AN EVALUATION OF MARKET INFORMATION SYSTEM OF FINGER MILLET FARMERS IN TESO SOUTH DISTRICT, KENYA

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DECLARATION

I declare that his thesis is my original work and has not been presented for a degree in any other university.

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ABSTRACT

Marketing information system emerged as an accompanying measure to market liberalization to improve competitiveness and functioning of markets. Market information systems were intended to correct the asymmetries created by economic liberalization, give bargaining power to farmers, create a transparent open trading environment and foster an efficient market systems for all stakeholders. The absence of easily accessible market information on the part of finger millet farmers leads to lack of market transparency, low bargaining power, low and highly variable prices, high risk, low produce quality and high losses, high cost of transaction and insufficient production to satisfy demand.

The study evaluates the market information system of finger millet farmers in Teso South, Kenya by comparing the different sources of market information used by finger millet farmers and assesses the factors that influence finger millet farmers' access and use of different sources of marketing information. A questionnaire with open and closed ended questions was used to extract both qualitative and quantitative data from a randomly selected sample of 139 households growing finger millet. The data were analysed using descriptive statistics and binary logistic regression was also used to assess the factors that influenced the access and use of the sources of market information.

Results show that farmers received market information from multiple Results show that farmers received market information from multiple sources. The most accessed source of market information was traders and brokers which was used by 75% of the respondents, this was followed by farmers (71%), extension agents (49%), field days (36%), radio (29%), mobile

phones (25%) and transporters and newspaper both accessed by 9% of the respondents. The least accessed source of market information was KACE which provided market information to 1% of the respondents. Different socio economic factors have varied influence on the use of different market information. Integration of both ICT based sources of market information and non ICT sources is inevitable to ensure all the farmers are given the opportunity to access and use market information.

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LIST OF ABBREVIATIONS

NCPB:	National Cereals and Produce Board
GOK:	Government of Kenya
KARI:	Kenya Agricultural Research Institute
ICRISAT:	International Crops Research Institute for the Semi-Arid Tropics
DAO:	District Agricultural Officer
MIS:	Marketing Information System
SSA:	Sub Saharan Africa
KACE:	Kenya Agricultural Commodity Exchange
TIS:	Total Information Score
LM 1:	Lower Midland zone 1
LM2:	Lower Midland zone 2

CHAPTER ONE

INTRODUCTION

1.1 Background information

Prior to market liberalization in the 1990s, the government maintained extensive controls over the marketing of cereals through the National Cereals and Produce Board (NCPB) as the sole buyer and seller of cereals and their products (GOK, 2002). The cereal markets were thus predictable as prices were more or less static in a particular season. In 1990s the participants in the agricultural sector needed little information, other than buying and selling arrangements laid down by the state (Odendo and De Groote, 2006). However, with structural adjustment programs in Sub Saharan Africa (SSA) countries aimed at market liberalization and globalization, most governments stopped intervening directly in the markets via marketing boards or parastatal organizations. Instead, market liberalization and globalization are driving agriculture out of the staple based subsistence systems towards a high value, information intensive and commercial enterprise (Adhiguru et al., 2009). The agricultural sector in Kenya is often exposed to global changes, hence timely, accurate and representative market information is a powerful tool to farmers' decision process in a liberalized marketing system. Farmers are increasingly looking for frequent interactions with various information sources to carry out their marketing tasks efficiently.

According to Tollens (2006), market information is a perishable commodity not only indispensable in informing farmers about market conditions, optimal timing of buying and selling, prices and location of willing buyers but also mandatory in making transactions more

equal and fair, inducing farmers to store optimally, plan ahead and make better informed decisions. Market information can break the vicious poverty trap and reduce inequality in markets.

Marketing information system emerged as an accompanying measure to market liberalization to improve competitiveness and functioning of markets (Kpenavoun et al., 2009). Market information systems were intended to correct symmetries created by economic liberalization, give more bargaining power to farmers, create a more transparent trading environment, and foster a more efficient market systems for all stakeholders (Tollens, 2006). In most sub Saharan Africa countries liberalized markets do not work effectively due to lack of timely and relevant information hence markets cannot provide a level playing ground for buyers and sellers (Odendo and De Groote, 2006).

The performance of agricultural markets is an important aspect in attaining food security and commercializing the agricultural sector. Nevertheless, agricultural markets often fail for small scale farmers who form the majority of agricultural producers (Barrett, 2008) and live in the rural areas (De Silva, 2005) and form part of the complex marketing system and need information (Oyewumi, 2006). Malfunction of agricultural markets often result from lack of access to information or from the endemic problem of information asymmetry between the farmers and the buyers (Poulton et al., 2006). Lack of marketing information and poor marketing strategies are arguably the greatest challenges facing agricultural sector in Kenya and the rest of Africa (Robbins and Ferris, 1999).

According to Staatz et al. (2011) investment on MIS is historically justified on three grounds: Firstly, to create an equitable distribution of bargaining power within the food system which in the short run, move market from a position of monopsony or oligopsony to a more competitive outcome due to provision of improved agricultural market information. In the long run, the argument is that higher prices to farmers will induce greater production. Secondly, market information improves market efficiency and private decision of market players both in the short term and long term. In the short run, better information can precede better spatial and temporal arbitrage (including discovery of new markets) of existing production through the reduction of search cost. In the long run, more informed decision making by farmers, traders, processors and consumers can lead to better allocation of resources overtime through the adjustment of production and consumption to respond more closely to consumers' effective demands and to the opportunity cost of the resources involved in production of those goods. Finally, it is argued that MIS plays an important role in informing public policies and providing the information to implement public programs.

Farmers' access to information sharply contrast with that of traders who are typically mobile and have close links with market centres which increases their understanding of markets and communication systems. The asymmetry of information leaves the farmers at the mercy of the middlemen (De Silva, 2005). Consequently majority of small holder farmers sell their produce in local poor paying markets or at farm gate rather than travel to distant better paying markets (Fafchamps and Hill, 2005). Some farmers may even opt out of markets, even when price incentives are offered to them (Barrett, 2008). Therefore, anything that can be done to trim down market entry cost especially the cost of access to information such as supplying marketing

information forms a central feature of any development in Africa (Robbins and Ferris, 1999). In order to establish a competitive market for agricultural produce, it is important that market information be accessible to all market participants (Oyewumi, 2006). However it should be noted that information has no value for those who do not use it even if they receive it (Armstrong et al., 2012).

1.2 Finger millet sub sector

Finger millet is one of the most important small grain crops grown in Eastern, Southern and Central Africa. It is a subsistent crop to many households but is a potential source of cash as it is easily marketed (Salasya et al., 2009). In Kenya, finger millet is mainly grown west of Rift Valley, particularly around the Lake Victoria region. This region which extends into Uganda and is the second largest finger millet growing region after Karkataka, India (Vietmeyer, 1996). The crop provides farmers with the best opportunity for reliable harvest, food and nutrition in environments where rainfall is erratic and scanty, and soil fertility levels are low (Obilana, 2003).

Millet production in Africa rose by 25% since the early 1970s to 2000s, and its importance in domestic diets is growing steadily (Oduori and Kanyenji, 2005). Several brands of finger millet flour sold in Kenyan supermarkets are produced by several flour milling companies in Kenya (Oduori, 2005). In Kenya finger millet is grown mainly by small holder farmers and covers an area of 65000 hectares (Salasya et al., 2009). At national level, 75% of Kenya's finger millet is produced by small scale farmers, and 20% and 5% by semi commercial and commercial farmers respectively. Among the small scale farmers, the average area planted per household is

approximately 0.5 hectares to 1 hectares (Omondi, 2011). In 2005, smallholders increased area planted and production of finger millet (Oduori and Kanyenji, 2005), due to finger millets' potential value as cash crop. In Kenya finger millet grain is used as food and in brewing beer, it can be used as poultry feed and the straws as fodder (Oduori and Kanyenji, 2005). Commercially finger millet is used as a raw material by East Africa Breweries and other brewers in manufacturing beer. It is also milled to produce finished flour products in form of 'Uji Mixes'. There is growing market demand for finger millet grain in Kenya, and it fetched over double the price of sorghum and maize (Oduori, 2005).

Finger millet grow in diverse soils, varying rainfall regime and able to survive drought conditions where maize crop often fail to reach physiological maturity. The problem of pests and diseases is negligible in finger millet production and the crop has excellent storability (Salasya et al., 2009). Of all major cereals, this crop is one of the most nutritious. Its grain taste good and some varieties of finger millet have high levels of methionine, an amino acid lacking in the diets of hundreds of millions of the poor who live on starchy foods such as cassava, plantain, polished rice and maize meal (Vietmeyer, 1996). It is also a rich source of minerals such as calcium, iron, phosphorous and manganese (Mgonja et al., 2005). These nutritive values make finger millet ideal for management of malnutrition (Salasya et al., 2009).

1.2.1 Finger Millet Production in Teso South District

Teso South district has a very high potential for finger millet production. Finger millet is widely grown in the gently undulating lands of Teso South district; almost every household has the crop because of its cultural value within the community for ceremonies such as weddings,

exhumations, dowries and marriage. The crop is grown both as food and cash crop. After several demonstrations in Teso south locations, some farmers have adopted row planting, fertilizer and manure application which have enhanced the yields of the crop. Marketing of finger millet is done locally and has not been streamlined. In 2011,a kilogram tin of finger millet was sold for Sh150 and Sh200 in the local markets, a price that was double the price of maize and sorghum (Omondi, 2011).

Table 0.1 Varieties of finger millet grown in Teso South District in 2011

Local varieties	Improved varieties
Emomwar	P224
Aran	Gulu E
Obokorit	U15
Epalat	KAT/FM1
Serere 1	

Source: Omondi (2011)

Local varieties shown in table 1.1 above are dominant in the district though Kenya Agricultural Research Institute (KARI) and International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) have introduced improved varieties shown in table 1.1 above. The improved varieties give high yields in comparison with the local varieties and are thus becoming popular with farmers. However, some farmers argue that the local varieties have better tastes compared to the improved varieties (Omondi, 2011).

Table 0.2 Production trends of finger millet in Teso South District

Year	Target HA.	Achieved HA.	Production (90 Kg bags)
2009	1800	1720	18,920
2010	2150	1805	21,660
2011	2400	2375	29,575(Long Rains)

Source: Omondi (2011)

In spite of the collaborative efforts made by Kenya Agricultural research Institute (KARI) and International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) to improve finger millet production in Teso South, area planted and quantity of finger millet harvested failed to reach the targets set by Ministry of Agriculture in 2009 through to 2011. The area where finger millet is planted in Teso South district has been increasing slowly from 1720 hectares in 2009 to 2375 hectares in 2011, though the increase is slightly below the Ministry of agriculture's targets as shown in table 1.2 above. Similarly the quantity of finger millet harvested during the long rains have improved from 18920 bags in 2009 to 29,575 bags in 2011(Omondi, 2011).

Table 0.3 Number of finger millet farmers in Teso South district in 2011

Division	No. of Farmers
Chakol	13,320
Amukura	9,947
TOTAL	23,267

Source: (Omondi, 2011)

The number of finger millet farmers in Teso South district is approximately 23,267 as shown in table 1.3 above farmers with majority of the farmers (13320) coming from Chakol division which is one of the two divisions (Omondi, 2011). Amukura division have a number of hills which are not occupied by farming households thus explaining its relatively small number of farmers (approximately 9,947 farmers).

1.3 Problem statement

In Kenya, finger millet grain is used as food and in local and industrial processing of beer (Oduori and Kanyenji, 2005). Demand for finger millet is high and its popularity has spread all over Kenya and opened up a large market due to its nutritional value (Salasya et al., 2009). The crop fetches more than the prices of most cereals in Kenya (Oduori, 2005). Farmers in Teso South district have inadequate market information on potentiality of the crop and consequently unaware of market potentiality of the crop.

The finger millet farmers like most small scale spend most of their time working in the fields which are generally isolated in the rural areas thus may be ignorant of the evolution of market prices and prevailing market conditions and consequently predisposed to exploitation by dishonest middlemen (Kherallah et al., 2002). Farmers lack of access to market information on the commercial potential of finger millet (Poulton et al., 2006) place them at the mercy of middlemen (De Silva, 2005). The dearth of market information on the part of finger millet farmers subjects farmers to low prices which are highly variable because they are unable to bargain due to their ignorance that comes as a result of limited market information (Tollens, 2006).

