THE EFFECTS OF MARKET INTELLIGENCE SYSTEMS ON SALES REVENUE AMONG FRENCH BEAN PRODUCERS: A CASE STUDY OF OL-DONYO SABUK, MACHAKOS COUNTY, KENYA

By

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DECLARATION

I hereby declare that the work contained in this thesis is my original work and has never been submitted for a degree in any other university.

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DEDICATION

This thesis is dedicated to my beloved husband Elijah Muthui and our son David Kyalo.

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ABBREVIATIONS AND ACRONYMS

ASDS	Agricultural Sector Development Strategy
B2B	Business to Business
CF	Contract Farming
COMESA	Common Market for Eastern and Southern Africa
EAC	East African Community
EU	European Union
GLOBALGAP	Global Good Agricultural Practice
FAO	Food and Agricultural Organization
FAOSTAT	Food and Agricultural Organization Statistical Database
FHFP	Fresh Horticultural and Floricultural Products
FPEAK	Fresh Produce Exporters Association of Kenya.
GDP	Gross Domestic Product.
GHG	Green House Gases
GIZ	German International Cooperation (*Gesellschaftfür Internationale Zusammenarbeit***)**
HCDA	Horticultural Crop Development Authority
ICIPE	International Centre for Insect Physiology and Ecology.
ICT	Information and communication Technologies
KHE	Kenya Horticultural Exporters
MIS	Marketing Intelligence System
MRLs	Maximum Residue Levels
NEMA	National Environment Management Authority
NGOs	Non-Governmental Organizations
OECD	Organization for Economic Co-operation and Development
PH	Hydrogen Potential
PVS	Private Voluntary Standards
SPS	Sanitary and Phyto Sanitary

SPSS	Statistical Package for Social Sciences
UNEP	United Nations Environment Programme
USDAU	United States Department of Agriculture
WTO	World Trade Organization

ABSTRACT

Businesses operate in a world in which information is more readily and publicly available than ever before. Thanks to the development of the Internet, information on market trends, legislation, customers, suppliers, competitors, distributors, product development and almost every other conceivable topic is available at the click of a mouse. Search engines, online libraries, company websites and other sources provide information in an increasingly plentiful, easy to find, and easy to digest way.

Small-scale farmers continue to sell their French beans to middlemen at throw away prices yet there are exporting companies that can buy their beans at high prices for profitability. This has been brought about by the possible missing information about the French beans marketing trends and the profitability of the crop, limited access to the necessary capital to make the switch possible, poor infrastructure necessary to bring the crops to export outlets, high risk of the export markets (for instance, from hold-up problems selling to exporters), limited human capital necessary to adopt successfully a new agricultural technology, for instance the Global Good Agricultural Practices (GlobalGAP) and Maximum Residue Levels (MRLs)requirements, and misperception by researchers and policy makers about the true profit opportunities and risk of crops grown for export markets.

This study was conducted to assess the impact of market intelligence systems on sales revenue of French bean farmers in Ol-Donyo Sabuk of Machakos County, Kenya. To achieve this overall objective, three specific objectives were addressed, namely; (1) to establish the existing French beans marketing channels in Ol-Donyo Sabuk, (2) to compare the sales revenues of French bean farmers with and without market intelligence systems, and (3) to compare return on capital for different actors within the French bean value chain. Systemic random sampling was used to select 120 farmers for this study. Data were collected through administering questionnaire for personal interviews. Data analysis was carried out using descriptive statistics such as percentages, and means to answer the stated objectives. In addition, statistical package for social sciences (SPSS) was used to analyse data. The study revealed that 30 percent of the 120 sampled French bean producers had access to French bean market intelligence systems, which is a small proportions of farmers compared to those who did not have access. The results revealed that 30 percent of the 120 sampled French bean producers were selling their produce as a group and had access to market intelligence systems 70 percent of the 120 sampled French bean producers not having access to market intelligence systems thus selling their produce to brokers. The results showed that group farmers selling their product to exporters had a higher return on capital as compared to individual farmers selling their produce to middlemen.

Based on the results of this study, it is recommended that the government and other key players in the horticulture industry enhance extension services to French bean producers by training them on market intelligence systems and stringent EU market requirements in order to improve on sales revenues from the crop and subsequent return on capital. Further the government establishes a French beans value addition plant that will cater for all farmers in French beans production and a high return on capital will go to Kenya economy but not to foreigners who own most of the value addition plants. This will too provide employment to many. The brokers should be removed from the production chain because they misuse farmers making profits where they did not invest and exporters would be advised to improve on their mode of produce payment and produce rejection handling.There is need to do away with hawkers and brokers within the value chain by having binding contracts and steady markets. Based on the findings, policy implications were drawn for improvingthe quality of French beans immensely by farmers through complying with GlobalGAP right from land preparation to harvesting and adhering to stipulated MRLs, proper postharvest handling of the produce with thorough grading and subsequent proper storage.

CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND INFORMATION

Agriculture, the mainstay of Kenya's economy, currently contributes 26 percent of the Gross Domestic Product (GDP) directly and another 25 percent indirectly (GOK, 2010). According to Agricultural Sector Development Strategy 2010-2020 the sector also accounts for 65 percent of Kenya's total exports and provides more than 18 percent of formal employment. One of the most important agricultural crops are the French beans (*Phaseolus vulgaris* L.), which are a major export vegetable and a source of revenue and income to the people of Kenya. Most of the crop is grown by the smallholder farmers, also called small-scale farmers, who virtually export the entire crop to Europe. Estimates indicate that up to 50,000 small-scale households are involved in French bean production in Kenya (Whittle *et al.,*1994) while approximately 100,000 people directly earn an income from French bean production and approximately 500,000 people derive income directly from the export of this crop (Sief *et al.,* 2001). For example, according to the Economic Survey of 2014, Ol-Donyo Sabuk is one of the largest exporters of French beans, and employs almost 90 percent of the area's youth. Middlemen buy French beans from farmers in Ol Donyo Sabuk at a cheap as low as Ksh20 per kilogram during off season and later resell the same produce at high prices

Despite the role French beans play in the local and national economies, more remains to be done in the context of enhancing its marketing intelligence systems. There are a wide variety of market intelligence systems or services in existence. The Organization for Economic Co-operation and Development (OECD) countries have traditionally emphasized the importance of information provision for the agricultural sector, a notable example being the service provided by the United States Department of Agriculture (USDA). Such systems are widely used in order to increase the transparency and the volume of information flow through the supply chains for different agricultural products (Richard *et al.,* 1955).

The ability of market intelligence systems to provide a valuable service has been strengthened with the development of the Internet and the advance of electronic commerce business models for instance; Business-to-Business (B2B) and consumer-to-consumer models. In addition, industrial structures, product complexity and the demanding nature of agricultural transactions are considered determining factors for the development of B2B electronic commerce in agriculture. With access to market intelligence by farmers, identification of potential markets would be more eased including pricing of different French bean products and selection of appropriate markets for the produce, taking note of the cost of production, infrastructure and socio-cultural aspects.

For many decades, horticultural production in Kenya has been dominated by small-scale farmers acting as out-growers to an exporting company (Grosh, 1994). While 40-60 percent of horticultural producers are small and medium scale farmers, between 60,000 farming families and up to two million Kenyans depend directly or indirectly on export vegetables for their livelihoods (ICIPE, 2004). The production of vegetables including French beans, sugar snaps, and mange tout leafy vegetables is through irrigation, with the French bean being a common produce to most of the farmers. Individual farmers have developed their own systems of irrigation especially for export crops. Large commercial farms account for 40 percent of irrigated land, small-scale farmers account for 42 percent and Government-managed schemes 18 percent (GOK, 2010).

It is estimated that intensified irrigation can increase agricultural productivity fourfold and, depending on the crops, income can be multiplied ten times according to the Agricultural Sector Development Strategy, 2010–2020. The main characteristics of horticultural produce are that it is destined for fresh consumption since it is highly perishable with relatively large surface area to high volume ratio. Most small-scale farmers in the country suffer from the high cost of farm inputs and later fail to get a reliable market for the produce. Much of the industry is dominated by middlemen, also known as brokers, who buy the produce at low prices and later sell at very high prices. This research aims to provide evidence-based information that would help small-scale

farmers get market linkages and prevent exploitation from the middlemen such as brokers, shylocks and other stakeholders along the value chain.

