and the pooled data. The variable was significant at 1% in the informal markets and at 5% significance level in the formal markets and the pooled data. Probability of a household accessing credit, be it either from a local group, microfinance institution or local bank increased the proportions of output marketed by 0.0445, 0.0487 and 0.0426 to the informal markets, formal markets and the pooled data respectively. This was probably due to the fact that credit acquisition enabled households acquire production inputs and other services essential in transforming production from subsistence to commercial production of maize. This result concur with those of Alene *et al.* (2008) who found out that credit worthy farmers had a 19% greater likelihood of market participation as compared to non credit worthy farmers.

Waiting time at the market place before selling had a negative effect on the proportions of output marketed through formal maize markets and the pooled data at 5% significance level.

Increase in waiting time before selling output by 1 hour reduced the proportion of output sold through the formal markets and the pooled data by 0.0166 and 0.0140 respectively. This cost is especially high during the harvest time and might be one of the major reasons that always discourage the smallholders from actively participating in formal maize markets

Output price had a positive and significant influence on the proportion of maize output marketed at 1% and 10% level in the formal markets and the pooled data respectively. Increase in output price by KES 1 increased the proportion of output sold through both the formal markets and the pooled data by 0.0129 and 0.0111 respectively. This result was consistent with those of Omiti *et al.* (2009) and Alene *et al.* (2008) who found out that better output prices were a key incentive for increased sales by farmers

Transport cost had a negative influence on the proportion of maize output marketed through the formal markets and the pooled data at 1% and 10% significance level respectively. It however did not have a significant effect on marketed output through the informal markets. Increase in transport cost by KES 1 from the mean reduced the proportion of maize output marketed through formal maize markets and the pooled data by 0.0167 and 0.0084 respectively. Transport cost seems to discourage smallholder farmers from participating more in formal maize markets. This variable was used to capture the extent of isolation of farming households from the market since transport cost increases with distance to the market, state of infrastructure and the mode of transport used. It is associated with the per unit cost of accessing the market (Key *et al.*, 2000). The result tallied those of Okoye *et al.* (2010) who found out that farmers with high cost of crop transportation were likely to be more of autarkic other than sellers and buyers other than autarkic.

Waiting time before payment was received also had a negative influence on proportions of surplus output marketed through both formal markets and the pooled data at 5% significance level. This indirect cost in form of time did not significantly affect households who sold their output through the informal markets. Most transactions here were on cash. Increase in waiting time before payment was received by 1 day reduced the proportion of output marketed through both the formal markets and the pooled data by 0.0226 and 0.0022 respectively.

Cost of sorting maize output in order to meet the required market standards influenced proportions of maize output sold negatively in all the three market categories. The cost was statistically significant at 1% level in both the informal and formal maize markets and at 5% level in the pooled data. A KES 1 increase in the cost of sorting a 90 kg bag of maize from the mean reduced the proportion of output sold by households through the informal markets, formal markets and the pooled data by 0.0138, 0.0218 and 0.0050 respectively.

Cost of rent paid by farmers to induce their output to penetrate the market was not significant in the informal markets. But for the formal markets and the pooled data, the cost was statistically significant at 5% level. A KES 1 increase in the cost of rent paid per bag reduced the proportions of output marketed through the formal maize markets and the pooled data by 0.0141 and 0.0119 respectively. This was one of the major costs that discouraged the smallholders from selling their output through the formal maize markets especially urban processors/ millers and the N.C.P.B. The cost is normally highest during the harvest time and at around the land preparation and acquisition of inputs stage when supply is very high as compared to the demand

Cost of information search was measured in terms of KES used for calling the markets to inquire about market prices and the actual travelling costs to the markets by farmers to inquire about prices and general market conditions for maize output. This cost was lowest at the farm gate and highest in urban millers and N.C.P.B. The cost was statistically significant at 5% and 10% level in the formal markets and the pooled data respectively. A KES 1 increase in cost of information search from the mean reduced the proportion of maize output marketed through the formal maize markets by 0.0171 and by about 0.0105 on the pooled data.