Inadequate market information significantly limits farmers bargaining power thus resulting in disproportionate distribution of benefits and risk between the farmers and the middlemen (Oyewumi, 2006). Finger millet farmers comparable to most small scale farmers in developing countries takes the larger portion of risk and draws the smaller benefits due to unreliable market information which in the long run act as a disincentive to finger millet production.

1.4 Purpose and Objectives

The main purpose of the study was to evaluate the market information system of finger millet farmers in Teso South District.

1.4.1 Specific objectives

- To identify and compare the different sources of marketing information used by finger millet farmers based on the information characteristics (reliability, usefulness, accuracy, timeliness, relevance and level of detail).
- To assess the factors that influences finger millet farmers' access and use of different sources of marketing information.

1.4.2 Research questions

- What are the sources of market information used by finger millet farmers in Teso South district? Do the sources of market information differ in terms of their reliability, usefulness, accuracy, timeliness, relevance and level of detail?
- What are the factors that influence finger millet farmers' access and use of different sources of markets information?

1.5 Justification

Marketing information for finger millet farmers' needs to demand driven yet little was known about sources of marketing information accessed and used by finger millet farmers in Teso South district following market liberalization. It was therefore important to assess factors that

influenced farmers' access and use of different source of marketing information and compare different sources of market information used by finger millet farmers based on information characteristics such as usefulness, accuracy, timeliness, relevance, reliability, level of detail and confidence in information provided by different source. The findings of the study would enable stakeholders in finger millet sub sector and disseminators of market information to finger millet farmers to make informed choices on alternative sources of market information which exhibit information characteristics desirable to the farmers.

The study provides useful information to finger millet farmers regarding the different sources of market information that are available in their locality that they use to enlighten themselves on the prevailing market conditions in order to realize maximum benefits of participating in the finger millet marketing chain.

It also provide useful information to policy makers who always install policies to regulate markets or counter market failure on the most appropriate sources of information that can be used to create an environment where information can be accessed by all participants in the market.

1.6 Organization of the thesis

The thesis is organized into five chapters including chapter one in which this introduction falls. Chapter two presents the literature review of the topic. In chapter three, the thesis presents the methodology that was used in the study including the sampling procedure that was used in collecting data for analysis. In chapter four there are results and discussions; conclusions and recommendations are presented in chapter five.

CHAPTER TWO

LITERATURE REVIEW

2.1 Information systems in agricultural markets

Agricultural marketing information system (MIS) can be defined as an organization or a group of organizations that collect data on market conditions, processes and analyses the data to transform it into market information and disseminates the market information to different stakeholders using one or more channels of information (Staatz et al., 2011). A market information system may have products such as market news which include information on prices, quantities, market conditions and business contacts; market analytical reports which show the cause of changes in the market condition and their effects on stakeholders, and business reports that can help stakeholders identify reliable trade partners. Marketing information includes details on potential market channels, paying requirements, quality, existing markets, market demands and requirements for post-harvest handling (Mahaliyanaarachchi, 2003). Stakeholders in market information system include farmers, traders, government policy analyst and policy makers, development organizations, input providers, banks, market information system personnel and researchers who directly or indirectly express needs for MIS information products.

Market information has a number of impacts (Mahaliyanaarachchi, 2003). These include; improving the negotiating position between farmers and traders, enabling efficient apportionment of productive resources, reducing risks by lowering transaction cost of accessing timely and reliable information and increasing farmers' ability to make marketing decisions that

maximize their farm revenues. Lack of market information is an entry barrier to both production and trade. In crop value chains where farmers successfully obtain reliable market information, shifts in cropping patterns to higher value produce have been noted (Giovannucci and Shepherd, 2001).

Marketing information can be considered as a public good hence likely to be underprovided by the market because firms are unable to control access and capture payments. This may lead to low levels of information which is asymmetric; producers are more likely to be poorly informed as compared to the traders about demands for their product (Poole, 2000; Poole and Lynch, 2003). Traders and farmers can therefore give out misinformation either through ignorance or through opportunism. Marketing information can also be a private good in the sense that it is a source of competitive advantage and has private benefits. In most cases the private marketing information is transmitted through informal networks and is more relevant, timely and detailed as compared to the public market information through MIS.

In most developing countries, market information is seen as a public service, particularly where there are numerous small scale farmers who are unable to pay for MIS services (Mahaliyanaarachchi, 2003). It is therefore provided by a government department and can take various forms ranging from market analysis and forecast to market price data. Market information has a wide range of uses and users (Ferris et al., 2008). Spot information is mostly used for direct sales negotiation and keeping abreast of market conditions. Market information that is collated over a period of time provides trend data that allows farmers and service providers to make decisions on which crops to grow and when to harvest crops based on seasonal

price trends. Historical market information enables co-operative marketing agents to make informed decisions on where to sell and how collective bulking, grading and storage can be used to add value to produce. Price data is used by financial institutions for monitoring long term health of the economy and assessing risk of lending to individual farmers. Historical and current data are used by researchers and policy makers to review shifting marketing patterns. Marketing information can also be used to monitor food security conditions.

With market liberalization, many poor smallholder farmers were disempowered, unaware of the evolution of market prices (Kherallah et al., 2002). MIS in Sub Saharan Africa were set up to correct asymmetries created by economic liberalization. However the marketing information systems suffered from inadequate financing, inability of bureaucrats to collect reliable market information and reluctance of traders to divulge information in fear of being taxed (Tollens, 2006). In developing countries, MIS is one way of increasing market transparency. Market transparency is a condition for effective competition and good marketing performance in liberalized markets. It can be defined as the degree of information that farmers, cooperatives, traders, exporters and market control institutions including government, have about parameters relevant to their decision making (Tollens, 2006).

In agricultural markets, transparency results in a number of effects. These include the fact that, farmers receive the proper production incentives and are able to adjust their production accordingly and seize the market opportunities. Information also enhances the bargaining position of the weaker participants in a marketing system thus resulting in fair prices and equity for all participants. It also signals profit opportunities, therefore creating incentives for market

participants, and reduces seasonal and erratic price variations and enables arbitrage to take place between markets. Market transparency reduces overall risk for all participants resulting in more stable markets which is necessary for long term planning and investment decisions. It also improves government regulation of markets, thus enabling better agricultural and marketing policies and public investments as governments are adequately informed about market conditions and performance.

A number of MIS programs aimed at enhancing farmers' access to agricultural information in low income and transition economies have skyrocketed in the last ten years (Staatz et al., 2011) and are mostly initiated through donor funding. Some MIS created in 1980s through to the early 2000s in SSA were typically state run efforts that focused primarily on price reporting (Rakotoson et al.). These early MIS were set up more to serve the government rather than traders and small scale traders. However, most MIS are barely functional (Varangis and Schreiber, 2001). Since the mid-2000s an array of alternative institutional models has emerged, including private sector system that offer the promise of financial sustainability through the sale of information to users for example the Kenya Agricultural Commodity Exchange (KACE) which serves as a market and information linkage in Kenya (Staatz et al., 2011). In terms of clientele, the different types of MIS mainly serve farmers, traders and government (Kizito, 2011).

More equal access to market information reduces information asymmetries among traders, small scale farmers, consumers and government; and encourages arbitrage, leading to greater uniformity in prices of a given commodity within a specific supply chain or country at a given time (Ferris et al., 2008), thereby offering some protection to vulnerable actors such as

smallholder farmers in the market system (Tollens, 2006) and raising their level of engagement with the market place. This is because, farmers in many countries, both developing and advance economies, lack specialist agricultural marketing knowledge, often for the good reason that they are specialist in production rather than agribusiness (Poole, 2000) hence information barrier. The results of information barriers are unexploited market opportunities, seasonal gluts and produce with inadequate quality specifications and control, inequitable returns to producers, peri-harvest losses and fundamentally poor returns to production and marketing system as a whole (Poole and Lynch, 2003). The trend demands that farmers acquire commercial skills and information about markets (Gellynck and Viaene, 2002).

Public MIS can be useful to reduce market imperfections (Kpenavoun et al., 2009). The provision of basic market information aims to assist farmers in being able to monitor market conditions and make better decisions on where to sell their produce and negotiate for improved prices rather than being compliant price takers (Ferris et al., 2008). The availability of market information especially price data provides the farmer with vital information with regards to market demand conditions. When farmers are able to access sufficient and transparent information about who has what goods, what quantities of commodity are available for sale, who wants what, and how much commodity to buy and at what price, subsequently they will be able to incorporate price considerations and market situation into their production, investment, financial and strategic decisions (Oyewumi, 2006).

The main objective of different MIS models is to enhance competition in the market by increasing market transparency for all market participants, and in particular the weakest who are

small holder farmers (Tollens, 2006). The rational is based on the premise that in all exchange relationships there are forces of the market power at play, and individuals or groups with most information tend to set prices (Ferris et al., 2008). Thus a functioning MIS may empowerment of farmers by strengthening their bargaining power which in turn increase the retail proceeds of their produce (Giovannucci and Shepherd, 2001). From the farmers' point of view, market transparency permit them to adjust their production and consumption decisions to proper incentives from the market and fine-tune their sales strategy in order to maximize their welfare (Tollens, 2006).

2.2 Empirical reviews

Naidoo and Rolls (2000) investigated the use agricultural information by small-scale cattle farmers in Mauritius and found that the farmers managed information as a production resource. The personal characteristics and cattle husbandry practices of the farmers were major influences on their management of information. The practices were mainly learnt from family elders. Extension advice was only partly remembered, but also rejected as the information from this source was less useful.

Mahaliyanaarachchi (2003) conducted a study on the market information system for up country vegetable growers and marketers in Sri-Lanka and its effects on the marketing process. The main sources of market information to farmers were wholesalers, followed by local collectors and neighbouring farmers. The farmers mainly received price information; but lacked information concerning quantity and quality required in existing markets. Both the retailers and wholesalers just as farmers relied on informal interpersonal sources of market information. There was a

positive relationship between farm gate prices and information on existing markets, quality, quantity and wholesale price thus implying that a great positive relationship between a marketing information system and farm gate prices. The researcher suggests that it is necessary to have day to day price information for the farmers to enable them to organize their production and marketing practices.

Poole and Lynch (2003) analysed the knowledge needs of agricultural smallholders from a theoretical and practical perspective. They focused on the 'private good nature' of some kinds of market knowledge and evaluated Information and Communication Technologies (ICT) with potential to deliver appropriate private market information and there by enhance market access. They established a need to develop and coordinate traditional information systems with other rural services in order to increase information access. They encouraged private provision of market information and development of mechanisms for cooperative sharing of information between farmers and traders. The researchers viewed the provision of market information as a social responsibility and argued that linkages between the fast expanding ICT media, commercial sponsors and national governments could help resolve agricultural market knowledge problems.

Slavic (2004) investigated changes in agricultural information systems over time in Czech. The findings showed that the actual sources of information changed although about half remained the same. Printed media remained the most important source of information. Social sources decreased in importance whereas professional sources, such as consultants, research and university sources, increased in importance. Horizontal transfer of information between similar farms remained very important. The researchers suggest that new information sources were

needed relate to agricultural information and predicted that computerized databases will be increasingly used in the future.

Odendo and De Groote (2006) studied grain marketing information for farmers in surplus and deficit zones in western Kenya. The study analysed the utility and reliability of the sources of marketing information and farmers' perception of the importance of marketing information. They found out that about three quarters of the farmers both in surplus and deficit zones perceived marketing information to be very important. The farmers received market information from multiple sources, individual traders and fellow farmers were frequently accessed and used. However, the farmers considered the information obtained from traders and fellow farmers to be unreliable.

Demiryurek et al. (2008) analysed the agricultural information systems and communication networks for the members and non-members of the Dairy Cattle Breeders' Association (DCBA) in the Samsun of Turkey. The research revealed the existence of multiple sources that exchanged and provided information in various forms and frequency. The sources of information accessed by members of DCBA not only stimulated the farmers to efficiently keep more European breeds and obtain more milk yield per cow but also enhanced their access financial incentives and other support services.

Fawole (2008) investigated pineapple farmers' access and use of information sources in Nigeria. In the study interview schedule was used to collect data. Results show that the pineapple farmers used information from sources that were easily available and accessible sources such as Radio and newspapers. It also showed that four demographic characteristics (age, sex, marital status,

education) had influence on farmers' source of information. The findings suggest that as farmers education level improves, they are more likely to source and use information.