1.2. STATEMENT OF THE PROBLEM

Small-scale farmers producing French beans face difficulties in marketing their produce. They sell their produce individually at the farm gate to middlemen or brokers or on local markets for given prices. As a result, farmers are often reduced to price takers irrespective of the costs they have incurred in the production, marketing and transportation process. Further, farmers have been subjected to multiple taxes by local authorities and government departments as they transport their produce to the market, thus contributing to reduce net farm income and distortions in marketing structures without necessarily improving the services that local authorities should deliver. In 2003, Kenya was the world's largest exporter of French beans. Although export horticulture continues to grow and has become Kenya's leading foreign exchange earner, there are concerns that the benefits from this promising sector may overlook the small-scale producers who initially formed the bulk of producers in this sector. This has been brought about by EU stringent market requirement including compliance to GlobalGAP; the MRLs and safe use of the pesticides, the Good Agricultural practices.

A key challenge for many French bean producers has been the changes in the main export markets that have necessitated the enforcement of stringent food safety and quality measures, which in turn threatens the procurement of produce from small-scale farmers in developing countries. At present there are a lot of market intelligence systems on French beans on the Internet and with some stakeholders, such as exporters like Home grown and Frigoken, but farmers are not able to access the information. Only brokers and the exporting companies for farmer contracts can access the information and buy the French beans at low prices and resell at high prices. Most of the farmers are poor, and have immediate needs to provide food for their families. As a result, they sell their produce cheaply to brokers who can offer immediate cash to deal with their daily needs. Besides, these farmers grow small volumes of French beans, as little as 5kg; thus they are

motivated to source for market elsewhere due to high costs of transportation. These farmers need to form Self Help Groups for marketing of their produce.

1.3. RESEARCH RATIONALE

Why do farmers continue to sell their French beans to middlemen yet there are exporting companies that can buy their beans at high prices for profitability? The likely answer to this question lies with the possible missing information about the profitability of the French beans, limited access to the necessary capital to make the switch possible, poor infrastructure necessary to bring the crops to export outlets, high risk of the export markets (for instance, from hold-up problems selling to exporters), limited human capital necessary to adopt successfully a new agricultural technology, and misperception by researchers and policy makers about the true profit opportunities and risk of crops grown for export markets (Ashraf *et al.*, 2007).

French beans are a major vegetable export crop in Kenya. In 2005, exported volume was 32,700 metric tons, valued at KSh 5.5 billion (HCDA, 2005). Moreover, French beans are currently a major income earner for the rural population and are mainly grown by small- to medium-scale growers. French beans have a high nutritional value contributing essential nutrients such as ascorbic acid, Vitamin A, Vitamin B and Calcium, among others (HCDA, 2005). The key destination for this crop is the European Union markets (MoA, 2006). This crop has been ranked high by exporting markets now faced with stiff competition from other export crops. The crop is grown mainly under irrigation with the Mount Kenya region of Kenya leading, generating about half of the total output. Other varieties grown include Julia, Amy, Monel, Samantha, Paulista and Vernadon (MoA, 2006).

1.4. RESEARCH OBJECTIVES

The main objective of this study was to assess the impact of market intelligence systems on the sales revenues of French beans among farmers in Ol-Donyo Sabuk. To achieve this objective, the study addressed the following specific objectives:

1. To establish the existing French bean marketing channels in Ol-Donyo Sabuk.
2. To compare the sales revenues of French beans among farmers with and without Market Intelligence Systems in Ol-Donyo Sabuk.
3. To compare return on capital for different actors within French beans value chain in Ol-Donyo Sabuk.

1.5. RESEARCH QUESTIONS

This study answers the following research questions:

1. What marketing channels exist for French bean farmers in Ol-Donyo Sabuk?
2. Does sales revenue for French bean farmers vary between those with and without access to Market Intelligence Systems in Ol- Donyo Sabuk?
3. Does return on capital vary for different actors within French bean value chain analysis?

1.6 STUDY LIMITATIONS

This study focused on assessing the impact of Market Intelligence Systems on French bean sales revenues among French bean producers in Ol-Donyo Sabuk due to limitations associated with time, finances and infrastructure. Also, a sample of only 120 respondents was used due to lack of funds. Most of the data collected were based on the recall ability of the respondents who may not have given very accurate information due to being forgetful considering most of them had only basic education. However, the research recommendations should be applicable in other areas having similar ecological and socio-economic data.

1.7 ORGANIZATION OF THE THESIS

This thesis is organized into five chapters. Chapter One comprises the introduction that highlights the background, importance of French beans to the Kenyan economy, the statement of the problem, research rationale, objectives, research questions, and limitations of the study. The second chapter focuses on literature review and delves into past studies and available information relevant to this study. The third chapter is on

research methodology and includes a description of the study area, sampling techniques, methods of data collection and tools for data analysis. In the fourth chapter, the main findings of the study are discussed in details. Chapter Five wraps up the thesis with conclusions and recommendations to promote sustainable French beans production in Machakos County.

CHAPTER TWO

LITERATURE REVIEW

2.1 INTRODUCTION

This chapter presents literature on French beans production and marketing including Market Intelligence Systems both domestically and internationally. The chapter begins by describing the role of French beans in Kenya, French beans agronomic aspects, domestic and Market Intelligence Systems on French beans, domestic and the International markets. Finally, the chapter concludes by presenting identified gaps that need to be addressed to promote sustainable French bean production and marketing in Kenya.

2.2 HISTORY OF MARKET INTELLIGENCE ON FRENCH BEANS

Generally market intelligence is a facilitating marketing function and is essential to a smooth, efficiently operating marketing system. Accurate and timely market intelligence/information facilitates marketing decisions, regulates the competitive market process, and lubricates the marketing machinery (Moulton and Padberg, 1976**)**. One important function of market intelligence is to improve decision-making. Farmers use market intelligence when selecting enterprises, changing production plans, making decisions on long term investments, and deciding the when, where, and how of their marketing strategies. The role of market intelligence is also important in the competitive market processes which regulate prices in the food industry. Although not widely recognized, market intelligence also contributes to operational efficiency in the food industry. Without the widespread availability of market information, buyers and sellers would need to devote considerably more time and money to market search activities than they currently do. Efficient marketing depends on the availability of market information to all concerned with the marketing process (Moulton and Padberg, 1976**)**. Knowledge of supply and demand conditions of a commodity helps both sellers and buyers to determine the appropriate price. Such questions as where or when to buy or sell can only be answered if information on the market conditions and trends is available. Everyone involved in the marketing process must, therefore, be engaged in gathering, analyzing

and interpreting market information. Generally the marketing of agricultural commodities faces a number of problems including:

(i) Market demand shift and price fluctuation. There is a time lag between decisions to produce and actual availability of the product. For instance, French bean prices may be high today and a farmer decides to produce and by the time the crop is being harvested, the level of demand might have changed and prices gone down.

(ii) Farmer education level. Many people engaged in farming in Kenya have low levels of education, and thus ignorant of market intelligence. As a result, farmers are exploited by unscrupulous middlemen who have adequate capital and market intelligence systems; who buy the produce at low prices and sell it at very high prices.

(iii) Perishability. Many agricultural products are perishable and rapidly deteriorate in quality and have to be processed before storage; hence this process increases the cost of marketing.

(iii) Seasonality. Many agricultural products are abundant at harvest time and scarce in the period between one harvest and the next. Consequently prices fluctuate between cropping seasons. Crops like French beans have high demand in the EU market over winter but when summer sets in the crop losses demand.

(iv) Storage and specialized transportation. Storage facilities are costly and increase the cost of marketing; for instance, hiring or constructing cold rooms and silos is very expensive. Transportation of fresh produce with specialized cooling systems is also expensive and thus increases the cost of production.

(v) Bulkiness. Some agricultural products are too bulky for their value. For instance a 50 kg bag of cabbages may be worth Ksh 500 while a bag of fertilizer of the same weight may be worth Ksh1, 200.