Tent ownership by a household had a positive and significant effect on the proportion of output marketed through both the formal maize markets and the pooled data at 5% significance level. Ownership of tents used for drying maize by farmers increased the proportions of maize sold through the formal maize markets and the pooled data by 0.0294 and 0.0108 respectively. This means that tents used for drying maize are a very important asset to smallholders especially because of the role they play in ensuring high quality of maize grain that can fetch higher prices in the market. This cost however did not significantly influence proportions sold through the informal maize markets.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

The Kenya vision 2030 stipulates that in order to commercialize the agricultural sector in Kenya, it is essential to improve market access (both formal and informal) for smallholder farmers and efficiently manage supply chains. This study therefore aimed at assessing how transaction costs shaped smallholder maize farmers' marketing decisions in Kwanza district, Trans Nzoia County, Kenya. This is because of the role transaction costs play in preparing commodities for sale and searching for the best markets.

Transaction costs had varied effects on smallholders' choice of either selling through informal or formal maize markets. Probability of selling through the formal maize markets was positively influenced by tent ownership and sorting produce into good quality before selling. It was also positively influenced by education level of household head and access to credit. Most farmers acquired market information from informal sources; this influenced their probability of participating in formal maize markets negatively. Age of household head also influenced formal maize market participation negatively.

The proportion of maize marketed out of the total harvested by the smallholders was positively influenced by a household's access to credit, output price and ownership of tents. However, transport cost to the market per bag, waiting time before receiving payment for produce sold, cost of sorting produce, cost of rent and information search cost negatively influenced intensity of market participation. Transport cost to the market affected those who sold through formal maize markets more than the informal maize market participants. This was probably because of the positive correlation between distance traveled to the market and cost of transport.

5.2 Recommendation

Policies to improve smallholder maize market participation especially in formal markets should target the relatively younger individuals; this is because they are the major market players in the region.

Policies geared towards accurate market information availability and access should also be promoted by both private and public stakeholders. Information communication technologies like internet services, mobile phones, radio and televisions can be used to provide timely, efficient and accurate market information on both product demand and output prices in different markets. The information database should be regularly and frequently updated to avail the most current and relevant information to farmers.

Tents for drying maize can be acquired collectively and easily through groups. This can be either producer or marketing groups with members guaranteeing each other. They can also benefit from opportunities that come with economies of scale and reduced cost of rent paid to markets because of improved product quality.

The government should also have proper plans for paying farmers for produce delivered to its agencies like the National Cereals and Produce Board on time. This can be done through partnership with financial institutions like commercial banks and the Agricultural Finance Corporation. Produce delivered can act as collateral for acquiring loans to be used for ploughing back to the farms and catering for other family expenses like school fees and Christmas festivities. This will greatly reduce constraints of the time farmers have to wait after selling produce before receiving payment therefore encourage them to participate more in high value formal maize markets.

5.3 Suggestions for future

The study focused on the role of transaction costs in influencing smallholder maize market participation and choice of selling point in Kwanza district, Trans Nzoia County, Kenya. There is need to also study on the marketing efficiency of different players in each channel; this will help identify the major sources of ineffiencies in agricultural marketing thus help in improving agricultural marketing process in Kenya further.

REFERENCES

Alene, A., Manyong, V., Omanya, G., Mignouna, H., Bokanga, M. and Odhiambo, G. (2008). Smallholder market participation under transactions costs : Maize supply and fertilizer demand in Kenya. *Food policy 33*: 318–328.

Amemiya, T. (1985). *Advanced Econometrics*. Cambridge, MA: Harvard University Press.

Anderson, R., Sweeny, D., Williams, A., Freeman, J. and Shoesmith, E. (2007). *Statistics for Business and Economics*. Thomson Learning.