Ferris et al. (2008) carried out a study on marketing information service in Uganda. The study focused on how often farmers accessed the channels of delivery. They found out that the frequently accessed channels of delivery were radios, traders, family and friends. The study did not take into consideration the reliability and utility of the various sources. The findings contrast the results established by da Silva et al. (2005) in Brazil which identified internet as the often used and preferred source of market information to Brazilian farmers. The interpersonal sources of information, which is often first in most African context, was ranked second by the Brazilian farmers in terms of their intensity of use. Radio, regional press newspapers and newsletters were less consulted and least preferred in Brazil.

Kpenavoun et al. (2009) studied the impact of public marketing information system on farmers' food marketing decisions in Benin. They found out that good access to information increased farmers are likelihood for selling at farm gate without a contract. They however argue that reliable market information is unlikely to be obtained from government supported market information system but often accessed within the farmers' social networks. The study never indicated the channels of information and their usefulness though it reinforced the importance of social networks in access of market information.

Demiryurek (2010) used agricultural information system theory to analyse the information systems used by organic and non-organic hazelnut producers. The findings showed that information systems for the two groups of farmers were very different. The conversion to

organic production clearly demanded changes in the information system to allow producers to acquire the appropriate new knowledge and skills. The organic producers had used more information sources frequently and actively than non-organic producers.

Oyesola and Obabire (2011) evaluated farmers' sources of information on organic farming. Findings show that the farmers' sources of information were radio, extension agents, television, newspapers, farmers association, fellow farmers and relatives. However the most preferred sources of information were mobile phone and radio. The study to some extent agrees with the findings of Fawole (2008) that farmers would use accessible sources such as radio.

Ali and Kumar (2011) established the role of information distribution via ICT channels in enhancing decision making capabilities of Indian tobacco farmers. The results indicate that the farmers who used ICT based sources of information had superior decision making abilities throughout the agricultural supply chain. The author also established that the respondent's level of education, income, land size holding and social category enhanced access to ICT based sources of information and bettered farmers' decision making ability. Similarly, Senthilkumar et al. (2013) investigated the factors associated with utilization of ICT amongst dairy farmers of Tamilnadu, India. They found out that land holding, herd size, income and farmers education were significantly associated with farmers access and use of ICT based sources of information.

Kiiza and Pederson (2012) determined the access to ICT based market information in Uganda. Their findings revealed that farmers' access to microfinance loans, membership to farmers associations and government awareness campaigns positively influenced the probability of access to ICT based market information. However distance to the trading centres and sex

negatively affect the likelihood of accessing ICT based market information with female headed households less likely to access ICT based information as compared to the male counterparts.

Ogutu et al. (2014) evaluated farmers decision to participate in ICT based MIS projects in Kirinyaga, Migori and Bungoma districts of Kenya. Bungoma had the highest proportion of farmers participating in the ICT based MIS projects and this was ascribed to the presence of KACE which is an ICT based MIS provider in the region. The findings indicates that, group membership prior to the project, age, the number of crops grown, ownership of mobile phones an land size owned increases the probability of participating in an ICT based MIS service. They also established that participation in ICT based MIS projects significantly improved the use of farm inputs such as improved seeds, fertilizer and other non-labour inputs; a result similar to that of Kiiza and Pederson (2012) who also found increased adoption of improved seed, increased farm yields and gross farm returns due to access to ICT based market information in Uganda.

This literature review shows that farm-level studies on market information systems mainly concentrate on ICT based sources of market information thus have neglected the market information which is provided informally by extension agents, traders and brokers who engage directly and give feedback to the farmers. Thus, this specific case can be considered as a contribution to understanding the both ICT based and non ICT sources of market information by finger millet farmers. The research methods and process employed, can be applicable in analysing other the sources of information for other farm enterprises in other parts of Kenya.

2.3 Theoretical framework

The study adopts systems theory to show interactions that exist between different components of marketing information system. Systems theory originates from Ludwig Von Bertalanffy's General System Theory (GST). Systems theory emerged in the 1950s to describe a holistic and analytical approach to solving complex problem (Rhodes, 2012; Von Bertalanffy, 1956).

A systems approach is an overall model for thinking about things as systems and these can be modelled to offer insights about the behaviour of such phenomena (Rhodes, 2012). Systems are sets of interacting components working within an environment to fulfil some purpose (Rhodes, 2012). Market information system is a system in which market information is generated, transformed, consolidated, received and fed back to underpin knowledge utilization by actors involved in the system (Demiryurek, 2010). Market information systems comprises market players who collects, process and use market information as a subsystem. These market players interact with one another and may actively or passively seek and use market information through face to face communication with others as well as the passive reception of information (Demiryurek, 2010). Farmers' access and use of sources and channels of marketing information in the system are influenced by information characteristics, decision maker's characteristics, environmental uncertainty perceptions and work environment factors.

A market information system can be considered successful if the market players such as farmers receive reliable market information and are able to transform it into market knowledge which is reflected in their marketing decision. The evaluation of market information system for finger millet farmers may aid in identification of basic components and structure of the system, the

different sources of information used by farmers in the system, understanding of how successfully the system works and how to improve system performance (Demiryurek, 2010). This approach will be useful to identify possible defaults and improve the farmers' sources of marketing information.

CHAPTER THREE

METHODOLOGY

3.1 Study area

3.1.1 Location and Size

The study was carried out in Teso South district, one of the districts created after 2007 from the former Teso and Busia districts of Western province. Following the March 2013 elections in Kenya, Teso South district have ceased to exist as a district but a sub county of Busia County. Teso south is bordered by the Republic of Uganda to the west, Busia district to the south, Teso North to the north and Nambale district to the East.

Figure 3.1 Map of Teso South district (Central Bureau of Statistics, 2009).

Teso South district and its two administrative divisions namely Amukura and Chakol are shown in figure 3.1 above. Teso south lies between latitudes 0^{o} 29'and 0^{o}32'northand longitudes 34^{o} 01' and 34^{o}07' east. The study area has a total of 321.8Km^2.

The district's headquarter was located in Amukura. Amukura division is the larger of the two divisions and is comprised of seven locations namely Amukura, Kwangamor, Akoreet, Kanjakito, Aremit, Kaliwa and Kotur as shown on figure 3.1 above. Chakol division is smaller of the two divisions and consist of five locations namely Asinge, Amongura, Apegei, Ochude, and Okame. However Chakol division have more finger millet farmers compared to Amukura as shown in table 1.3. This is because Amukura division has a number of small hills hence not suitable for finger millet farming. According to Kenya census in 2009, Teso south has a human density of 325 persons per Km^2. During the 2009 population census, the population of Teso South district was 103,036 persons who resided in an area of 321.8Km^2 of land. Agricultural land available per is 0.25 ha of land per person. The largest ethnic group in the area is the Teso community.

3.1.2 Economic activities

The main economic activities in the district are small scale crop and livestock production. The dominant cash crops are sugar cane, cotton, tobacco and sunflower. Food crops include maize, cassava, sorghum and finger millet, beans, pigeon peas, bananas and vegetable. Marketing of crops and livestock is limited by poor transport infrastructure in the district. The district has murram road and residents commonly use motor cycles (boda boda) as a main means of transport.

3.2 Conceptual framework

Market information system consists of people, equipment and procedures designed to gather, sort, analyse, evaluate and distribute needed, timely and accurate marketing information to decision makers, it begins and ends with information users (Armstrong et al., 2012). Market information system consists of two integrated subsystems which include market players who gather, sort, analyse, evaluate, distribute and use market information; and sources and channels of information through which the market information is disseminated to the end users or fed back into the system.

A markets information system exists within an environment that is characterized by variability and complexity. Actors in the market environment continuous search for market information from different sources are influences by various aspects as shown in 3.2 below.

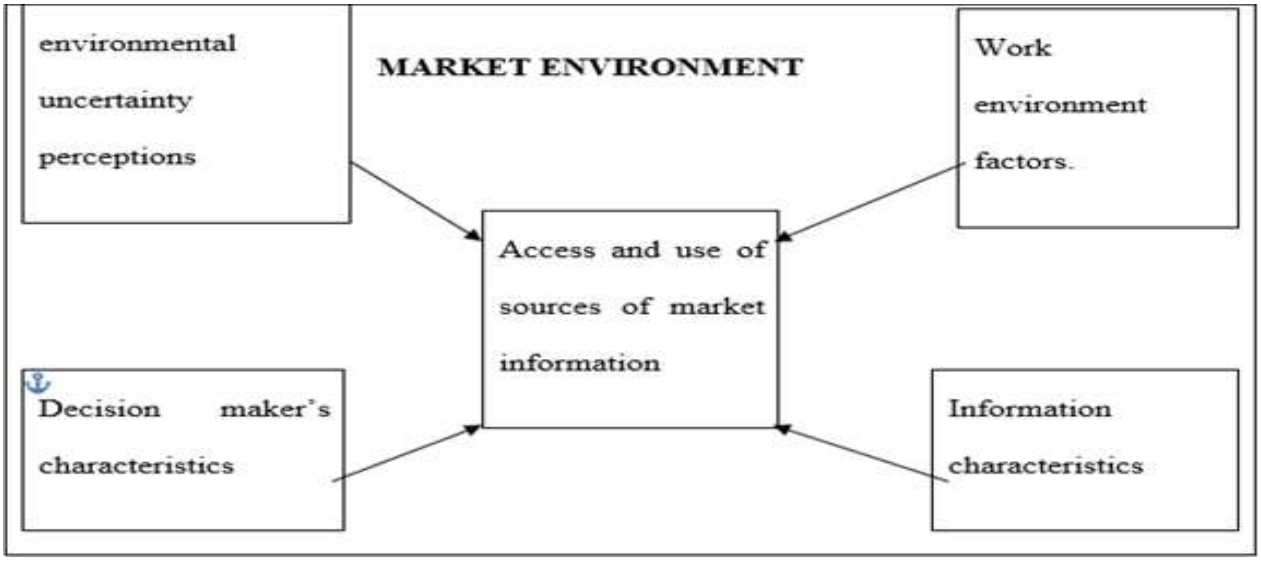

Figure 3.2 Conceptual framework

Source: Modified from Ashill and Jobber (2000)

The choice of a source of market information is based on decision maker's characteristics and work environment factors as shown in figure 3.2 above. In this case the decision maker is the farmer who makes decision regarding what to produce, how much to produce, where to sell the produce and renegotiate for improved prices rather than being compliant price takers.

The sources of information that a farmer is exposed to will determine whether he/she has access to reliable market information or not. The characteristics of information such as scope, level of aggregation, time horizon, currency, required accuracy and frequency of use contained in the particular source of information or channel of communication, will determine the usefulness of information (Ashill and Jobber, 2000).

Reliable marketing information can help predict, strategize, plan and act expediently, rationally and efficiently (Mundy and Sultan, 2001). Therefore, it is fair to assume that farmers, if given access to timely and relevant market information, they will overtime take the advantage of the available information on making decisions that will improve their productivity and profit margins (Oyewumi, 2006), thus reducing business risk transaction cost and enabling market participants to explore business opportunities (Robbins and Ferris, 1999). Provision of basic market information is a service that aims at increasing efficiency of agricultural markets and contribute towards overcoming issues of market failure based asymmetric access of the market information (Ferris et al., 2008).

The access and use of sources marketing information in a marketing information system is thus influenced by the information characteristics, decision maker's characteristics, environmental uncertainty perceptions and work environment factors as shown in figure 3.2 above. The

environmental uncertainty perceptions includes: seasonality of crop production, their state, effect and response. Work environment factors include: decision type, decision importance, decision arrival time, task difficulty and task variability. Information characteristics include: scope, timeliness, and accuracy, level of aggregation, currency and sources of information. Decision maker's characteristics include: education, tolerance of ambiguity, locus of control and experience.