French beans are the immature green pods of *Phaseolus vulgaris* L. grown mainly for export in Kenya and are an important vegetable export crop in the country. However, local consumption of French beans is growing gradually. Both large and small-scale farmers grow French beans. Because of high labour requirements, it is recommended that the crop is grown on a small-scale, possibly with staggered planting. It is grown both for fresh consumption and processing. Canning and freezing are the main processing done on

French beans. The peak export market demand is between October and May. French beans take 45 to 50 days to mature. A study conducted in Nkuene and Abogita areas of Meru County identified French bean production constraints in descending order as marketing (55 percent), transport (30 percent), diseases pests (10 percent) and other natural catastrophes (5 percent). The major diseases that were reported to affect French beans in a decreasing order of importance were rust (83.5 percent), fusarium wilt and nematodes (23.9 percent) and blights (25.4 percent). Farmers use Dithane-M45 (36 percent), Anvil (28 percent) and various other fungicides to control foliar diseases. Major insect pests were bean fly (79 percent), thrips (42 percent) and mites (39 percent). Farmers use Dimeathoate (66 percent) and Karate (38 percent) to control insect pests this is consistent to the international journal of integrated pest management in French beans production. Overuse of fungicides is common as some farmers (31 percent) use a spray regime of twice weekly for effective disease and pests control. They spend more than Ksh 3,000 per season on pesticides (Monda, *et al.,* 2003).

Further, rejections of produce due to damage by diseases and pests, and also due to variety preference by brokers, were critical constraints. Farmers are aware of harmful residues in beans due to chemicals used that contribute to a high rate of rejection but lack alternative disease management strategies. Farmers are aware of some bio-pesticides for management of insects but lack information on their effectiveness for safe plant disease management. French beans (*Phaseolus vulgaris* L.*)* are a major vegetable export crop in Kenya and a potential income earner to small-scale farmers. Smallholder farmers grow most of the crop and virtually all is exported to Europe.

The major French bean production areas in Kenya are Athi River, Kirinyaga, Meru and Naivasha with varieties such as Amy, Paulista, Samantha and Julia being the most commonly grown. A number of new varieties are still undergoing trials in the country. Picking of French beans begins nine (9) weeks after sowing and continues for about three (3) weeks when the weather is dry (Kariuki, 2003). French beans require an optimum temperature range of 16–25^{0}C and friable loam soil that is well drained with high levels of organic matter and a pH of 6.5-7.5 (HCDA, 2005). Higher fruit productivity is

achieved in cooler weather. Frost, dry winds, long rains and fog periods are harmful. Irrigation is vital to maintain continuous production (GOK 2010). The annual export from fresh vegetables fetches about 35–40 percent of foreign exchange in Kenya. However, there is a trend in decrease of French bean export figures. For example, in the year 2000, French beans export was 25,222 tonnes but in 2001 the amount decreased to 15,407 tones, a decrease of about 38.9 percent (HCDA, 2005). In order to improve production, it is important to identify production constraints and opportunities, which is part of the objective of this study.

According to Tegemeo Institute of Agricultural Policy and Development (2004), French beans and other vegetable products generally move quickly through the marketing system to combat spoilage. After harvest, fresh produce including French beans is handled and packed either by a shipper or grower for shipper. Fresh produce grown either by farmers or companies may be exported, or sold direct to consumers, retail stores, or foodservice establishments. Sales from grower-shippers to retailers and foodservice establishments might be mediated by whole sellers or brokers, or might occur directly. These marketing channels have undergone considerable change since the late 1980s. Prior to 1987, fresh fruits and vegetable markets were more fragmented; most transactions took place between produce grower to shippers and wholesalers on a day-to-day basis, based on fluctuating market prices and quality levels.

Today, a typical produce sale may take place between a multiproduct grower to shipper and a large supermarket retailer under a standing agreement or contract specifying various terms and conditions including marketing services provided by the grower-shipper, volume discounts, and other price adjustments and quality specifications. Changes in these marketing services coincided with the growth of value-added and consumer-branded products, increasing variety, consolidation of food wholesalers and retailers, the expansion of the food services actor, and the greater role of produce imports and year-round supply. French beans marketing channels in Kenya and EU can be illustrated as shown in Figure 1.

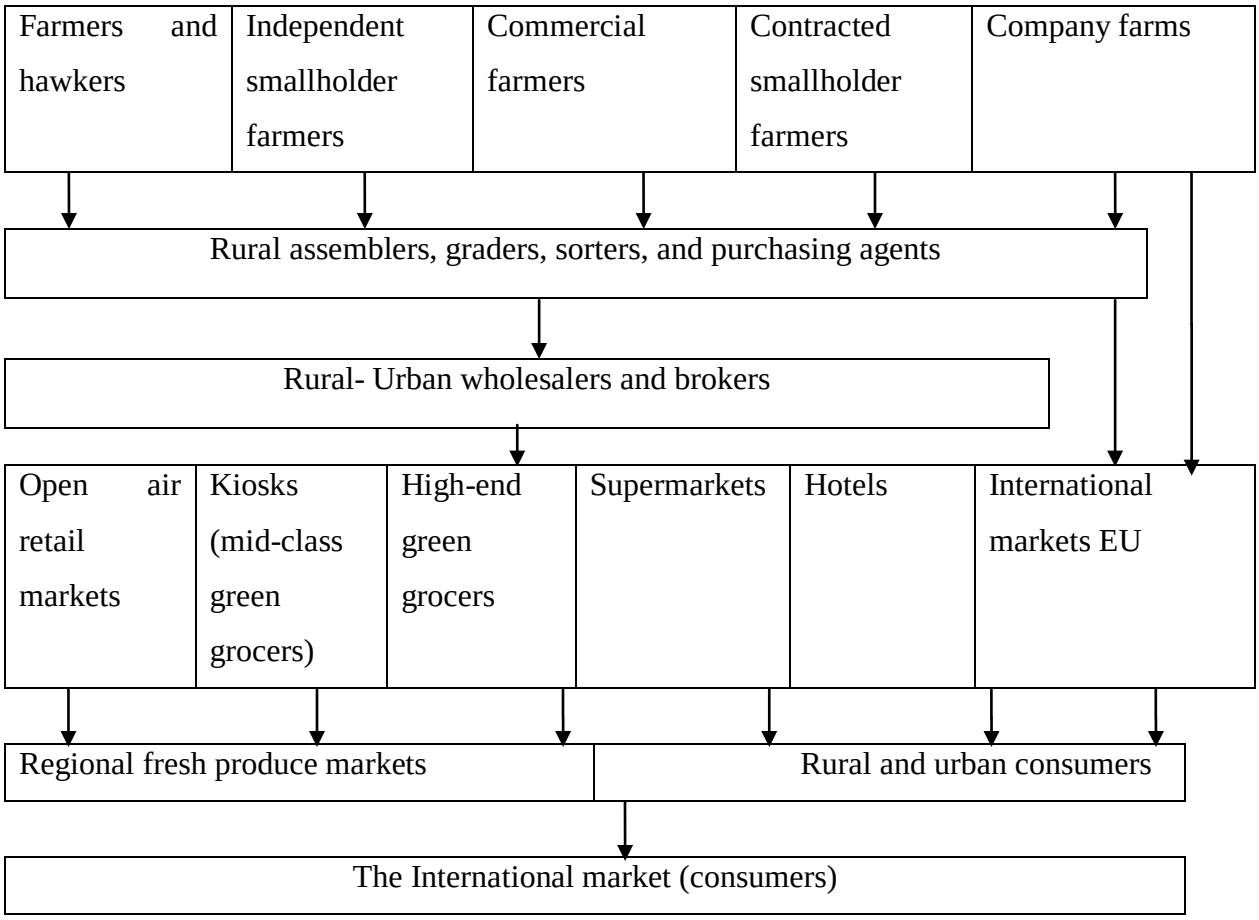

Figure 1: Marketing channels for French beans production in Kenya. (Dijkstra, 1997)

The production of French beans, one of Kenya's most important export vegetable crops, is steadily rising. As a result, processing of the beans including canning and freezing is also on the increase. French beans from Kenya are exported to the United Kingdom, France, Holland, Germany, United Arab Emirates and South Africa. Similarly, local consumption of French beans has also increased over the last five years, providing a ready market for the produce. The countries exporting French beans in Africa include Zimbabwe, Egypt, Zambia, Ghana, Morocco, and Senegal. There is a high demand for French beans in Europe throughout the year; this means that farmers can grow French beans year round and get market for the crop. In fact, it is the leading vegetable export from Kenya and has been ranked the finest globally (Sief *et al.*, 2001). Besides, the crop matures faster and is ready for harvesting in three months from the date of sowing (Okado, 2000). Therefore, the short maturity period allows farmers to recoup their investment within a short period. Moreover, the crop is harvested three times a week for

about three to four months. Every time farmers harvest the crop, it is bought in cash by various brokers and traders. This enables the farmers to have a consistent cash flow that allows them to meet their basic needs and wants such as food, housing, school fees and medical expenses.