Ariga, J. and Jayne, T. (2010). Factors driving the increase in fertilizer use by smallholder farmers in Kenya, 1990-2007, Tegemeo Institute of Agricultural Policy and Development, Egerton University, Kenya.

Ayuya, O. (2010). Evaluation of willingness to accept and adopt clean development mechanism projects among small scale farmers in Njoro district, Kenya. Unpublished MSc. Thesis, Department of Agricultural Economics and Agribusiness Management, Egerton University, Kenya.

Bahta, S. and Bauer, S. (2012). Policy options for improving market participation and sales of smallholder crop produces: A case study of Free State province of South Africa. *African Journal of Agricultural research* 7 (24), 3525-3533.

Barrett, B. (2008). Smallholder market participation: Concepts and evidence from eastern and southern Africa. *Food Policy* 33: 299–317.

Bridjet, J. (2009). Institutional and technical factors influencing agricultural marketing channel choices amongst smallholder and emerging farmers in the Kat river valley. MSc. Thesis, University of Fort Hare, South Africa.

Campbell, C. (1999). Perceptions of price unfairness: antecedents and consequences. *Journal of Marketing Research* 36 (2), 187-199.

Carre`, M. and Drouot, D. (2002). Nature of technological change. Online: http://www.crest.fr/doctravail/document/2002-56.pdf. Accessed 15th August 2011.

Chirwa, E. (2009). Determinants of marketing channels among smallholder maize farmers in Malawi. Working paper No. 2009/03. Department of Economics, university of Malawi, Chancellor College.

Cooksey, B. (2003). Marketing reform? The rise and fall of agricultural liberalization in Tanzania. *Food Policy* 21 (1), 67-91.

Cunningham, T., Brown, W., Anderson, B. and Tostao, E. (2008). Gender differences in marketing styles. *Agricultural Economics* 38 (1), 1–7.

De Janvry, A., Fafchamps, M. and Sadoulet, E. (1991). Peasant household behaviour with missing Markets: Some paradoxes explained. *The Economics Journal* 101 (409), 1400-1417.

Delgado, C. (1999). Sources of growth in smallholder agriculture in Sub-Saharan Africa: The role of vertical integration of smallholders with processors and marketers of high-value added Items. *Agrekon* 38 (Special Issue), 165-189.

Dorward, A. and Kydd, J. (2005). Making agricultural market systems work for the poor: Promoting effective, efficient and accessible coordination and exchange. Imperial College, London.

Fafchamps, M. and Gabre-Madhin, E. (2001). Agricultural markets in Benin and Malawi: Operation and performance of traders, World Bank working paper series No. 2734 Washington, D.C.

FAO. (2004). Changing patterns of agricultural trade. The evolution of trade in primary and processed agricultural products. Online: http://www.fao.org/docrep/007/y54. Accessed 12th February 2012.

Frank, D. and Henderson, R. (1992). Transaction costs as determinants of vertical coordination in the US food industries. *American Journal of Agricultural Economics* 74 (4), 941-950.

Friesen, K. and Palmer, E. (Eds.). (2002). Integrated approaches to higher maize productivity in the new millennium. In: proceedings of the 7th Eastern and Southern Africa regional maize conference, Nairobi, Kenya, 11–15 February 2002. CIMMYT, Mexico.

46

Goetz, J. (1992). A selectivity model of household food marketing behaviour in Sub-Saharan Africa. *American Journal of Agricultural Economics* 74: 444 - 452.

Heckman, J. (1979). Sample selection bias as a specification error. *Econometrica* 47:153–161.

Holloway, G., Nicholson, C., Delgado, C., Staal, S. and Ehui, S. (2000). Agro-industrialization through institutional innovation, transaction costs, cooperatives and milk market development in the East African highlands. *Agricultural Economics* 23: 279-288.