3.3 Empirical Model

3.3.1 Total Information score

The general systems theory was used in the analysis of the agricultural information systems and communication network used by members and non-members of the Dairy Cattle Breeders' Association in Samsun province of Turkey by Demiryurek et al. (2008). Demiryurek et al. (2008) used the Total Information Score (TIS) to measure reliability of source agricultural information used by dairy cattle breeders. Total information score is a variable derived from taking the product of the frequency of contact with information sources and their usefulness as shown in appendix 4. Sources of information used Dairy Cattle Breeders' Association (DCBA) in the Samsun of Turkey were then ranked based on Total information scores. It was found that the main function of the information systems was the dissemination of dairy-faming-related information. Association membership enabled the cattle breeders to keep more European pure-bred cows and provided financial incentives, rather than developing a modern dairy sector. The non-members of the Association mainly used their existing knowledge and traditional practices.

Demiryurek (2010) in his analysis of information systems and communication networks for organic and conventional hazelnut producers in Samsun Province of Turkey also used the Total Information Score to compare information systems from these two groups of producers. Information systems for organic and conventional producers were found to be different. Total Information Score of organic hazelnut producers was higher than that of conventional hazelnut producers hence implying that the organic hazel nut producers not only had frequent contacts with sources of information but also obtained useful information from the sources.

Total information score is used in this study to compare the reliability of different source of the market information used by finger millet farmers in Teso South District. Marketing of finger millet is a continuous process hence weights used for frequency of contact in the (Demiryurek, 2010; Demiryurek et al., 2008) are applicable. In order to define the concept of information contact, the respondents were asked to specify each source of market information they use and the frequency of contact with the source in the previous year. In addition, they were asked to rate on a Likert scale the degree of usefulness of information for finger millet marketing obtained from each named information sources. Total Information Score was formulated as:

Total information Score

$TIS_{ij} = FC_{ij} \times IU_{ij}$

Where FC is the frequency of contacts with a source of marketing information used by i-th finger millet farmer (computation of FC is shown in appendix 3) and IU is the degree of usefulness of information source as rated by i-th finger millet farmer (computation of IU is shown in appendix

5). The respondents provided detailed information on how to rate the categories of usefulness of each information source. The frequency of contact were mainly based on the respondents' actual contact with information sources.

The weights were given for frequency of contact are as follows (refer to appendix 3); weight of 0 was given to no contact, 1 for once a year, 2 for two or three times a year, 4 for four or five times a year, 12 for once a month, 30 for two or three times a month, 52 for once a week, 130 for two or three times a week and 365 for information contacts once a day (Demiryurek, 2010; Demiryurek et al., 2008). Similarly, the degree of usefulness of information sources was also weighted as follows (refer to appendix 5); a weight of 0 was given to not useful at all, 0.25 for little useful, 0.50 for somewhat useful, 0.75 for useful and 1.00 for very useful (Demiryurek, 2010; Demiryurek et al., 2008). The scores were calculated on the basis of percentages of farmers' reporting each level of use of the sources (refer to appendices 3, 4 and 5).

3.3.2 Logistic regression model

A binary logistic regression model was used. Different sources of market information were identified and for each source a logistic regression run to infer the factors that influence its use. The use of a given source of market information is a dichotomous dependent variable. The cumulative distribution function for a logistic random variable is given by Hill et al. (2008) as shown in equation 1 below:

Equation 1

$$\wedge(\boldsymbol{l}) = \boldsymbol{P}[\boldsymbol{L} \leq \boldsymbol{l}] = \frac{\mathbf{1}}{\mathbf{1} + \boldsymbol{e}^{-\mathbf{1}}}$$

The probability of using a given source of marketing information by a finger millet farmer lies between 0 and 1.

$$Source\ of\ market\ information = \begin{cases} 1\ If\ a\ farmer\ used\ a\ given\ source\ of\ market\ information \\ 0\ if\ the\ farmer\ did\ not\ use\ a\ given\ source\ of\ market\ information \end{cases}$$

Probability that the observed value of Y takes the value of 1 given by equation 2 below:

Equation 2

$$\boldsymbol{P_j = \frac{1}{1 - e^{-\beta_0 + \beta_i X_i}} = \frac{\exp(\beta_0 + \beta_i X_i)}{1 + \exp(\beta_0 + \beta_i X_i)}}$$

Where

P_j=Probability of using a given source j

B_0 = Maximum likelihood estimate of the constant term

β_i =Maximum likelihood estimates of the parameters

X_i=Explanatory variables (gender, age, farming experience in years, number of crops grown, size of land in acres, number of children, quantity of crops sold, perception of reliability of the source and level of education).

The probability that the observed value of Y=0 is given by equation 3 below:

Equation 3

$$\mathbf{1 - P_j = \frac{1}{1 + \exp(\beta_0 + \beta_i X_i)}}$$

Where

Pj=Probability of using a given source j

B_0 = Maximum likelihood estimate of the constant term

βi =Maximum likelihood estimates of the parameters

Xi=Explanatory variables (gender, age, farming experience in years, number of crops grown, size of land in acres, number of children, quantity of crops sold, perception of reliability of the source and level of education).

Logistic regression model is thus given by equation 4 below:

Equation 4

$$P_{Source\ of Market\ information_j} = E\left(Source\ of\ market\ information_j\right)$$

$$= \wedge\ (\beta_0 + \beta_1 X_i)$$

Where

Pj=Probability of using a given source j

B_0 = Maximum likelihood estimate of the constant term

βi =Maximum likelihood estimates of the parameters

Xi=Explanatory variables (gender, age, farming experience in years, number of crops grown, size of land in acres, number of children, quantity of crops sold, perception of reliability of the source and level of education).

3.4 Sampling Procedure

A cross sectional farm household survey was carried out to assess the marketing information system of farmers in Teso south district. The study obtained primary data from finger millet farmers, a group that deals with both production and marketing.

Teso South district and its two administrative divisions (Amukura and Chakol) shown figure 3.1 were purposively sampled for the survey due to the fact that finger millet is widely grown all the divisions. All the 12 locations were also purposively sampled. At the time of the survey in 2012, Teso South district was relatively new having been created from the greater Teso district hence the 12 villages that existed in the old Teso district were upgraded to locational status to form Teso south district. A list of farm households was therefore available at locational level. Households were randomly sampled from a list of households in each location. 12 households were randomly sampled from each of the 7 locations of Amukura while 11 households were sampled from each of the 5 locations of Chakol division.

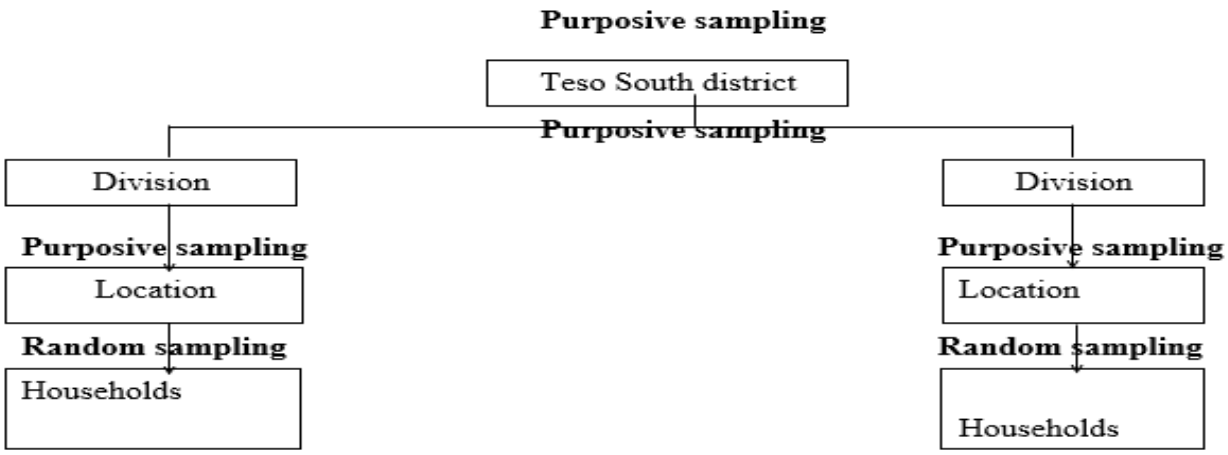

Figure 3.3 Sampling framework

Source: Author

Sample size determination

To determine a representative sample size, Cochran (2007) formula for cross sectional studies was used:-

Equation 5

$$n_0 = \frac{z^2 pq}{d^2}$$

Where

n_0 = Desired sample size

z = standard deviation (1.96) which corresponds to 95% confidence interval

p = Expected prevalence of proportion

q = 1-p

d = Degree of desired accuracy set at 0.05

$$n_0 = \frac{1.96^2 \times 0.1 \times 0.9}{0.05^2}$$

$$n_0 = 138$$

Equation 6

$$n = n_0 \times \frac{N}{N + n_0}$$

N = Uncorrected population

n = corrected sample size

$$n = 138 \times \frac{\mathbf{23,267}}{\mathbf{23,267 + 138}}$$

$$n = 137$$

The corrected sample size was calculated as 137 although actual data were collected from 139 respondents.

3.5 Data collection and analysis

Data on the socio economic characteristics of finger millet farmers, different sources of market information used by finger millet farmers and their information characteristics (reliability,

timeliness), factors affecting access and use of the sources of market information and challenges faced by finger millet farmers in accessing market information provided by the available channels of information were collected in March and April of 2012 using a semi structured questionnaire.

The questionnaire was administered randomly selected 139 households growing finger millet in the district**.** The interview targeted the household head and in case of his/her absence, the alternative was to interview the spouse or the oldest son or daughter in that order. Statistical package for social science (SPSS) was used to generate descriptive analyses from the primary data that was obtained from the respondents. For categorical variables the frequencies were obtained. For continuous variables measures of central tendencies such as mean, standard deviation and range were obtained.

To compare the different sources of market information, six information characteristics which include reliability, usefulness, accuracy, timeliness, relevance, level of detail and confidence in the source were used. Frequency distribution for each of the six information characteristic for each channel/source of information was generated using SPSS version 16. The sources of marketing information were ranked from the highest to the least based on the weighted average that they scored out of the total expected average. The sources were also compared based on their reliability and then ranked according to their information scores. Total information score is a combined variable of frequency of contact with information sources and usefulness. Information scores for each source of the farmers' marketing information were calculated by multiplying the weights of information contact with degree of information usefulness

To assess the factors that influences finger millet farmers' access and use of different sources of marketing information. A binary logistic regression model was used. The use of a given source of market information is a dichotomous dependent variable as given by (Hill et al., 2008). STATA was used to generate the output for the logistic regression models for each of the information sources identified.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Household socio-economic and farm characteristics

This section used frequency distribution and descriptive statistics relevant household socio economic and farm characteristics.

Table 4.1 Farmers socio-economic characteristics

	Categories	Frequency	Percent
Sex	Male	66	47.5
	Female	73	52.5
Age	21-30	9	6.5
	31-40	37	26.6
	41-50	47	33.8
	51-60	24	17.3
	Over 60	22	15.8
Education	Primary	89	64.0
	Some secondary	28	20.1
	Completed high school	9	6.5
	Some additional training	5	3.6
	Undergraduate	2	1.4
	None	6	4.3
Marital status	Married	133	95.7
	Widowed	6	4.3
Occupation	Farming	139	100.0
	Small scale business	18	13.0
	Casual labor	7	5.1
	Formal employment	13	9.4
	House wife	30	21.7
Social status	Village elder	6	4.3
	Church leader	33	23.7
	Chief/assistant chief	4	2.9
	Youth leader	7	5.0
	Community member	89	64.0

Source: survey results 2012

Gender of the respondent: the findings in table 4.1 above suggests finger millet farming is dominated by women in Teso South district thus an illustration of boundless gender parity regarding the production of the crop.

Age of the respondent: majority of finger millet farmers are within the economically active age range thus assumed to be able to meet the physical labour requirements associated with finger millet production. Only 15.8% within the senior citizen category as shown in table 4.1 above, a group that are likely to struggle to meet the labour demands of finger millet production despite the wealth of experience they have gained in the crop production and marketing.

Level of education of the respondent: The findings table 4.1 imply that a high literacy level among finger millet farmers in Teso South district with majority (64%) of the respondent had primary education hence it is assumed that most of the respondents are able to understand markets dynamics (Omiti et al., 2009) and this can influence the access and use market information and hence success in marketing of finger millet.

Marital status: Majority of the respondents were married men and women. 95.7 per cent were married while 4.3 per cent were widowed.