According to FAOSTAT (2004) report, at present, an acre of land yields about four tonnes of French beans at a selling price of Kshs 60 per kilogram. Therefore, a farmer will earn approximately Kshs 240,000 by the end of the harvest period. After deducting all expenses, farmers make an average profit of Kshs 80,000 shillings per acre per season or in a three-month period of growing French beans (Kariuki, 2003). Some enterprising farmers lease several farms from neighbours or friends who live in towns and are unable to farm due to various engagements; thus such farmers earn hundreds of thousands from French beans. Also, timing of the market is imperative. A farmer needs to plant the crop when the best prices are expected and in times of shortages. Flooding the market with the crop is disastrous to farmers' due to low demand. Therefore, to insure against crop loss or failure in seasons of over-production, it is critical to grow a different variety of crops to diversify a farmer's sources of income.

2.3 THE GROWTH CYCLE OF FRENCH BEANS

During sowing, the most important thing to consider is the seed depth. Research has demonstrated that a depth of 3-5 cm for sandy soils and a depth of 2 cm for heavy soils are sufficient (Stanley *et al.*, 2011). French beans growth cycle from day one to the end of the crop cycle is shown in Table 1.

Table1: French Bean Growth Cycle

Period/timeline	Observation/activity
0-10 days	Seedling emergence
11-25 days	Vegetative phase
35th day	Commencement of flowering
50th day	Harvesting commences
55-80 days	Harvest period

***Source: Whittle *et al.* (1994).**

2.4 ROLE OF FRENCH BEAN FARMING

French beans constitute 40 percent of the vegetable exported from Kenya (Abdulrabi *et al.*, 2001). In the French beans export value chain, there are many actors, namely farmers who grow the crop, middle men and exporters who contract farmers, airlines and logistics companies who are involved in shipping of the product, the government as a regulator, and the supermarkets in Europe where the crop is retailed. Over 100,000 farmers in the country are involved in the cultivation of French beans while more than 200,000 people are either directly or indirectly employed in industries related to the crop's production and marketing (Abdulrabi *et al.*, 2001). At the national level, the French bean is a horticultural crop for foreign exchange with consistent crop production throughout the year.

According to FAOSTAT (2004)report, during short rains of intense stormy rains, sweeping out the crop coupled by the crop diseases and pests, total earning is estimated at Kshs 20,000-25,000 due to crop loss, which is in contrast with the normal gross margin for French beans of about Kshs 80,000 per harvest per hectare under normal circumstances. Given the labour intensive nature of French beans, small-scale farmers normally dedicate not more than half hectare to the French bean crop, which is harvested three times a year French bean crops in a year under rain fed conditions due to its short life span-45 days and have great potentials to produce more with irrigation. Thus, small-scale farmers on average earn Ksh 80, 000 a year on half hectare plot, roughly four times the returns from maize and dry beans combination (FAOSTAT, 2004). In both cropping systems, a farmer would normally reap extra benefits because horticulture provides an important source of cash income and maize satisfies much of the household's food needs.

2.5 KENYA'S SUCCESS IN FRENCH BEAN PRODUCTION

According to Sief *et al*., (2001), Kenya is successful in the production of the French beans because it has suitable environmental conditions, skilled human resource, better marketing strategy and fairly good infrastructure. With regards to the environment, the country lies astride the equator and has varying altitude ranging from 0 to 5,199 meters

above sea level; a factor that enables year round production of French beans. Most Kenyan farmers are young, and are aged below 40 years, majority who have completed secondary education and therefore can understand and comply with quality standards for export at the EU, a principal market for Kenyan French beans.

The country's geographical position is also suitable; one can fly to any African country from Nairobi, the capital city of Kenya, within four hours, including a country like South Africa, which is at the farthest end of the continent. This geographical advantage has made Nairobi to be an international airline hub thus increasing the availability of airfreight to EU countries, a paramount factor in export horticulture. Large exporters also enter into joint ventures with Airlines to assure availability of airfreight space in cargo cabins. The Horticultural Development Authority, the Private Sector and the Ministry of Agriculture have continuously marketed the country for many years as a hub of horticulture. Finally, preferential trade agreement with the European Union and other economic regional blocks has made Kenyan exports to gain access to such markets.

French beans production is concentrated around central Kenya, in areas such as Nyeri, Kirinyaga, Mwea and Meru, because of: (i) the numerous rivers in the region that provide water allowing year round production; (ii) many of the agricultural-input companies that operate within the region; therefore necessary equipment such as drip lines, irrigation pumps, fertilizers, pesticides and technical information are readily available to farmers; (iii) the region's proximity to Jomo Kenyatta International Airport making it faster for the produce to arrive in Europe within 48 hours after harvest - when in fresh condition (FPEAK, 1975); and (iv) the adaptability of the bean to wide geographical altitudes and a variety of soils; from light sands to heavy clays, although experts say it does better in well-drained loam soils rich in organic matter.

2.6 ECOLOGICAL REQUIREMENTS OF FRENCH BEANS

French beans require an altitude of between 0 to1, 800 meters above sea level and warm temperatures ranging from 12 to 34^0C. Temperatures below 12^0C encourage frost that is harmful to the crop while temperatures above 34^0C result in flower abortion. French

beans require rainfall distribution of between 600 and 1,500 mm annually, well drained soils; a waterlogged soil will increase risk of root and collar rot and seed asphyxia during seed germination. Moreover, French beans are very sensitive to salinity. Therefore it is recommended that fertilizer applications be applied in parts to avoid excess doses of salts (Abdulrabi *et al.*, 2001). Timing of the market is important; planting of French beans should be done when best prices are expected and in times of shortages. Flooding the market with the crop is disastrous to a farmer due to low demand and high supply. To insure against crop loss or failure in seasons of overproduction, it is critical to grow different types of crops to diversify the farmers' sources of income.

Before planting French beans on the farm, it is important to consider the preceding crops that were in the field. Some crops share the same diseases, for example, and planting French beans following crops with similar pests and diseases may result in a build-up of pests and diseases. Besides, there are possibilities that the previously sowed crops may have depleted the mineral resources in the soil thus making it necessary to supply additional nutrients to the soil. Table 2 indicates the crops to avoid, those that have no effect on the soil condition and those that are beneficial if they precede French beans.

Table2: Recommended French bean crop rotation trends

Harmful preceding crops	**No impact as preceding crop**	**Beneficial as preceding crop**
Peas	Groundnut	Cereals (Maize, Sorghum and
Eggplant	Potato	Millet)
Melon	Pepper	Fodder grass
Zucchini	Celery	Cabbage,
Lettuce	Lettuce	Kale, turnip
Okra	Carrot	Beetroot
Watermelon	Onion	Cassava
Cucumber	Garlic	Sweet potato
Beans	Shallot	Strawberry

Source: Partly adapted from Ashraf *et al.* (2009) and Sief *et al.* (2001)

2.7 FERTILIZER APPLICATION

French bean lacks biological nitrogen fixation because of poor or no nodulation. Hence, it needs liberal nitrogen fertilization (100-120 kg/ha) (Ashraf *et al*., 2009). The crop requires 60kg P2O5/ha and response to potassium and other micronutrients are rarely observed. Table 3 below gives an example of a general fertilizer regime that can be used to increase production of French beans. There is basal dressing with organic matter at 10-20 tons per hectare or with fertilizer application followed by irrigation. There is also first and second fertilizer application as per the rates given in Table 3. At flowering to harvesting foliar feed which is Potassium Nitrate is sprayed to the crop for best quality pods. Table 3 gives the recommended fertilizer application rates for French beans production.