IFAD. (2003). Promoting market access for the poor in order to achieve the millennium development goals. International Fund for Agricultural Development, roundtable discussion paper for the 25th anniversary session of IFAD's governing council. February, 2003. Online : http://www.ifad.org/english/market/index.html. Accessed 20th February 2012.

Jagwe, J. (2011a). The impact of transaction costs on the participation of smallholder farmers and intermediaries in the banana markets of Burundi, DRC and Rwanda. Unpublished PHD. Thesis, Department of Agricultural Economics, Extension and Rural Development, University of Pretoria, South Africa.

Jagwe, J., Ouma, E. and Machethe, C. (2011b). Transaction costs and smallholder farmers' participation in banana markets in the Great Lakes Region. Department of Agricultural Economics, Extension and Rural Development, University of Pretoria, South Africa.

Jari, B. (2009). Institutional and technical factors influencing agricultural marketing channel choices amongst smallholder and emerging farmers in the Kat river valley, Unpublished Msc. Thesis, University of Fort Hare, South Africa.

Jayne, S. and Argwings-Kodhek, G. (1997). Consumer response to maize market liberalization in urban Kenya. *Food Policy* 22 (5), 447-457.

Key, N. and Runsten, D. (1999). Contract farming, smallholders and rural development in Latin America: The organization of agro-processing firms and the scale of out grower production. *World Development* 27 (2), 381-401.

Key, N., Sadoulet, E. and De Janvry, A. (2000). Transaction costs and agricultural household supply response. *American Journal of Agricultural Economics* 82 (May), 245-259.

Kherallah, M. and Kirsten, J. (2001). The new institutional economics: Applications for agricultural policy research in developing countries. Markets and structural studies division, Discussion paper No. 41, International Food Policy Research Institute, Washington DC.

Kherallah, M. and Minot, N. (2001). Impact of agricultural market reforms on smallholder farmers in Benin and Malawi. IFPRI Collaborative Research Project. International Food Policy Research Institute, Washington DC.

Kherralah, M. (2000). Access of smallholder farmers to the fruits and vegetables market in Kenya. International Food Policy Research Institute Working Paper, Washington DC.

Kirimi, J. (2008), Kenya's domestic horticulture subsector: What drives commercialization decisions by rural households?. Unpublished MSc. Thesis. Department of Agricultural, Food, and Resource Economics. Michigan state University.

Kirimi, L., Sitko, N., Jayne, S., Karin, F., Muyanga, M., Sheahan, M., Flock, J. and Bor, G. (2011). A farm gate to consumer value chain analysis of Kenya's maize marketing system, Working paper No. 111, MSU international development.

Kwach, D. (2013). Effect of fertilizer input subsidy on maize production in Kenya: The case of Wareng District. Unpublished M.A Thesis, School of Economics, University of Nairobi, Kenya.

Kydd, J. and Dorward, A. (2001). The Washington consensus on poor country agriculture: Analysis, prescription and institutional Gaps, *Development Policy Review* 19 (4), 467-478.

Machethe, L. (2004). Agriculture and poverty in South Africa: Can agriculture reduce poverty? http://cfapp1docspublic.undp.org/eo/evaldocs1/sfcle/eodoc357114047.pdf. Accessed 23rd October 2011.

Maitre d', H., Leneilleur, S. and Bienabe', E. (2011). Linking smallholders to efficient markets. 3rd European forum on rural development, Palencia, Spain.

Makhura, M., Kirsten, J. and Delgado, C. (2001). Transaction costs and smallholder participation in the maize market in the northern province of South Africa. Proceedings of the seventh Eastern and Southern Africa regional conference, 11- 15 February 2001, 463- 467. Pretoria, South Africa.

Maltsoglou, I. and Tanyeri, A. (2005). Transaction costs, institutions and smallholder market integration: Potato producers in Peru. ESA working paper No. 05-04. Online: www.fao.org/es/esa. Accessed 10th October 2012.