Occupation: The total percentage was more than 100% because there were respondents who had more than one occupation. The main occupation of the study population was farming (100%) followed by housewife as shown in the table 4.1. Some of the farmers however engaged in other activities shown in table 4.1 either for the social welfare of families or to generate additional off farm income.

Social status: Majority (64%) of the study population were ordinary community members, while the rest were village elder (4.3%), church leader (23.7), chief/assistant chief (2.9%) and youth leader (4%). As far as social status are concerned, more than half of the respondents belong to ordinary community member category – the group which represents the lower social rank.

Table 4.2 Means, standard deviation and range for farming experience, farm size, number of children and produce harvested and sold

N=139	Minimum	Maximum	Mean	Standard deviation
Farming experience in Years	2	64	20.6	13.0
Size of farm in acres	0.4	27.4	3.5	3.4
Number of Children	0	16	6.5	2.9
Finger millet harvested per year in Kg,	11	2100	259.9	341.7
Finger millet sold per year in Kg	0	2000	160.3	273.2

Source: Survey results (2012)

Farming experience in years: The mean year of farming experience was 20.6 with a standard deviation of 13.0 as shown in table 4.2 indicating an experienced farming group. Most experienced farmer has grown finger millet for 64 years thus likely to be a senior citizen and may not have physical strength necessary in finger millet farming.

Farm size in acres: The mean farm size reserve for finger millet production was 3.5 acres with a standard deviation of 3.4. On ideal situation 3.5 acres of land expected to produce an average of 1400Kg of finger per harvest, yet the farmers are producing far much below the expected quantity. This implies that opportunity still exist in the district to increase finger millet production without necessarily increasing the area planted. Better farm management practices if implemented by the finger millet farmers in Teso south could increase finger millet returns to land. The smallest farm was 0.4 acres while the largest farm was 27.4 acres.

Number of children: All individuals in the household who were below 18 years were considered as children. The mean number of children per household was 6.5 with a standard deviation of 2.9. The minimum number was 0 and the maximum number was 16. Finger millet production is very labour intensive thus children contribute in most cases to the farm labour during school holidays.

Quantity of finger millet harvested per year: The mean kilograms of finger millet harvested in a year are 259.9. The minimum kilograms harvested in 11 and the maximum is 2100 kilograms. However, there were wide variations in quantities of finger millet harvested amongst the farmer as shown by high standard deviations (Table 4.2). This could be attributed to relatively different farm management practices amongst the farmers. Finger millet is harvested twice in a year and on average farmers grow finger millet on 3.5 acres in Teso south thus the mean quantity harvested per year on approximately 3.5 acres is far much less than the expected yield of 400 kilograms per acre in one harvest. More research and development can therefore be increased in the area to enable farmers reach the expected levels of production.

Quantity of finger millet sold per year: The mean kilograms of finger millet sold in a year are 160.4 with a standard deviation of 273.2. The minimum is 0 and the maximum kilograms sold are 2000. The average quantity of finger millet sold was more than half the quantity harvested a likely indication that the finger millet farmers were more market oriented and hence needed reliable market information.

Table 4.3 Farm characteristics

	Categories	Frequency	Percent
Farming system	Mixed cropping	16	11.5
	Crops and Livestock	123	88.5
Major crops	Finger millet	139	100
	Maize	129	92.8
	Sweet potato	77	55.4
	Cassava	122	87.8
	Sorghum	83	59.7
Major livestock kept	Cattle	112	80.6
	Goats	57	41
	Sheep	29	20.9
	Poultry	128	92.1
Objective of growing finger millet	Sales	2	1.5
	Subsistence	22	16.1
	Sales and subsistence	113	82.5

Source: Survey results (2012)

The results of the farm characteristics that were analysed are presented in table 4.3 above. Some of the farm characteristics have frequencies and the percentages of exceeding the sample size of 139 and 100% respectively since the respondents belong to more than one category of the characteristics listed below.

Farming system: Results in Table 4.3 above show that famers mainly practice livestock and crop production signifying the complementary role played by livestock in crop production.

Major crops: The crops grown in the study area included finger millet, maize, cassava, sorghum and sweet potato. Most households grew finger millet (100%) followed by maize (92.8%), cassava (87.8%), sorghum (59.7%) and sweet potato (55.4%) in that order. The high number of crops grown per farm household are mainly to satisfy diverse households' food requirements.

Major livestock: The livestock kept in the study area included Cattle, Goats, Sheep, and Poultry. Most households kept poultry (92.1%), followed by cattle (80.6%), goats (41%) and sheep (20.9%) in that order. Livestock play a compliments crop production are often relied on to generate additional income, supply food and manure to farmers.

Objective of growing finger millet: The main objective of growing finger millet was for both sale and subsistence as shown in Table 4.3 above. This may be a pointer that if finger millet production and marketing is improved it will increase the levels of income of farming households through its sale.

4.2 Comparison of the communication channels and sources of market information.

In this study the terms sources and communications channels are used as synonyms thus no distinction was drawn between communication channels used for disseminating market information and sources of market information. This was because of the technical difficulty of verifying the exact sources of information that fed the channels of communication with the information that was disseminated to farmers. Similarly in communication, there is a tendency of end users of information such as farmers and traders to rely on media of exchange such as phone and radios since the main source of information may be unknown. The sources of market information used by finger millet farmers in the study area included traders, farmers, newspapers, extension agents, Mobile phone, field days, transporters, Kenya Agricultural Commodity Exchange and Radio as shown in table 4.4 below. The comparison is made by

ranking the sources based on the number of farmers who use a particular source as shown in table 4.4 and in terms of the information characteristics identified in the page 37 above.

Table 4.4 Sources of market information

Sources	Frequency	Per cent
Brokers	106	76.3
Traders	104	74.8
Farmers	99	71.2
Extension agents	68	48.9
Field days	50	36.0
Radio	40	28.8
Mobile phone	35	25.2
Transporters	13	9.4
News papers	12	8.6
KACE	2	1.4

Source: Survey results (2012)

All the finger millet farmers had access to marketing information. The farmers received market information from multiple sources as shown in table 4.4. Majority of the farmers (72.3%) used brokers as their main market information source. When farmers supply finger millet produce directly to urban markets or consign the produce to agents in those markets, then brokers or traders in the markets are their main source of information and this information is completely up-to-date (Giovannucci and Shepherd, 2001; Shepherd, 1997). However, farmers may not always receive the reliable and up to date market information held by traders or brokers. Information available to traders and brokers on urban and rural market prices is approximately more current than that provided by other sources market information. Undoubtedly, traders intend to make a profit and one way to do this is to ensure there is a big disparity between the price they pay farmers and the price they get when they sell the finger millet produce (Giovannucci and Shepherd, 2001). This difference must certainly cover all their marketing costs. They bargain

with farmers by claiming that urban market prices are lower than they actually are (Giovannucci and Shepherd, 2001; Kherallah et al., 2002; Shepherd, 1997).

Farmers were positioned as third most used source of market information. Other farmers can be an important source of market information, particularly about local markets. However, it should not be assumed that market information from farmers is always reliable. Firstly, farmers will remember the total price they received, but may not know the exact weight that they sold (particularly when using non-standard containers), and thus cannot provide reliable information on the price per kilogram. Secondly, farmers may exaggerate the prices they receive in order to make other farmers to think that they are either very good at negotiating with traders or produces top-quality produce which gets them best prices (Giovannucci and Shepherd, 2001; Shepherd, 1997).

The five sources of market information widely used are all interpersonal sources a finding which is consistent with that of Mahaliyanaarachchi (2003) which found that majority of farmers still rely on word of mouth either from other farmers, traders and extension service. This may result from farmers' trust in interpersonal sources which give feedback and distrust in print (newspapers) and electronic sources (mobile phones and radio) which in most cases are the channels of communication. Radio was a major source to only 28.7% of the farmers a finding that may be attributed to lack of congruence between the time the information is broadcast and the time farmers listen to the radio. The low use of radio, mobile phones and newspapers may be because some farmers who may not be able to afford access to these sources of market information. This finding contradict the findings of Fawole (2008) and Oyesola & Obabire

(2011) that showed that ranked mobile phones and radios as the most popular sources of information accessed and used by farmers in Nigeria as opposed to the interpersonal sources of information.

The use of Kenya Agricultural Commodity exchange (KACE) which is the formal source of marketing information was minimal, only 1.4% used the source shown in table 4.4 above. KACE extensive use of modern ICT options for delivery of market information may be costly and technical for ICT illiterate finger millet farmers thus limiting their access and use (Karugu, 2010). Similarly, the use of newspapers is also limited by high levels of illiteracy and costs associated with the purchase of newspaper.

Seventy three percent of the respondents received market information on price per standard weight while 35.5% received information on the location of finger millets markets.55.5% expressed interest in receiving marketing information on the varieties of finger millet preferred in the market.

Farmers expressed diverse uses of market information as follows; majority of the respondents (66.2%) who received marketing information used it in deciding when to sell their finger millet. 42.4 per cent used the information in deciding where to sell their finger millet, 23 per cent used the information in deciding the quantity of finger millet to plant, while 21.6 per cent used the information in negotiating with finger millet traders for better prices.

Most of the farmers (63.3%) considered marketing information to be very important and 36.7 per cent thought that they could use the marketing information to increase their income. Sixty four

per cent of the respondents admitted that the marketing information received was little hence not sufficiently up to date for its purposes, 98.6 per cent of the respondents could not rely on the information received.

4.2.1 Characteristic of information from different sources

The information characteristics that formed the basis for comparing sources of market information are identified as usefulness, timelines, and accuracy, level of detail, relevance, reliability and confidence in the source.

Table 4.5 Usefulness of different sources of marketing information

Sources of marketing information	Weighted average
Expected weighted average=5.0	
Field days	3.7
Extension agents	3.6
Farmers	3.6
Traders/ brokers	3.1
Radio	3.1
Mobile phone	2.7
Transporters	2.7
News papers	2.4
K.A.C.E.	2.0

Source: Survey result (2012)

The results in table 4.5 ranks field days as the most useful source of marketing information while Kenya Agricultural Commodity Exchange least useful source. Farmers perceived market information got from field days, extension agents and other farmers to be most useful. This is because exchange of marketing information through these sources occur between people who know each other and had built trust over time a finding that concurs with that of Odendo and De

Groote (2006) which showed that farmers mainly rely on interpersonal sources of market information.

The usefulness of field days and extension agents as sources of market information is derived from their impartiality in the market. Shepherd (1997) argued that extension workers are potentially the best sources of market information for most farmers. Shepherd (1997) believed that extensions agents are able to identify local buyers for various crops including finger millet and find out what prices they are paying and their terms and conditions because of their agribusiness knowledge. In the long term, extension workers can keep records of prices reported by the MIS and plot them on graphs so that farmers can visit them and see the seasonal fluctuations. In the short term, extension workers can help farmers understand the MIS broadcasts (Giovannucci and Shepherd, 2001; Shepherd, 1997).

Traders and brokers usefulness as sources of market information are derived from their active role in finger markets which keep them abreast with daily wholesale and retail buying prices for finger millet in selected main markets in the country, as well as commodity offers to sell and bids to buy (Kherallah et al., 2002). Market information broadcasted on the radio may be useful but in most cases fails to reach majority of farmers because it is either broadcasted in wrong languages or at the wrong times for farmers to be listening(Shepherd, 1997).

However, KACE least usefulness to finger millet farmers may be linked to its extensive use of modern ICTs such as digitalized market resource centres (MRCs), short messaging service (SMS), interactive voice response service (IVRS), internet database system (IDS) for

information collection, processing and delivery which are still infeasible options to most small scale farmers who are ICT illiterate (Karugu, 2010; Poulton et al., 2010).

Table 4.6 Accuracy of different sources of marketing information

Sources of marketing information	Weighted average
Expected weighted average=5.0	
K.A.C.E.	4.5
Extension agents	3.1
Field days	3.0
Farmers	2.9
Radio	2.5
Traders/ Brokers	2.4
Mobile phone	2.4
Transporters	2.3
News papers	2.0

Source: Survey result (2012)

The result in table 4.6 shows that Kenya Agricultural Commodity Exchange (K.A.C.E.) was ranked as the most accurate source of market information with a weighted average of 4.5 and transporters as the least accurate source of market information with a weighted average 2.0. The top ranking of KACE reassures of the organization's mandate to facilitate competitive and efficient trade of finger millet and other agricultural commodities in Kenya (Karugu, 2010). KACE collects it market information through a formal market research process which assures its market information some level of accuracy in comparison the other sources of market information that farmers use (Karugu, 2010).