Table3: Recommended Fertilizer Application Rates (per Hectare) for French Beans

Fertilizer application	**(Classic fertilizer application**)	**(Alternative fertilizer application)**	**Fertilizer application coupled with irrigation)**
Basal dressing	10-20 tons organic matter	10-20 tons organic matter	10-15 tons organic matter 100 kg K2SO4 100 kg 18-46-0 100 kg K2SO4
Application (1st hoeing)	200-400 kg at 10:10:20	200 kg K2SO4 150 kg DAP	100 kg 18-46-0 25 kg Urea 40 kg/week of 16-9-26 (soluble fertilizers) 20 kg/week of 0-52-32 (soluble fertilizers) 100 kg K2SO4
Application (2nd hoeing)	(150-300 kg)2 at10:10:20	150kg KNO3 50 kg DAP	25 kg Urea 40 kg/week of 16-9-26 (soluble fertilizers) 20 kg/week of 0-52-32 (soluble fertilizers)
Flowering to harvest	Foliar spray	Foliar spray	40 kg KNO3 (soluble fertilizers)
Inputs N:P:K	50-100/50-100 100-200	76/92/232	100/137/200
N/K2O balance	½	1/3	1/32

Source: Partly adapted from Ashraf *et al.* (2009) and Sief *et al.* (2001).

2.8 DISEASE MANAGEMENT IN FRENCH BEANS

The major disease of French beans is rust. It is caused by a fungus known as *uromyces appendiculatus*; which is effectively controlled by two fungicides, Dithane M45 or Anvil. To reduce the prevalence of this disease, farmers should avoid sprinkler irrigation; since such irrigation wets the leaves predisposing the crop to rust. Also, in cases where furrow irrigation is practiced, there is a high incidence of wilt and nematode attacks. The wilt is caused by a fungus known as *Fusarium oxysporum*. The most appropriate method for irrigating French beans is through drip irrigation; which allows direct application of water to the root zone, a regular water supply is essential for French beans as moisture affects yields, uniformity and quality. Water stress during flowering reduces yields, as does water logging. Irrigation in dry spells is recommended as 35 mm per week at planting and 10 days post emergence, followed by 50 mm per week thereafter until end of production (Nderitu *et al*., 1993).

2.9 FREQUENCY OF HARVESTING THE FRENCH BEAN

The date of seedling emergence depends on the variety of the French beans, the soil condition, and the altitude that determine the commencement of harvesting. It is expected that emergence will occur within 4-10 days. Flowering will commence after 28-35 days. Farmers harvest French beans thrice a week; Monday, Wednesday and Friday. On these days, they engage casual labourers to help them pick the crops. On the days of harvest, buyers come and before the end of the day the produce is already packaged in a cold room in Nairobi awaiting export to Europe. Harvesting lasts for 3-5 weeks and by the end of the harvest season, the farmer would have harvested 4-5 tonnes for every hectare planted.

2.10 OPPORTUNITIES AND CHALLENGES OF CONTRACT FARMING

This is an arrangement by an exporting company like Home-grown/Fin rays or KHE where the exporter has field support staff to mobilize and recruit farmers into Self - Help Groups for collective selling of the produce so that the exporter can have the required product or volume. This enables these companies to meet their daily volumes targets while the farmer gets technical support from the company's field technical staff. The

technical officers train farmers on proper management of the crop, best agricultural practices post-harvest handling and market requirements. This means those farmers who have a contract with the exporter benefit and attain skills in French beans marketing intelligence. Contract farming is practiced in different models and has been defined in various ways. Key and Runsten, (1999) define contract marketing as an intermediate institutional arrangement that allows firms to participate in and exert control over the production process without owning or operating the farms. According to Baumann (2000), it refers to a system where a central processing or exporting unit a 'system where a central processing or exporting unit purchases the harvests of independent farmers and the terms of purchase are arranged in advance through contracts'. Similarly Eaton *et al.* (2001) define contract farming as an agreement between farmers and processing and/or marketing firms for the production and supply of agricultural products under forward agreements, frequently at predetermined prices.

The arrangement often involves the purchaser in providing a degree of production support through, for example, the supply of inputs and the provision of technical advice. For this arrangement to work the farmer commits himself to provide a specific commodity in quantities and at quality standards determined by the purchaser. The company on the other hand agrees to support the farmers' production and to purchase the farmers' commodity. Therefore, contract farming can be regarded as a partnership between agribusiness companies and farmers. The intensity and formality of the contractual arrangement varies with depth and complexity of its organization. On the one hand, buyers and producers may cooperate irregularly based only on verbal agreements with no further assistance concerning input supply and extension services. A more formalized system specifies the transactions and responsibilities of both parties in a contract document. The farmer normally provides land, labour and tools while the buyer often supplies inputs on credit, extension services on grading, marketing and transportation of the produce (Ndegwa *et al.*, 2006)

In addition to these, the contract also mentions the quantity and quality requirements for the cultivated crop, prices, technology application (Ochieng, 2005). Out grower or

contract farming schemes can be seen as a special form of contract farming, which in the past was often introduced by governments (Ochieng, 2005). At present, private enterprises run schemes in order to more closely control and monitor the farm operations. In contrast to contracted groups, grading centres for horticultural produce are managed and sometimes even financed by company staff. Professional graders provide daily support to farmers during the grading procedure. The company strictly regulates the input supply and through its presence on the ground provides extension services more often enabling them to reach out to thousands of out growers.

Small-scale farmers often face difficulties in French beans production and marketing of the produce. They usually sell their produce individually at the farm gate to brokers or to local markets. This reduces farmers to price takers irrespective of the costs they incur in the production and marketing process. Furthermore, they often bear the high risk of not being able to market their produce. On the other hand, processors often are not able to procure the quantity and quality of the product they are looking for.

Contract farming (CF) provides an opportunity to improve such a situation. It is one form of vertical co-operation along value chains where a farmer or producer organization co-operates with a partner along market value chain (wholesaler or agro-processor) by stipulating regulations and mutual liabilities within a contract on the production, supply and acceptance of the product. CF as a tool has existed for many years as a means of commercially organizing agricultural production of both large-scale and small-scale farmers. In countries that previously followed a central planning policy, and in those countries that have liberalized marketing through the closing down of marketing boards such as Kenya, interest in CF is rising (Ndegwa *et al.,* 2006).

In Kenya, several development agencies, including German International Cooperation (*Gesellschaftfür Internationale Zusammenarbeit***)** GmbH (GIZ), provide support to agribusiness services as one major area of support. In promoting the development of the private sector in agriculture, the value chain approach represents one conceptual framework as a starting point. The support of contract farming, or the creation of farm-

agribusiness linkages, in turn is one specific tool to promote certain value chains. Changes in consumption habits, such as the increasing number of fast-food restaurants, the growing importance of supermarkets in many countries, and the continued expansion of world trade in fresh and processed products, have also provided the impetus for further development of this mode of production (Eaton *et al.,* 2001). This is because well-managed contractual agreements can help reduce transaction costs as well as risks on both sides. In addition, the fulfilment of standards increasingly required by international buyers can be more easily controlled in contract farming arrangements. Thus, traceability of the food chain is one important incentive to enter into contract farming ventures. The ultimate objective is to achieve a sustainable long-term collaboration between producer organization and the marketing partner, resulting in a win-win situation for both sides based on mutual trust.

Contracting farming is faced by several setbacks namely: (i) in times of product scarcity, prices offered in the open market are often higher than guaranteed by the contract thus tempting farmers to outsell their produce and breach the agreement; (ii) inefficient management and marketing problems might lead to the company not purchasing all the contracted produce; (iii) field staff of contracting companies are quite often corrupt thus favour specific farmers or groups when it comes to purchasing the product; and (iv) companies often force farmers to buy inputs from them to ensure the quality they need. However, the companies may sometimes increase the input prices higher than the local input stockist and lastly companies, which are operating in a niche, might exploit their monopoly situation.