Mangisoni, J. (2006). Markets, institutions and agricultural performance in Africa. ATPS special paper series No. 27, the African Technology Policy Studies Network, Nairobi. Online: http://www.atpsnet.org/content/files/documents/Speci. Accessed 15th March 2012.

Ministry of Agriculture. (2010). District agricultural office annual report, Trans Nzoia, Kitale, Kenya (Unpublished).

Mukhwana. (2004). Improving smallholder marketing in Africa: The case of maize. Paper presented at the vision 2020 conference on assuring food and nutrition security in Africa by 2020: Prioritizing action, strengthening actors, and facilitating partnerships, April 1–3, 2004, Kampala, Uganda.

Nyangito, H. (1997). A review of policies on the maize sub-sector in Kenya, Institute of Policy Analysis and Research, Nairobi, Kenya.

Okoye, B., Onyenweaku, C. and Ukoha, O. (2010). An ordered Probit model analysis of transaction costs and market participation by smallholder cassava farmers in South-Eastern Nigeria. Online: http://mpra.ub.uni-muenchen.de/26114/MPRA Paper No. 26114, posted 22. Accessed: 13th October 2012.

Olwande, J. and Mathenge, M. (2010). Market participation among poor rural households in Kenya. Tegemeo institute, Egerton University, Nairobi, Kenya. Selected paper prepared

for presentation at the International Association of Agricultural Economists (IAAE) Triennial Conference, Foz do Iguaçu, Brazil, 18-24 August, 2012.

Omiti, J., Mc. Cullough, E., Otieno, D., Madelon, M., Nyanamba, T. and Murage, A. (2006). Participatory prioritization of issues in smallholder agricultural commercialization in Kenya, KIPPRA discussion paper No. 64, Nairobi: Kenya Institute for Public Policy Research and Analysis.

Omiti, J., Otieno, D., Nyanamba, T. and Mc Cullough, E. (2009). Factors influencing intensity of market participation by smallholder farmers, a case study of rural and peri urban areas of Kenya. *Afrijare* 3 (1), 11-15.

Pingali, P., Meijer, M. and Khwaja, Y. (2005). Commercializing small farms: Reducing transaction costs. ESA Working Paper No. 05-08: Online available: ftp://ftp.fao.org/docrep/fao/008/af144e/af144e00.pdf. Accessed 10 October 2011.

Poole, D., Del Campo Gomis, J., Igual, F. and Gimenez, V. (1998). Formal contracts in fresh produce markets. *Food Policy* 23 (2), 131-142.

Poulton, C., Kydd, J. and Dorward, A. (2006). Overcoming market constraints on pro-poor agricultural growth in sub-Saharan Africa. *Development Policy Review* 24 (3), 243-247.

Rhaghau, G., Shafiul, D. and Katsushi, S. (2012). Agriculture, markets and poverty – A comparative analysis of Laos and Cambodia, Research institute for economics and business administration, Discussion paper series, RIEB, Kobe university, Japan.

Robison, L. and Siles, M. (2002). Social capital and poverty reduction: Toward a mature paradigm. Agricultural Economics Report no 614, Michigan State University, U.S.A.

RoK. (2010). Economic Review of Agriculture. Central Planning and Project Monitoring Unit, Ministry of Agriculture, Kenya

Ruijs, A. (2002). Cereal trade in developing countries: A stochastic equilibrium analysis of market liberalization and institutional changes in Burkina Faso. Labyrint Publication, Netherlands.Online:http://dissertations.ub.rug.nl/FILES/faculties/eco/2002/a.j.w.ruijs/title con.pdf. Accessed: 21-02-2012.

Sasseville, N. (1988). Harvesting and handling produce: Plan now for high quality. Guide for Missouri Farm. *Journal of Agricultural Extension* 19: 19-21.

Sharma, P., Kumar, K. and Singh, R. (2009). Determinants of small scale farmer inclusion in emerging modern agrifood Markets: A study of the Dairy Industry in India. Indian Institute of Management. Working Paper No.2009-02-01.