On the contrary, the process through which transporters acquire market information is largely informal, they in most cases execute task assigned to them by traders and brokers thus may be ignorant of the actual evolution of markets conditions.

Extension agents are impartial market stakeholders and may not derive any individual advantage from hoarding market information and hence unlikely to give deliberately biased information unlike traders and other farmers (Shepherd, 1997). Traders and brokers in contrast are expected to give least accurate market information despite having up-to-date information, they will want to buy finger millet produce as cheaply as possible so as to increase their profit margins (Kherallah et al., 2002). Mobile phones, traders, newspapers and transporters had weighted averages that were less than half of the expected weighted average.

Table 4.7 Timeliness of different sources of marketing information

Sources of marketing information	Weighted average
Expected weighted average=5.0	
K.A.C.E.	4.0
Traders / brokers	3.1
Farmers	3.0
Extension agents	2.8
Field days	2.7
Mobile phone	2.6
Newspapers	2.4
Radio	2.2
Transporters	2.1

Source: Survey result (2012)

Kenya Agricultural commodity Exchange (KACE) was ranked as the timeliest source of marketing information with a weighted average of 4.0 as shown on table 4.7 above. This is because KACE collects, updates, analyses and provides reliable and timely marketing information and intelligence on a wide range of crop commodities for instance finger millet, targeting actors in commodity value chains, with particular attention to smallholder farmers and small scale agribusinesses (Karugu, 2010; Poulton et al., 2010). KACE also have the capability

to keep up-to-date with daily wholesale and retail buying prices for finger millet in selected main markets in the country, as well as commodity offers to sell and bids to buy which enhances their timeliness.

In second and third ranks were traders and farmers respectively with a weighted average of 3.1 and 3.0 respectively. Traders and farmers willing to sell their finger millet produce actively engage in the market place hence likely to be aware of the evolution of markets prices and quantities making them relatively timely sources of information (Shepherd, 1997).

Market information is highly perishable hence sources that are rarely updated are likely to be late. Market information disseminated by extension agents during farm visit and during field days have high chances of becoming obsolete before reaching the end users (Shepherd, 1997). In addition, dissemination of market information is not a primary role of extension services thus may be shadowed by the many roles performed by the extension agents, especially when most farmers hardly have any produce to sell and thus incapable of taking advantage of timely market information. However, the extension agents have the capability to put together information about price trends over a number of years. However, market information from extension agents can still be used to make future decisions about what to plant and about out-of-season production as well as the appropriate timing to sell or store produce.

Results in table 4.7 show that mobile phones and newspapers had weighted averages of 2.6 and 2.4 respectively, these two are media of communication thus secondary sources of information whose timeliness maybe spurious. Similarly, radio and transporters are secondary sources which rely on other primary sources. Secondary sources of market information exhibit a time lapse

inherent when information is received and transmitted from primary source to a secondary source then disseminated either directly or through a channel of communication to the end users who are farmers.

Table 4.8 Relevance of different sources of marketing information

Sources of marketing information	Weighted average
Expected weighted average=5.0	
K.A.C.E.	4.5
Field days	3.5
Farmers	3.4
Extension agents	3.4
Traders/ brokers	2.8
Mobile phone	2.7
Radio	2.7
Newspapers	2.5
Transporters	2.1

Source: Survey result (2012)

Kenya Agricultural commodity Exchange (KACE) was ranked as the most relevant source of marketing information with a weighted average of 4.5 as shown in table 4.8. KACE is a formal source of marketing information thus has specialties in market research as well as resources which are fundamental in gathering, analysing, disseminating and storing market information (Karugu, 2010). The organization has the capability to tailor appropriate market information to its diverse clientele including finger millet farmers. This gives KACE an edge over the other sources of market information in terms of congregation of relevant market information.

Other than traders and brokers who are primary sources deriving their market information from prevailing market conditions, the remaining sources may be secondary sources hence their

relevancy is highly dependent on the relevance of the primary sources they acquire their information from.

Table 4.9 Level of detail given by the sources of market information

Sources of marketing information	Weighted average
Expected weighted average=5.0	
Extension agents	3.2
Field days	3.1
K.A.C.E.	3.0
Farmers	2.8
Traders/ brokers	2.4
Newspapers	2.4
Mobile phone	2.3
Radio	2.3
Transporters	2.0

Source: Survey result (2012)

Results in table 4.9 show that most detailed market information was obtained from extension officers or field days. Extension services often publicize detailed market information though individual extension agents or field days, either by making bulletins available to farmers or by reproducing the information on market notice boards. However, field days or extension agents may only reach a small group of farmers and market information disseminated may be outdated or information may be made available too late to be of any use.

The level of detail given by sources of market information such as newspapers, radios and mobile phones may be limited by relatively high cost associated with media publication and broadcast which may not be met by both the provider and users of market information (Shepherd, 1997). Broadcasting detailed market information through radio may be monotonous to listeners thus limiting the amount of detail that can be aired on radio programs.

KACE ranks third in terms of the level of detail contained in the marketing information that it distributes. This is nevertheless anticipated since it is a formal source of marketing information. However the ability of individual finger millet farmers to extract and take advantage of the market information from KACE is dependent on their familiarity with modern information communication technology (ICT) such as mobile phone short message service (SMS), interactive voice response (IVR) service, live radio auction service and online computer services most of which are unfeasible to small scale finger millet farmers due to relatively high costs of mobile phone calls, SMS and IVRS along with ICT illiteracy (Karugu, 2010).

Newspapers can be used to give more comprehensive information, however confining information to newspapers is pointless in areas like Teso south district where many farmers (64%) have primary level of education thus semi illiterate. However for literate farmers, the newspaper layout is very important, and comprehension of market information can be greatly improved with the use of graphics.

Table 4.10 Confidence in market information disseminated from different sources

Sources of marketing information	Weighted average
Expected weighted average=5.0	
Extension agents	3.4
Field days	3.1
Farmers	3.1
K.A.C.E.	2.8
Traders/ brokers	2.4
Mobile phone	2.4
Radio	2.4
Newspapers	2.2
Transporters	2.0

Source: Survey result (2012)

The respondents expressed more confidence in marketing information given by the extension service providers and field days respectively shown on table 4.10 above. Extension service because of its robust nature may have marketing specialists on different markets can get in touch with market information about markets further away thus boosting farmers confidence in information disseminated by the extension agents or during field days.

Farmers also expressed confidence in market information got from other farmers. Farmers treat one another as members of a homogeneous group which enhances communication and confidence amongst them (Oetzel, 1998).

Confidence in traders and brokers as sources of market information arise as a result of farmers dealing with the same trader or broker for many years (Shepherd, 1997). However confidence in traders and or brokers can expose finger millet farmers to exploitation by these traders whose main interests is to maximize profits (Karugu, 2010). To minimize exploitation, farmers should strive to confirm the accuracy of market information they receive from their preferred trader or broker with other market agents.

Low levels of education among smallholder finger millet farmers is blamed for low confidence in marketing information disseminated through sources such as newspaper, KACE and mobile phones as sources of marketing information (Karugu, 2010). Senthilkumar et al. (2013) found out that in spite of the number of projects oriented towards the transfer of agricultural information through ICTs in rural India, still the confidence in ICTs were very low compared to interpersonal sources of communication resulting in low acceptability and utilization of ICTs in the rural areas.

4.2.2 The reliability of the different sources of market information

Finger millet farmers' contact with the sources of market information

Table 4.11 Frequency of contact with source of marketing information

	Never %	Yearly %	Monthly %	Weekly %	Daily %	FC
Traders/ brokers	4.3	26.8	29.7	37.0	2.2	31.1
Farmers	2.2	0.7	20.9	28.1	48.8	195.2
News-papers	59.9	7.3	4.4	24.1	0.7	15.7
Extension agents	5.1	18.4	64.7	11.0	40.4	161.1
Mobile phones	36.0	5.9	8.1	9.6	0.0	6.0
Field days	7.9	73.4	18.0	0.7	0.0	3.3
Transporters	66.9	19.2	8.5	5.4	48.7	181.8
KACE	0.0	0.0	100.0	0.0	0.0	12.0
Radio	5.1	7.7	7.7	30.8	0.0	17.0

Source: Survey result (2012)

The finger millet farmers interviewed reported the highest number of contacts with fellow farmers as shown in table 4.11 above. This is because most effective information exchanges easily take place amongst members of a homogenous group for example which are farmer to farmer exchanges. Farmers consider themselves as near peers and similar in socio-economic status, education and other important attributes which enhance communication and learning amongst them (Oetzel, 1998). However the farmers had the least number of contacts with marketing information from field days. This is because field days are occasionally events in farmers' calendar.

The respondents also reported high number of contact with transporters and extension agents (refer to appendix 5 for details). Transporters frequently penetrate the rural areas to collect

produces from farmers. Extension officers on the other hand interact with farmers to provide agricultural information not only related to marketing but also production of various crops and animals.

Usefulness of market information disseminated by the different sources

Table 4.12 Level of use of the sources of market information

	Not useful %	Little useful %	Somewhat useful %	Useful %	Very useful %	IU
Traders/ brokers	6.0	24.1	34.6	29.3	6.0	0.5
Farmers	1.5	13.9	23.4	48.2	13.1	0.6
News-papers	23.7	30.4	27.4	15.6	3.0	0.4
Extension agents	1.5	8.3	35.3	41.4	13.5	0.6
Mobile phones	17.3	26.3	31.6	20.3	4.5	0.4
Field days	0.7	12.7	26.1	34.3	26.1	0.7
Transporters	16.7	28.8	31.1	19.7	3.8	0.4
KACE	0.0	0.0	100.0	0.0	0.0	0.5
Radio	4.3	26.1	34.8	26.1	8.7	0.5

Source: Survey result (2012)

Results in table 4.12 show that the most useful source of market information was found to be field days followed by, farmers and extension agents (refer to appendix 3), a finding that is consistent with that of Odendo and De Groote (2006) that revealed that informal sources of market information very useful to farmers. Farmers and extension agents were both frequent contacts with useful information thus providing both quantity and quality market information.

Field day though passed as a useful source despite farmers' limited contact with the source, this is because the field days are occasional events thus cannot be relied on fully for frequent marketing activities. Finger millet farmers came in frequent contact with transporters and ranked

it as the second most frequent sources of market information, however transporters were short of useful information hence not a quality source of information.

The usefulness of newspaper as a sources of market information is limited by both the cost associated with obtaining a newspapers regularly and low levels of education amongst most of the farmers.

Total information scores

Table 4.13 Total information scores for the sources of market information

Sources of market information	Total Information Score	Rank
Farmers	28.9	1
Extension agents	21.5	2
Transporters	7.3	3
KACE	6.0	4
Traders/ brokers	5.3	5
Radio	3.3	6
News-papers	1.6	7
Mobile phones	0.9	8
Field days	0.4	9

Source: Survey result (2012)

Total information scores shown in table 4.13 reflect not only quantity but also the quality of information contact, hence used to measure the reliability of sources of marketing information. The findings in table 4.13 show that farmers and extension agents which are both interpersonal sources had the highest total information scores (refer to appendix 4). This implies that these two were more reliable and credible sources of market information; hence farmers regularly used these sources to make good production and marketing decisions. Sources such as radio, newspapers and mobile phones all of which are operated from outside the locality of the farmers

had low information scores. This implies that they were less useful to the farmers. They had weaker feedback potential as compared to the interpersonal sources in which farmers were able to get instant explanations and clarifications.

4.3 Factors affecting the access and use of sources of markets information

The factors outlined in table 4.1 were thought to influence access and use of sources of market information thus their effect were assessed in binary logistic regressions. However the factors affecting the use of transporters, newspapers and KACE were not assessed since less than 10% respondents had used the sources as shown in table 4.4. The in results in table 4.14 and 4.15 below show that different socio-economic factors have varied influence in access and use of the different sources of market information.