On the same note, buyers who have contract farming experience also face various challenges. These are: (i) farmers fail to value a contract adequately but sell their produce out to brokers who offer them a better price; and (ii) most small-scale farmers in Kenya are organized in Self Help Groups, which do not have the status of a legal entity, therefore cannot be sued in court. In some regions in Kenya, farmers seem to lack the right attitude to grow crops commercially for the market. Since they do not have enough commitment, the crop performs poorly and thus they incur losses. Farmers sometimes do

not understand the necessity to stick to the planting programme of the company and quite often fail to plant on time. This brings the company into trouble in fulfilling their obligations to their customers.

2.11 MARKET INTELLIGENCE SYSTEMS HIGHLIGHTS

Market Intelligence is the information relevant to a company's markets gathered and analyzed specifically for the purpose of accurate and confident decision-making in determining market opportunity, market penetration strategy, and market development metrics.Market information systems (also known as market intelligence systems or market information services(MIS) refers to the information systems used in gathering, analyzing and dissemination of information about prices and other information relevant to farmers, animal rearers, traders, processors and other actors involved in handling agricultural product value chain (Dijkstra, (1997). Marketing intelligence can be represented in a triangular manner (Marketing Wikipedia the Free Encyclopaedia, 2009) showing the product intelligence, competitor intelligence, market understanding and the customer insight, as illustrated in Figure 2.

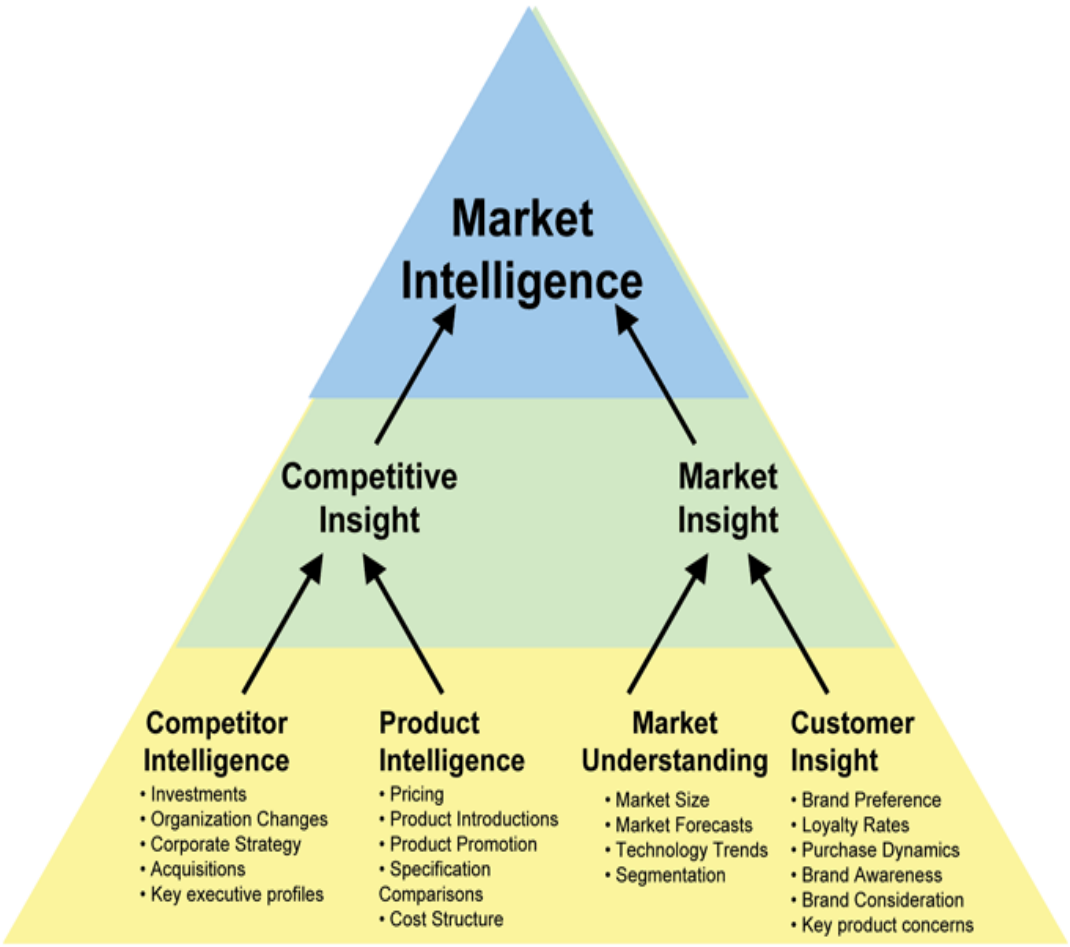

Figure 1: Triangular representation of market intelligence.

Market intelligence system yields an ongoing and comprehensive understanding of the market. Market intelligence system is comprised of four knowledge areas namely; competitor intelligence, product intelligence, market understanding and customer insight. All these four interacts to form a complete understanding of the market, thus forms market intelligence systems (Crowley, 2009). Market intelligence systems play an important role in agro-industrialization and food supply chains. With the advancement of Information and Communication Technologies (ICT) in developing countries, the income generation opportunities offered by market intelligence systems have been sought by

international development organizations, Non-Governmental Organizations (NGOs) and private businesses (Jaffee, 1995).

2.12 DOMESTIC MARKET

Domestic trade in horticultural produce is an important source of livelihood for players in the horticulture value chain. Export horticultural sub-sector has continued to experience significant growth since the 1990s to become Kenya's leading export earner in 2007, ahead of tea and coffee. In 2008, export earnings from this sector grew to Sh. 73.7 billion up from Sh. 57.3 billion in 2007 (WHO, 1990). ASDS 2010–2020 emphasizes three main export horticultural products namely fruits, vegetables and cut flowers. Small-scale farmers have played a more important role in the production of export vegetables. The largest vegetable exports by volume are French beans, which is also referred to as Green beans or Kenya beans, the latter giving an indication of Kenya's dominance in the export markets of the United Kingdom, France and Germany (Okado, 2000). In 2003, Kenya was the world's largest exporter of French Beans (Okello *et al.,* 2007). French beans production and export by small-scale farmers was the focus of this study.

Although export horticulture continues to grow becoming Kenya's leading foreign exchange earner, there are concerns that the benefits from this lucrative sector may bypass small-scale producers who initially formed the bulk of producers in this sector. A key challenge for many small-scale farmers has been the changes that have occurred in the main export markets that have necessitated the enforcement of stringent food safety and quality measures, which threatens the procurement of produce from small-scale in developing countries (Dolan *et al.,* 2001; Vermeulan *et al.,* 2008).These requirements have been shown to threaten the participation of small-scale producers in developing countries largely due to the huge financial investment requirement (Dolan *et al.,* 2001; Graffham *et al.,* 2007; Jaffee, 2004). The major destination for Kenya's French beans is the European Union with the United Kingdom (UK) accounting for 53 percent, French markets 40 percent and the Netherlands having the least (7 percent) of the market. Collectively the European market introduced a food quality and safety standard referred to as the Euro Retailer Produce Working Group and Good Agricultural Practice

(GlobalGAP) protocol for fresh fruits and vegetables in September 2003 which became into force in January 2004 (Okello *et al.,* 2007).

GlobalGAP protocol consists of control points that cover aspects of agricultural production from seed to delivery of product at farm-gate. It also includes environmental and social aspects. Kenyan French beans exporters therefore have to seek certification under this protocol in order to continue sending their produce to these markets. Because of the high costs involved, getting many small-scale farmers certified as well as monitoring their compliance to the standards is a nightmare; thus many exporters prefer to work with larger-scale farmers who can meet certification costs easily or they may prefer to move into direct production. This in turn threatens to lock out small-scale farmers from horticultural export (Dolan *et al.,* 2001). An important aspect of export horticulture development in Kenya has been the fact that it has developed largely within the private sector.

The government has largely played a regulatory role through the Horticultural Crops Development Authority (HCDA). Given the weaknesses in government operations, direct government involvement and subsequently state run marketing boards, the export of horticultural products has evolved through various marketing institutional arrangements. An institutional arrangement, also known as governance structure, is a term used within the New Institutional Economics (NIE) to describe a structure within which members of a society individually or collectively cooperate (Doward *et al.,* 1998). It further defines institutional arrangements as an arrangement between economic units that govern the way in which these units can cooperate and/or compete.