Sindi, J. (2008). Kenya's domestic horticulture subsector: What drives commercialization decisions for rural households? Unpublished MSc. Thesis: Michigan State University, U.S.A.

Siziba, S. and Diagne, A. (2011). Determinants of cereal market participation by Sub-Saharan Africa smallholder farmer. *Learning Publics Journal of Agriculture and Environmental Studies 2* (1), 180–193.

Ton, G. (2010). Resolving the challenges of collective marketing incentive structures that reduce the tensions between members and their group. ESFIM Working Paper 4. Paris/Wageningen, IFAP/ AGRINATURA.

Toye, J. (1995). The new institutional economics and its implication for development theory, in Harris, J., Hunter, J. and C. Lewis (eds.). The New Institutional Economics and Third World Development, London and New York: Routledge.

Vance, C. and Geoghegan, J. (2004). Modeling the determinants of semi-subsistence and commercial land uses in an agricultural frontier of Southern Mexico: A switching regression approach. *International Regional Science Review* 27 (3), 326–347.

Williamson, O. (2000). New Institutional Economics: taking stock, looking ahead. *Journal of Economic Literature* 38 (3), 595-613.

World Bank. (2008). World development report: agriculture for development. The World Bank, Washington D.C.

QUESTIONNAIRE FOR SMALLHOLDER MAIZE FARMERS

BACKGROUND INFORMATION

Date…………………………………………………………………………………………..

Enumerator…………………………………………………………………………………..

Name of village……………………………………………………………………………..

Name of respondent ………………………………………………………………………

Phone number of the respondent……………………………………………………………

A. DEMOGRAPHIC DETAILS

Fill in the relevant information

A.1. Actual age of the household head in years?...

A.2. Gender of the household head? MALE [   ], FEMALE L [   ].

MARITAL STATUS			
Single	Married	Widowed	Divorced

A.3. Total number of household members? ………………………………..…………………

A.4. Total number of children below 10 years of age? ……………………………………...

A.5. Total number of household members between 10 and 18 years of age? ……………………….

A.6. Total number of household members between 11 and 65 years of age? ……………………….

A.7. Total number of household members above 65 years of age? ……………………………….

A.8. Actual years of education spent in school (   )

A.9. Highest education level of the household head

No formal education	Primary school only	Secondary/ high school	Tertiary education	Others(specify
Education level				

A.10. What kind of land do you own? WITHOUT TITLE DEED [   ], TITLE DEED [   ]

A.11. What is the size of your land (Acres)?...……………………….

A.12. Do you lease land for farming? YES [   ], NO [   ]

A.13. If YES, how much land did you lease last year?..

A.14. Do you lease out your land to other people? YES [   ], NO [   ]

A.15. What is your main objective of farming? (Y= Yes, N= No)

Objectives	Y/N
Food supply	
Basic income/profit	
Livestock feed	
Others (specify)	

A.16. On what size of land did you practice maize farming last year (Acres)?

....……..…..

A.17. Which type of seeds did you plant the last harvest season?

Certified Hybrid seeds [   ], Ordinary seed from last harvest [   ], Other (specify)

....…..………….

A.18. What is the perception of the quality of maize seed you planted last?

High [ ], Low [ ], Average [   ]

A.19. Why did you plant the seed type?

It was affordable in terms of money [   ], It was the type available in markets during planting season [ ], I believe it is of high quality [ ]

Other (specify)

....

....

A.20. Are you a member of any credit organization? YES [ ], NO [ ]

A.21. If YES, What type of institution is it? LOCAL BANK [   ], MFI [   ],

LOCAL GROUP [   ]Other (Specify) ....

A.22. What is the name of the organization?

....

A.23. Do you take loan for agriculture from the institution? YES [   ], NO [   ]

A.24. If YES, What amount did you take the last season (KES)?...

A.25. From your own opinion, is the loan given on time and the amount required?

No [ ], Yes [.].

Explain...