Table 4.14 Binary logistic regression results on factors influencing the use of sources of market information

N=139	Field days Prob>Chi^2(12)=0.000 Log likelihood Ratio=103.21 Pseudo R squared= 0.135			Traders Prob>Chi^2(12)=0.012 Log likelihood Ratio= 94.181 Pseudo R Square = 0.193			Farmers Prob>Chi^2(12)=0.035 Log likelihood Ratio=83.001 Pseudo R squared=0.222	
Variables	β	P-Value	Marginal effects	β	P-Value	Marginal effects	β	P-Value
Sex								
Female (reference group)								
Male	-0.150	0.693	-0.245	-0.068*	0.078	-0.004*	-0.024	0.663
Age								
30 years & below (reference group)								
31-50 years	0.182**	0.028	0.033**	0.102	0.987	0.000	0.562	0.309
Over 50 years	0.033***	0.001	0.011***	0.273	0.507	0.190	-0.008	0.989
Farming experience in years	0.161**	0.016	0.026**	0.017	0.277	0.000	0.648	0.604
Number of crops grown	2.038**	0.003	0.066**	0.036	0.230	0.112	0.013	0.855
Size of land in acres	0.140*	0.067	0.028*	-0.019	0.854	-0.007	-0.194	0.757
Number of children	-0.121	0.220	-0.023	-0.003	0.407	-0.002	-0.479	0.573
Quantity of finger millet sold	2.993***	0.000	0.029***	0.200**	0.017	0.082**	-0.160	0.828
Perception of reliability of the source								
No (reference group)								
Yes	2.669*	0.065	0.082*	-2.984	0.528	-0.035	0.460	0.523
Level of Education								
Primary School (reference group)								
Secondary school	0.323	0.382	0.052	0.079	0.268	0.002	.265	0.125
Tertiary education	0.763	0.206	0.068	0.006	0.570	0.000	.043	0.882
Constant	1.616	0.199	0.308	4.422**	0.042	0.054**	-3.610	0.125

Note: The asterisks [*, **, and ***] represent statistical significance at 10%, 5% and 1% levels respectively.

Table 4.15 Binary logistic regression results on factors influencing the use of sources of market information

N=139	Mobile phones Prob>Chi^2(12)=0.000 Log likelihood=-617.289 Pseudo R squared=0.403			Radio Prob>Chi^2(12)=0.012 Log likelihood Ratio=75.965 Pseudo R squared=0.078			Extension agents Prob>Chi^2(12)=0.000 Log likelihood Ratio=44.879 Pseudo R squared=0.247		
Variables	β	P-Value	Marginal effects	β	P-Value	Marginal effects	β	P-Value	Marginal effects
Sex									
Female (reference group)									
Male	0.479***	0.000	0.016***	1.127*	0.063	0.187*	1.235	0.470	0.013
Age									
30 years & below (reference group)									
31-50 years	1.324***	0.000	0.046***	0.557	0.286	0.071	-2.024	0.158	-0.022
Over 50 years	-0.871***	0.000	-0.012***	0.265	0.708	0.036	-1.167	0.364	-0.036
Farming experience in years	-0.395***	0.000	-0.012***	0.609*	0.086	0.095*	-0.965*	0.070	-0.018*
Number of crops grown	0.305	0.514	0.010	1.776*	0.078	0.013*	0.851**	0.017	0.055**
Size of land in acres	1.611***	0.001	0.086***	2.651**	0.018	0.107**	0.039**	0.071	0.167**
Number of children	-0.061	0.606	-0.002	0.949	0.879	0.038	1.225	0.470	0.081
Quantity of finger millet sold	0.814*	0.080	0.030*	1.643***	0.000	0.270***	0.213**	0.032	0.595**
Perception of reliability of the source									
No (reference group)									
Yes	0.216**	0.023	0.070**	2.457*	0.055	0.011*	3.666**	0.036	0.010**
Level of Education									
Primary School (reference group)									
Secondary school	0.488*	0.098	0.020*	1.452**	0.035	0.055**	2.453**	0.044	0.039**
Tertiary education	0.670***	0.000	0.023***	1.832**	0.039	0.061**	4.646**	0.028	0.063**
Constant	-5.600***	0.000	-0.012***	1.116**	0.044	0.043**	2.539	0.332	0.216

Note: The asterisks [*, **, and ***] represent statistical significance at 10%, 5% and 1% levels respectively.

Age of the respondents have a significant influence on the use of field days and mobile phones as sources of market information hence consistent with the finding of Adetumbi et al. (2013) which showed age to have significant influence on use and access of ICT based sources of information. The probability of using field days as a source of market information increases by 2.8% and 0.1% for farmers aged 31-50 years and over 50 years respectively. Farmers aged 31-50 years have a higher probability of accessing and using field days compared to their counterparts who are aged above 50 years because the still have more physical ability to participate in the field day events. The probability of using mobile phones to access market information by farmers aged 30-50 years increases by 4.6% while that farmers aged above 50 years decreases by 1.2%. Use of mobile phone in accessing market information is still relatively new hence older farmers are less likely to use it as source of market information. These findings are consistent with the findings of Sekabira et al. (2012)who established that access and use of information decreases as age increases.

The findings in table 4.14 and 4.15 above show that sex significantly influenced the use of mobile phones, radios and traders as sources of market information. The probability of male in comparison to females using radio and mobile phone as sources of market information increases by 1.6% and 1.9% respectively while the probability of male in comparison to female using traders as a source market information decreases by about 0.4%. Sex not only represent differences in market orientation between male and female (Omiti et al., 2009) but also determines access and control to certain assets such as radios and mobile phones. These findings are consistent with that of Adetumbi et al. (2013) and Kiiza and Pederson (2012) which showed

that male headed households are more likely to access ICT based sources of market information like radios and mobile phone in comparison to their female counterparts.

Farming experience significantly reduces the probability of using mobile phone and extension agents as sources of market information by 1.2% and 1.8% respectively. However it raises the probability of using field days and radios by about 2.5% and 9.5% respectively as shown in table 4.14 and 4.15 above.

Results in table 4.14 and 4.15 show that number of crops grown positively influenced the use of radio, field days and extension agents. This may be attributed to the fact that radio, field days and extension agents are sources that not only give diverse information of various crops but are also easily accessible to most farmers (Fawole, 2008).

Size of land owned enhances the use of radio, mobile phone, extension agents and field days as sources of market information as shown on table 4.14 and 4.15. These results concurs with those of Ali and Kumar (2011), Kirui et al. (2012) and Ogutu et al. (2014) which also indicated that that land size positively influence the access of ICT based sources of market information such as radio and mobile phones. The larger the farm size, the more the output and consequently relatively high farm incomes that enable farmers to access and pay for market information from various sources (Sekabira et al., 2012).

Findings in table 4.14 and 4.15 show that the quantity of finger millet sold positively influences the probability of using field days, extension agents, mobile phones and radios as sources of market information. The more produce a farmers has for sale the more like the farmers is to seek

market information from multiple sources, and increased farm income from sales of produce permit farmers to access and pay for market information from the different sources (Sekabira et al., 2012).

Perception of reliability of the source of market information positively influence the likelihood of using radio, mobile phone, field days and extension agents as shown on table 4.14 and 4.15 above. Positive perception of reliability of a source of market information gives farmers more drive and bravery to explore and use different sources that they perceive to be reliable (Sekabira et al., 2012).

Level of education have positive effect on the likelihood of accessing and using of mobile phones, radios and extension agents to acquire market information as shown on table 4.15 above. This finding corroborates with those of Fawole (2008) and Ali and Kumar (2011). Level of education arguably represent human capital thus likely to improve farmers' understanding of market dynamics (Omiti et al., 2009). It is therefore posited that farmers with high level of education are better placed to read, understand and implement procedures for appropriate access and use of market information from mobile phones, radios and extension agents (Sekabira et al., 2012).

4.4 Challenges faced in accessing and utilizing market information

The reported challenges to accessing and utilizing marketing information were mainly; inaccessibility of the markets, changes in market conditions within a short time, unreliability of the sources, lack of market specific information, delays in dissemination of information,

infrequent contact with the information sources, cost of accessing the information and ignorance on the various sources of market information.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATIONS

All the surveyed households produced finger millets as one of the major crops in their farms. The respondents had access to both formal and informal sources of market information The farmers perceived the brokers as most knowledgeable about prices since they traded in large volumes and has high markets power, however this may have impact on the farmers proceeds especially if the brokers fail to pass the correct market information to the producers resulting into information asymmetry.

Access to comprehensive market information is essential for agricultural marketing; the public sector should support provision of market information to improve market transparency. In the past few years, there have been efforts to provide ICT based market information services, however it is worth noting that farmers are still very confident in extension service as sources of market information, thus transforming the market information system into an ICT based system may preclude most farmers who are semi illiterate hence reliant on non ICT based sources of market information. Integration of both ICT based sources of market information and non ICT sources is inevitable to ensure all the farmers are given the opportunity to access and use market information.

Despite the Kenya Agricultural Commodity Exchange ranking first in terms of accuracy, timeliness and relevance; few farmers use the source due to ignorance on the source. It is therefore necessary to create awareness amongst farmers on the alternative sources of marketing

information to enhance their access and use of marketing information. KACE as an entity needs to make itself known to its primary clients who are farmers through advertisement and advocacy campaigns in order to increase the number of farmers who find their services useful as a source of agricultural marketing information. Training on the use of modern information communication technology (ICT) such as mobile phone short message service (SMS), interactive voice response (IVR) service, live radio auction service and online computer services could be explored by K.A.C.E to build farmers capacity to use the ICT based channels of information.

Poor roads acted hindered farmers' access to markets. 67.2% cited poor roads as an obstacle to venture into distant markets that offered better prices, hence also a disincentive to utilization of the market information received. There is need for increased investment in infrastructure like roads by the government of Kenya, as this would be an incentive for the finger millet farmers to utilize marketing information and actively participate in agricultural marketing and increase penetration in to the market.

The goal of Agricultural marketing information systems which is addressing the informational disadvantages faced by small-scale producers and traders must be reinforced. To incentivize collection, Sub County-level staff must truly believe that information is not being collected for statistical purposes, but rather as part of an efficient service that benefits farmers and agribusinesses in their area. A low-cost branding campaign targeting both internal and external audiences would be a first step. However, it is critical that agricultural marketing information system provide valuable, concise, well-presented information to share with their Sub County smallholders and small-scale traders. The viability of data collection process depends on this

reciprocity between sub county officers and traders. Another solution might be a dedicated market information officer in each Sub County, whose responsibilities would include collecting and reporting prices from a select number of Counties.

Reforming Agricultural marketing information systems will be necessary in achieving in achieving high-level ownership amongst finger millet farmers. Commitment from all actors in the system is vital to emphasize how an effective MIS can foster broad-based agribusiness development in Kenya. Key decision-makers at the Ministry of Agriculture, such as from the Policy and Planning department, could be the focal point of the conversation, but they may need assistance from Ministry of Finance on board. A consistent advocacy campaign on information and communication technology (ICT) based systems such as mobile phone and internet should be combined with sponsored study tours for top level policymakers to observe effective price information systems of different commodities in action.

However, further research need to be done to determine the economic impact of these sources of market information on household agricultural productivity and welfare of smallholder farmers in Teso South, since majority of the respondents asserted their usage of different sources of market information to increase their farm returns.

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APPENDICES

Appendix 1. Questionnaire

Evaluation of Marketing Information System for Finger Millet Farmers in South Teso District

Division ……. Location …….

Sub Location ……Village ……...

Name of the interviewer ……..

Name of the respondent ……...