These economic units, for instance, farmers and exporters opt for arrangements that help to reduce transaction costs that they face. Transaction costs are defined as the costs incurred in the process of exchanging goods and services. Also it includes the costs of identifying and screening different trading opportunities, outlets and partners, the cost of negotiating trading agreements, the cost of transferring the goods, services and ownership rights as well as the costs of monitoring the trade conditions to ensure compliance and

enforcement as per the agreement (Jaffee, 1995). Buyers and sellers in Kenya seek to form and participate in institutional arrangements that minimize these transaction costs while maximizing revenue.

The bulk of the produce for domestic markets comprises vegetables and fruits. Flower trade is still limited and largely targets the export market. The major actors involved in trade are producers, traders, middlemen, transporters and local authorities. The margins between farm gate prices and consumer prices are wide and indicative of suppressed profitability for the producer. Many markets have inadequate physical facilities and do not therefore provide facilities like storage and cold rooms, weighing equipment, loading/offloading and social amenities.

Domestic market information is asymmetry between market players; thus distorts market prices, squeezes producer margins, skews trade benefits toward middlemen and traders, and blocks entry of new market players and increases the gap between the producer and market price; that is, the farmer does not get market information and middlemen benefits rather than the farmer. There is also failure to honour contractual obligations between buyers and producers; buyers keep on changing contract terms thus leaving farmers frustrated. Poor coordinated development and management of markets and marketing activities by relevant government ministries and local authorities has led to poor market infrastructure, which compromises produce quality and hygiene, leading to greater post-harvest losses. There is also prevalence of produce of substandard hygiene and quality arising from weak enforcement of standards, and poor consumer awareness. The inappropriate packaging and post-harvest handling of horticultural produce also stands to be a challenge. Defective produce due to crop pests and diseases coupled with poor post harvest handling has posed a greater change in the domestic market. Plates 1 and 2 indicate produce rejection by Kenya Horticulture Exporters (KHE) because of poor quality due to defects.

Plate 1 and 2: French bean pods rejected by Kenya Horticulture Exporters (KHE)

2.13 REGIONAL AND INTERNATIONAL MARKET

World trade of fruits and vegetables was estimated at around US$60 billion in 2002 (Njagi, 1995). The EU market is one of the world's largest markets for Fresh Horticultural and Floricultural Products (FHFP). This market has been growing steadily in quantity and quality for the past two decades. Although imports are only a relatively small portion of this market, they represent a significant trade opportunity for a number of developing countries, and more especially for African countries. Vegetable imports account for 2 percent or 1 million tons of the 50 million ton market, and fruit imports account for 24 percent or 7.5 million tons of the 31.5 million ton market (Harrison *et al.*, 1987). Among the continent's producers, sub-Saharan countries still represent a small share of the imports (except in the fruit sector with major exporters like South Africa and *Côte d'Ivoire*).

The EU remains Kenya's principal market in horticultural export produce; with the UK, Netherlands and France being the main markets. Other important markets in the EU are Germany, Switzerland, Belgium and Sweden. The Middle East and South Africa are also vital markets outside the EU. Currently, the UK is the principal market, taking a 34 percent share of total exports, followed by the Netherlands with 31 percent and France with 15 percent, while Germany takes 5percent (Dolan *et al.*, 2001).

The statistics of regional trade in the horticulture subsector are scanty but there are indications that Kenya could be a net importer of some horticultural produce from the region. The major imports include pineapples, apples, onions, oranges, bananas and tomatoes (Jaffee, 2004). The flow of produce to Kenya is encouraged by the strong Kenyan shilling and relatively high cost of domestic production. Kenya is a major exporter of horticultural produce mainly to the EU. Other destinations include USA, Middle East, Japan, Russia, and South Africa. Competition in these markets are stiff due to a large number of suppliers such as Colombia, Ecuador, Ethiopia, Spain, Morocco, Israel, Egypt, India, and China. In 2009, Kenya exported 350,474,113 kg of horticulture produce valued at Kshs 71.6 billion (Swernberg, 1995). Exports comprise mainly freshly cut flowers and fruits. There are fragmented efforts in marketing Kenya's horticulture by stakeholders that should be coordinated. Imports include citrus, apples, pears, grapes.

These imports have a major impact on the local market and adversely affect local production. With the opening up of the local market to horticultural imports, more so from Common Market for Eastern and Southern Africa (COMESA) and East African Community (EAC) member countries; there is a risk of spread of diseases and pests that can be detrimental to local horticultural production. Kenya is a signatory and has been implementing a number of international protocols. In the recent past, there has been increasing shift of horticultural investment to other competing countries and an increase in the number of non-tariff barriers to trade. Between 2007 and 2009, horticultural exports have declined and imports of horticultural produce from the region have increased (Agricultural Sector Development Strategy 2010-2020).

There is the problem of inadequate use of information to facilitate trade and investment decisions in domestic, regional and EU markets coupled with high cost of domestic production. The risk of introduction and spread of diseases and pests from one country to another and over-reliance on a narrow product range have remained a challenge to small-scale horticulturalists. Horticulture is very important to the Kenyan economy because it is the second largest foreign exchange earner after tourism; it generates about 300 million US dollars per annum (PKF Consulting Ltd and International Research Network, 2005).

Over two million people of the Kenyan population are directly or indirectly employed by the horticulture industry. Small-scale farming remains the largest employment opportunity in Kenya and is central to the empowerment of women, who form the bulk of the workforce, estimated at 82 percent (WHO, 2003).

The income generated through sales of horticultural crops pays for food, education and medicine. Horticulture is the fastest growing sector in agriculture industry in terms of value, investment and volumes. Its growth is rated at 10 percent annually (Gehrig *et al.,* 2009). This growth can be reflected in the exports of 1999 and 2003. The horticultural exports in these years were 200.6 and 346.1 thousand tons respectively (PKF Consulting Ltd and International Research Network, 2005). Horticulture is the best engine for poverty alleviation and rural development (Fresh Produce Exporters Association of Kenya (FPEAK, 1975).

A shift in thinking is perhaps fundamental. Firstly, rather than looking for income generating projects for the population of small-scale farmers, perhaps market opportunities is critical and farmers ask how to exploit it given the rural resources available. It is important to recognize that farmers at the bottom quartile who are virtually landless and have access to less than 0.1ha per head may not participate commercially in a value chain as self-employed growers. Their needs are far more immediate and these are issues of development, food security and poverty alleviation rather than commerce; but the improvement of rural income, the income in the locality, should impact on small-scale farmers' livelihood.

The emerging and current challenges in the horticultural export to Europe, particularly the requirements of international regulations and the need for very large and regular consignments of produce in EU markets have favoured export horticulture in the hands of the larger and highly capitalized producers. These problems include: need for traceability which has accelerated the trend to concentrate export horticulture in the hands of highly capitalized producers. It is essential for EU importers to receive supplies from known

sources and to be able to check agricultural practices and handling standards on the farms. This favours large commercial farms than small-scale farmers.

There is also the issue of fair trade ethics; supermarkets in the UK and other EU markets, being increasingly concerned with ethical trading issues, are supportive of utilizing small-scale farmers provided that they can meet import standards. Customer concerns over the apparent exploitation of African producers are assisting small-scale farmers to be incorporated fairly into international trade (Kotler *et al*., 2009). Consumers also express their concern about the ethical behaviour of exporting companies by means of ethical buying and consumer behaviour. The ethical consumers of horticultural produce in the EU feel responsible towards sub-Saharan societies and express these feelings by means of their purchasing behaviour towards ethical issues such as human rights, labour conditions, environment, fair-trade, products free from child labour, organic foods, and promoting development of poor African nations (Dolan *et al.,* 2001).

The problem of proliferation of private standards and supermarket power in EU countries is that there is rapid multi-nationalization and consolidation of the supermarket sector; with own private standards over the EU legislated standards, with profound changes in procurement systems affecting the small-scale farmers in sub-Saharan countries. Every supermarket has its own standards over the EU legislation, which directly determines the quality, quantity and specific health and safety requirement for the EU consumers. These supermarkets provide trade opportunities for horticultural exporters. However, the standards increase the overhead costs to the smallholders thus constraining their performance in the horticultural export industry and future expansion of export business.