A.26. What did you use the loan for? Buying inputs [   ], land preparation [   ], Facilitating the marketing process [   ], other (Specify)

....

....

B. HUMAN CAPITAL ENDOWMENTS

B.1) For how long have you been farming? (Yrs)..

B.2) How did you acquire the farming knowledge applied on your farm?

Knowledge acquisition	Experience [ ]
	Education [ ]

B.3) Do you attend farmer trainings on either farming/ marketing?

YES	How often		NO	Reasons for not
	Regularly			
	Rarely			

C. MARKETS

C.1. When do you sell your produce? Immediately after harvest [   ], After 0-2 months [   ],

After 2-4 months [   ], Over 4 months[   ]

C.2. Which month did you actually sell your last maize harvest?...

C.3. Which markets do you usually use in selling your produce?

Market	Amount (90 kg bags)	Reason
Farm gate		
Urban processors/ millers		
Middlemen at the market centre		
Local posho millers		
NCPB		
Directly to consumers at the market centre		
I do not sell		
Other (specify)		

C.4. At what price in KES did you sell your maize output the last harvest season per 90 kgs bag?

Selling month	Market sold	Output sold	Price (KES)

C.5. Approximately how long does it take after reaching the market before selling your produce in Hours?

....

....

C.6. How much output did you produce the last harvest season (90 kg bags)?

....

C.7. Approximately how much of that produce did you intend to sell (Marketable surplus)? (90 kg bags)...

C.8. Did you sell all the quantity you intended to sell? Yes [   ] No [   ],

C.9. If NO, How much did you sell?

....

C.10. What are the main benefits of the market channel you use regularly?

High prices [ ], Timely payment [ ], Nearer [ ], Less strict conditions [ ], Other (specify)

....

....

C.11. In your own opinion, can you describe the marketing process as fair and transparent?

Yes [ ], No [ ]

C.12. Do you pay some money **(Rent)** as an incentive for your produce to be accepted in the market? Yes [ ], No [ ]

C.13. If Yes, approximately how much do you pay per transaction?

....

C.14. How difficult is it to look for buyers?

Easy	Fair	Difficult

C.15. Do you have any contractual agreements or a guaranteed/ ready market with any buyer? Yes [ ] No [ ].

C.16. If Yes, how did you enter the agreement? By signing a written agreement [ ], Word of mouth [ ], Other (specify)

....

C.17. What is the major benefit of the agreement above? Provision of inputs (seeds and fertilizer) [ ], ready market [ ], High prices [ ], other (specify)

....

C.18. Do you consider the grade of your produce when selecting the market to use in selling your produce? Yes [ ], No [ ]

C.19. How can you classify the quality of your last harvest? Poor [ ], Fair [ ], Good [ ]

C.20. Does your perception of grading correspond to the one that is used in the market?

Yes [ ], No [ ] (Explain)

………………………………………………………………………………………………

C.21. Do you sort your produce before selling into good and bad quality produce?

Yes [ ], No [ ]

C.22. What price did you pay as cost of sorting maize per bag last year in KES?
………………………………………………………………………………………..……….

C.23. Did you have problems in meeting the quality required by the market? Yes [ ], No [ ].

C.24. If Yes, What were the major problems? Poor quality of seed planted [ ], Lack of drying facilities after harvest [ ], Poor storage after harvest [ ], Others (specify)

………………………………………………………………………………………………

…………………………………………………………………………….………………..

C.25. What happened to produce with poor quality? Sold to buyers at a lower price than the market price [ ], Used as animal feed [ ], Used for home consumption as food [ ], Other (specify).

………………………………………………………………………………………………

…………………………………………………………………………………………….

C.26. How do you dry your produce after harvest?

Using tents [ ], On the ground [ ], I do not dry [ ]

C.27. Do you own tents used for drying maize? Yes [ ], No [ ]

C.28. In your opinion, do you think the drying method you use affects the final quality of your produce? Yes [ ], No [ ]

C.29. How far was the marketing point from your farm (Kms)?...