1. Socio economic characteristics of the respondent

Sex	Age	Level of Education	Marital status	No. of children	Occupation	social status
○Male ○Female	○Under20 ○21-30 ○31-40 ○41-50 ○51-60 ○Over 60	○Primary ○Some secondary ○Completed High school ○Some additional training ○Undergraduate ○Post Graduate	○Married ○Single ○Divorced ○Separated ○Widowed ○In a Relationship		○Small scale trader ○Business man ○Casual laborer ○Formal employment ○Housewife ○Others (specify)	○Village elder ○Church leader ○Chief/sub chief ○Youth leader ○others (Specify)

2. Farm characteristics

Farming Experience in Years	Size of farm in ha	Farming system	Crops grown	Animals kept	Objective of Growing Finger Millet
		○Mixed cropping ○Single cropping ○Crops and Livestock	○Finger millet ○Maize ○Potato ○Cassava ○Sorghum ○Others	○Cattle ○Goats ○Sheep ○Poultry ○Others (specify)	○Sales ○Subsistence ○Sales and Subsistence ○Others (specify)

Sources of Farming Information

3. How much finger millet do you produce in a given year
4. How much of the produce do you sell in a given year?

5. How do you use your finger millet produce?

○Sales ○Give to friends and relatives ○Consumption

○Cultural activities ○Others (specify)

6. Who does the selling of the finger millet?

○House hold head ○Housewife ○Child ○Others (specify)

7. How do you transport your finger millet from the farm to the market?

○Use vehicle ○Use animals' ○Use human body ○Others (specify)

8. What is the condition of the roads?

○Good ○Fair ○Bad

9. Do you deliver your finger millet to National Cereals and Produce Board (NCPB)?

○Yes ○No

10. Who are the buyers of your finger millet?

○Middlemen/Traders ○Consumers ○Processing Industries

○Fellow Farmers ○Relatives ○Others (Specify)

11. Where do most of the buyers come from?

○Local area ○Neighbouring Communities ○Other Parts of Kenya

○Across the Border ○Others (Specify)

12. What type of market information is available to you?

○Price of produce per standard weight ○Location of finger millet markets ○Others

13. How do you use the available market information?

○In deciding what to plant ○In deciding where to sell ○In deciding when to sell

○In negotiating with traders for better prices ○Others (specify) …….

14. What market information would you like to receive that you are not currently accessing?

○Varieties of finger millet in the market ○Location of finger millet market

○Price of produce per standard weight ○Others (specify)…….

15. What is your opinion on the information available from all the sources?

○Can use it to increase their incomes ○Needs more information

○Information is sufficiently up to date for his purposes ○Can he rely on the information provided

○Others

16. How do the buyers know where the finger millet market is located?

○Traders ○Extension visits ○Farmers ○Brokers ○NCPB ○Friends

○Newspapers ○Telephone ○Field day ○Transporters ○Others (specify)

17. How do you as a producer get information where to find buyers?

○Traders ○Extension visits ○Farmers ○Brokers ○Transporters

○Newspapers ○Telephone ○NCPB ○Field-days ○Others (specify)

18. Of all the media/sources listed above, which **would you like to use** (in ideal conditions) as information sources? Please choose five and put them in your order of preference:

○Most wanted: No: _____ ○3rd: No: _____ ○5th: No: ___

○2nd-most: No: _____ ○4th: No: _____

19. Which of the following sources of information do you use/not use?

Sources of information	Use	Not use	Reason for use/not use
Traders/Brokers			
Farmers			
Newspapers			
Extension visits			
Mobile phone			
NCPB			
Field days			
Transporters			
Others (specify)			

20. For production and marketing purposes, how much market information do you obtain from the following media/sources?

Source	Very little	Little	Somewhat little	Medium	Much	Somewhat much	Very much
Traders/ Brokers							
Farmers							
Newspapers							
Extension visits							
Mobile phone							
NCPB							
Field days							
Transporters							
Others (specify)							

21. How many times last year were you in contact with market information from the named sources?

Source	Never	Yearly	Monthly	Weekly	Daily
Traders, Brokers					
Farmers					
Newspapers					
Extension visits					
Mobile phone					
NCPB					
Field days					
Transporters					
Others (specify)					

22. For each of the following characteristics shown below please rate your level of agreement using the following scale:

Agreement: 1=not at all, 2=slight extent, 3=moderate extent, 4=great extent, 5=very great extent

Level of agreement									
	Traders/ Brokers	Farmers	News-papers	Extension visits	Mobile phone	NCPB	Field days	Transporters	Others
Relevance									
Accuracy									
Usefulness									
Reliability									
Timeliness									
Level of detail									
Confidence in the source									

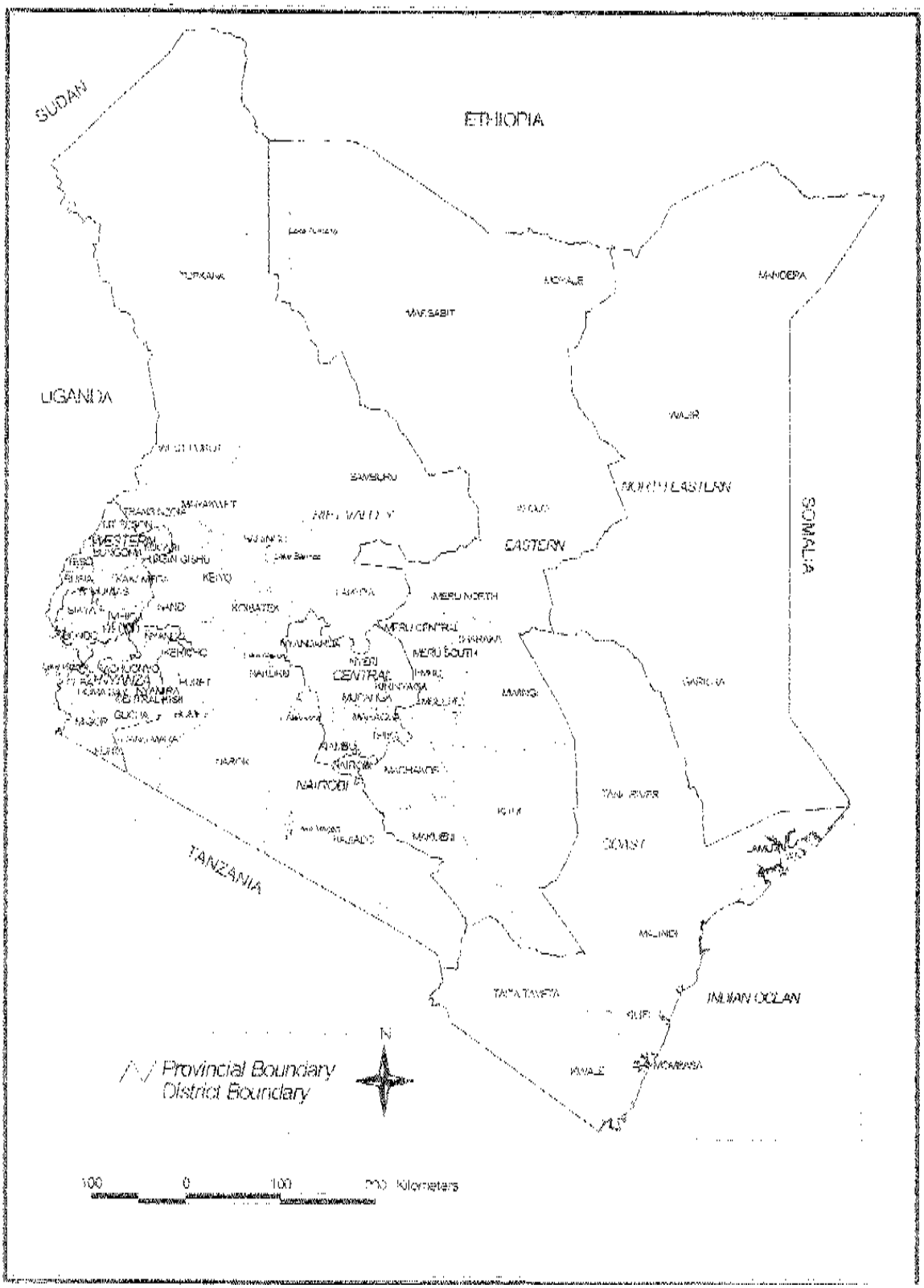
23. For each of the following characteristics shown below please rate your level of importance using the following scale:

Importance: 1=not at all, 2=slightly important, 3=moderately important, 4=very important, 5=extremely important

Level of importance									
	Traders, Brokers	Farmers	News-papers	Extension visits	Mobile phone	NCPB	Field days	Transporters	Others
Relevance									
Accuracy									
Usefulness									
Reliability									
Timeliness									
Level of detail									
Confidence in the source									

24. What challenges do you face in accessing and utilizing market information from a particular source?

Appendix 2. Location of Teso in Kenya



Appendix 3. Computation of Extent of information contact with the sources (FC_{ij})

	Never	Yearly	Monthly	Weekly	Daily
Scores	0.0	1.0	12.0	52.0	365.0
Traders	0.0	0.3	0.3	0.4	0.0
FC for Traders	0.0	0.3	3.6	19.2	8.0
Field days	0.1	0.7	0.2	0.0	0.0
FC for Field days	0.0	0.7	2.2	0.4	0.0
Transporters	0.7	0.2	0.1	0.1	0.5
FC for Transporters	0.0	0.2	1.0	2.8	177.8
Farmers	0.0	0.0	0.2	0.3	0.5
FC for Farmers	0.0	0.0	2.5	14.6	178.1
Extension visits	0.1	0.2	0.6	0.1	0.4
FC for Extension visits	0.0	0.2	7.8	5.7	147.5
KACE	0.0	0.0	1.0	0.0	0.0
FC for KACE	0.0	0.0	12.0	0.0	0.0
News-papers	0.6	0.1	0.0	0.2	0.0
FC for news papers	0.0	0.1	0.5	12.5	2.6
Mobile phones	0.4	0.1	0.1	0.1	0.0
FC for mobile phones	0.0	0.1	1.0	5.0	0.0
Radio	0.1	0.1	0.1	0.3	0.0

Appendix 4. Computation of Total Information Score

	FC	IU	IS	TIS
Traders	0.0	0.0	0.0	5.3
	0.3	0.1	0.0	
	3.6	0.2	0.6	
	19.2	0.2	4.2	
	8.0	0.1	0.5	
Farmers	0.0	0.0	0.0	28.9
	0.0	0.0	0.0	
	2.5	0.1	0.3	
	14.6	0.4	5.3	
	178.1	0.1	23.3	
News papers	0.0	0.0	0.0	1.6
	0.1	0.1	0.0	
	0.5	0.1	0.1	
	12.5	0.1	1.5	
	2.6	0.0	0.1	
Field days	0.0	0.0	0.0	0.4
	0.7	0.0	0.0	
	2.2	0.1	0.3	
	0.4	0.3	0.1	
	0.0	0.3	0.0	
Extension visits	0.0	0.0	0.0	21.5
	0.2	0.0	0.0	
	7.8	0.2	1.4	
	0.6	0.3	0.2	
	147.5	0.1	19.9	
Mobile phone	0.0	0.0	0.0	0.9
	0.1	0.1	0.0	
	1.0	0.2	0.2	
	5.0	0.2	0.8	
	0.0	0.0	0.0	
Transporters	0.0	0.0	0.0	7.3
	0.2	0.1	0.0	
	1.0	0.2	0.2	
	2.8	0.1	0.4	
	177.8	0.0	6.8	
KACE	0.0	0.0	0.0	6.0
	0.0	0.0	0.0	
	12.0	0.5	6.0	
	0.0	0.0	0.0	
	0.0	0.0	0.0	
Radio	0.0	0.0	0.0	3.3
	0.1	0.1	0.0	
	0.9	0.2	0.2	
	16.0	0.2	3.1	
	0.0	0.1	0.0	

Appendix 5. Computation of level of use of the sources of market information (IU_{ij})

	Not useful	Little useful	Somewhat useful	Useful	Very useful	IU
Scores	0.000	0.250	0.500	0.750	1.000	
Traders	0.060	0.241	0.346	0.293	0.060	
IU of traders	0.000	0.060	0.173	0.220	0.060	0.513
Field days	0.007	0.127	0.261	0.343	0.261	
IU of field days	0.000	0.032	0.131	0.257	0.261	0.681
Transporters	0.167	0.288	0.311	0.197	0.038	
IU of transporters	0.000	0.072	0.156	0.148	0.038	0.413
Farmers	0.015	0.139	0.234	0.482	0.131	
IU of farmers	0.000	0.035	0.117	0.362	0.131	0.644
Extension visits	0.015	0.083	0.353	0.414	0.135	
IU of extension visits	0.000	0.021	0.177	0.311	0.135	0.643
KACE	0.000	0.000	1.000	0.000	0.000	
IU of KACE	0.000	0.000	0.500	0.000	0.000	0.500
News-papers	0.237	0.304	0.274	0.156	0.030	
IU of news paper	0.000	0.076	0.137	0.117	0.030	0.360
Mobile phones	0.173	0.263	0.316	0.203	0.045	
IU of mobile phones	0.000	0.066	0.158	0.152	0.045	0.421
Radio	0.043	0.261	0.348	0.261	0.087	