C.30. For how long do you travel before reaching the market place in Hrs?..................................

C.31. How much do you pay for a single trip to the market per bag (Ksh)?

....

C.32. How is your produce moved to the marketing points?

	Type of transport				
	Bike	Truck	Tractor	Matatu	Other(specify)
Own					
Hired(individually)					
Hired(group)					
Buyer's transport					

C.33. What general problem do you experience in moving your produce to the market?

Small size of produce	Lack of transport	High transport cost	Other(specify)

C.34. Complete the table below of payment and how long it takes to receive payment.

Market channel	Payment mode			Waiting time (Hrs)
	Cash	Cheque	Other (Specify)	

C.35. When selling your produce, do you combine with other farmers? Rank the reason. (1, most important, 3, least important)

	Reason (Rank)		Reason (Rank)
YES	It lowers costs [ ]	**NO**	You sell at different times [ ]
	Increases bargaining power [ ]		You sell at different markets [ ]
	Share market knowledge [ ]		You don't agree on markets [ ]
	Other (Specify)		They will degrade your produce [ ]
			Other (Specify)

C.36. Do you later on buy maize for home consumption for food? YES [   ], NO [   ]

C.37. If YES, which Month do you start buying…………………..………………………..…

C.38. At what price did you buy maize for food lastly per 2 kg tin?………………………………

D. INFRASTRUCTURE

D.1. What type of road do you use to the market?

Tarmac road only	Murram road only	Both

D.2. How do you rate the road in your opinion?

Bad	fine	Good

D.3. Are you satisfied with the total number of roads linking you to the market?

Yes [   ], No [   ].

D.4. How do you store your produce after harvest? Modern raised store [   ], Traditional granary [   ], In the family house [   ], other (specify) [   ]

....
....
....

E. MARKET INFORMATION

E.1. Do you have access to market information? Yes [   ], No [   ]

E.2. Do you receive market information before sales? Yes [   ], No [   ]

E.3. What kind of market information do you seek mainly? Buying prices offered by the market [   ], The quality demanded [   ], Terms of payment [   ], Others (Specify)

....
....

E.4. What is your main source of market information? Radio [   ], Telephone [   ], Market [   ], Neighbours [   ], Extension Officers [   ], Middlemen [   ], Other (Specify)

....

....

....

E.5. Approximately how much do you spend in searching for market information both in form of phone calls and actual travelling to the market place in KES?

....

E.6. Do you consult other farmers before making a decision to sell? Yes [   ], No [   ]

E.7. If Yes, What do you normally consult about? Buying prices offered by the market [   ], The quality demanded [   ], Terms of payment [   ], Others (Specify)

....

....

F. EXTENSION SERVICES

F.1. Do you contact extension officers during the marketing period? Yes [   ], No [   ]

F.2. What services are provided by extension officers? Market information [   ], Record keeping [   ], Others (Specify)

....

F.3. Are the extension officers always available when you need them?

Never available [   ], Available sometimes [   ], Always available [   ]

F.4. What major problems do you face in contacting extension officers? Extension workers are rarely available [   ], They don't give clear information on market demand [   ], Other (Specify)

....

....

....

G. PRICING

G.1) Do you perform price surveys before selling? Yes [   ], No [   ]

G.2) Who sets the prices during sales?

I set the price	We negotiate	Government	Buyers	Others (Specify)

G.3) What decides the sale price of your produce?

	Very important	Important	Not important
It depends on the price of other local farmers			
It depends on the market we sell to			
It depends on the production costs			
It depends on the transaction costs			

G.4) How do the prices that buyers are willing to pay differ from your expectations?

Lower than expected [   ], Equal [   ], Higher than expected [   ]

G.5) When selling, who negotiates on your behalf? Brokers [   ], Yourself [   ]

THANK YOU FOR YOUR TIME