Climatic change, food miles, carbon ‘foot print’ and life-cycle have posed a big challenge in the horticultural production; there is a growing concern in the EU about the sustainability of agricultural and food systems and their interactions with environment and human health. Evidence is mounting that ‘farm’ to ‘plate’ transport costs, or the food miles could be substantial. Food that has travelled long distances is perceived to be harmful to the environment and has attracted media attention in some of the EU markets

for horticultural produce. UK studies indicate that total agricultural, environmental and health costs were £1514 million for the year 2000 (Berdegué *et al.,* 2003) of which £2.2 million (0.1 percent) were contributed by UK imports of fruits and vegetables, which was a relatively small percentage. It has been found out that sub-Saharan countries use lower energy and lower emission per tonne of horticultural produce exported to EU compared to that produced within the EU. However, the food mile policy will continue affecting horticultural exports to the EU markets. Greenhouse gases and subsequent carbon sequestration have contributed greatly to climate change.

There is increasing quantities of greenhouse gases (GHG) in the earth's atmosphere, which have led to modification of the climate. Horticultural production contributes to this build-up of GHG and global warming (Jaffee, 2004). The emission of GHG is associated with long distance food production and distribution. In the life-cycle supply chain GHG emission is dominated by the production phase which contributes 83 percent of the average UK household's 8.1 tonnes carbon dioxide emission per year 'foot print' for food consumption. Transportation represents only 11 percent of the life-cycle emission and delivery from the producer to retail four percent only. Therefore 'buying local' policy of EU consumers will not lower the average household's food related climate carbon 'foot print'.

EU market has recognized that a shift to vegetable from meat diets achieves more GHG reduction than buying only locally sourced food. This is an opportunity that African horticultural exporters can exploit. Healthy eating: '5-a-day' advice to UK consumers (Berdegué *et al.,* 2003) , the UK government's nutrition advisers have encouraged UK consumers to eat more vegetables and fruits for a healthy diet to manage the emerging medical conditions that have resulted from poor eating habits (WHO, 1990). This piece of advice stems from fruit and vegetable consumption contained in the World Health Organization report on Diet, Nutrition and the Prevention of Chronic Diseases. In order to meet these needs and demand, the UK market provides an opportunity for horticultural exporters from African countries to satisfy the needs of these consumers.

The World Trade Organization (WTO) agreement on Sanitary and Phyto-Sanitary (SPS) measures has also some influence on the export market. The SPS measures aim to protect the lives and health of consumers of horticultural produce among WTO members. The SPS does not discriminate between WTO members. The European legislation represents the minimum requirements for market access that can constitute obstacles to trade between EU and African horticultural exporters. The 'Private Voluntary Standards' (PVS) has extended the level of control by EU retailers back along their supply chain to horticultural producers and exporters. Suppliers rather than retailers meet the cost of compliance with PVS, which are per certification and individual farm units, regardless of the size. African smallholders face difficulties in meeting these costs and fees because the standards were originally developed for large farms in Europe (WHO, 1990).

2.14 IDENTIFIED GAPS

Many scholars have conducted studies on various aspects of French beans production, value chain and marketing locally and globally (Jaffee, 1994) with most of their studies being focused on production, crop protection, postharvest handling and canning/processing (Sief *et al.,* 2001). Their research found out that French beans from Kenya are the finest and of the best quality, a leading vegetable in the export market. The crop is of high demand in Europe throughout the year. This means that farmers can grow French beans year round and get a ready market thereby contributing positively to the country's gross domestic product. However, market requirements and whether farmers are conversant with the stringent market requirements and how their produce can reach Europe to many French beans producers are not well known. Most of the French beans producers do not have access to the market and market intelligence systems for them to be able to sell their produce on the EU and the world market. Therefore there is need to train farmers on French beans market intelligence systems, marketing channels, stringent market requirements and generally the crop marketing intelligence which will help farmers to seek the best market for their produce for profit maximization.

Dolan *et al.* (2001) and Vermeulan *et al.* (2008) found that a key challenge for many small-scale farmers has been the changes that have occurred in the main export markets

that have necessitated the enforcement of stringent food safety and quality measures which in turn threaten the procurement of produce from small farmers in developing countries. Their focus was on the challenges but not how to deal with the problem through training farmers on the impact of market intelligence systems on French sales revenue, which is key to profit maximization and subsequent contribution to the gross domestic product of this country.

All the previous studies have contributed to the production of quality French beans and French bean market intelligence systems and their link with French beans sales revenue. Nevertheless, the impact of market intelligence systems on French bean sales revenue has not been exploited. As a result, the current study provides a holistic approach to the understanding of the French beans market intelligence systems for export market as a pre-requisite for the sustainable production of French beans, and subsequent contribution to the country's GDP.

CHAPTER THREE

METHODOLOGY

3.1 INTRODUCTION

This chapter outlines the methods and tools used to achieve the study objectives. It presents the types and sources of data, and the analytical methods that were used. The first section of methodology briefly describes the study area, sample sizes used, descriptive data analysis and the subsequent section gives the analysis of return on capital of different actors involved in French bean value chain analysis.

The study was conducted in Ol-Donyo Sabuk Machakos County, Kenya. The study area was purposely selected because most of the inhabitants are small-scale farmers who are agribusiness oriented, producing French beans. A total of 120 farmers were randomly selected through systematic sampling technique. The respondents were selling their produce either as a group to an exporting company or selling individually to brokers. Farmers selling French beans produce as a group and with access to marketing intelligence systems and other farmers selling their French beans individually to brokers have been studied and their sales revenues analyzed. The selection of Ol-Donyo Sabuk as a study area was necessitated by certain underlying factors, Ol-Donyo Sabuk is accessible and near; and is cost effective to collect data around the area due to limited resources.

3.2 DESCRIPTION OF THE STUDY AREA

3.2.1 Geographical Location

Ol-Donyo Sabuk is in the border of Machakos County and Thika East District. The Athi River passes through the area and it is actually the border between Machakos and Thika East and small-scale farmers use this water to irrigate their crops for the export horticulture market and for local consumption. Ol-Donyo Sabuk lies on the leeward side of Chazabe hills, which provides for the cool weather and two rainy seasons around the year (Machakos District Environment Action Plan 2009-2013). Farmers here rely on export produce for their household incomes and livelihoods.

Ol-Donyo Sabuk is 20.7 km^2 in size and is located in Machakos District; Eastern Province. Ol-Donyo Sabuk area of Machakos County was selected as a representative study area to assess the impact of market intelligence systems on French bean sales revenues among French beans producers in Kenya. Although the region contributes substantially to small-scale French bean production at national level, no detailed studies were done previously (Machakos District Environment Action Plan 2009-2013). Out of a population of three hundred farmers in the production of the French beans in the region, a socio-economic survey of French bean production and subsequent marketing of the produce was conducted on 120 farmers.

According to the UNEP (2010), Ol-Donyo Sabuk area occurs at the border of Kenya's Central/Eastern province in Ol-Donyo Sabuk Township. Thika town is the nearest town, about 20 kilometres from the Ol-Donyo Sabuk Township. The Ol-Donyo Sabuk Township is a natural ecosystem with a national park surrounded by marginal small-scale dry land farmlands and irrigated crops along the Athi River. Ol-Donyo Sabuk National Park is owned by the Kenyan government; this was formerly the sisal estate and cattle ranch of Lord Delamere that has been partly protected, and partly sub-divided into small-scale farms. Many of the former farm workers on the large estate have settled in the region, making the area highly diverse in terms of ethnicity.

Land rights have not been well established in the study area, even for families farming land for over twenty years. A mixed cropping system prevails in the Kilimambogo area. Maize, with legumes (green beans and other legumes such as pigeon pea) are the most common food crops, along with fruit crops of mangoes, papaya, and avocado, and some coffee plantations. Pigeon peas are an important crop for domestic consumption, and for food security in the region. Green beans, grown for the domestic market and export, figure increasingly greater in Kenya's economy.

The Latitude and Longitude of Ol-Donyo Sabuk is-1.3, 36.9 respectively.-1.3 Latitude and 36.9 (GOK, 2001). Athi River runs along Ol-Donyo Sabuk and small-scale farmers

make use of its waters for irrigation (UNEP, 2010). The study area is diagrammatically represented below.

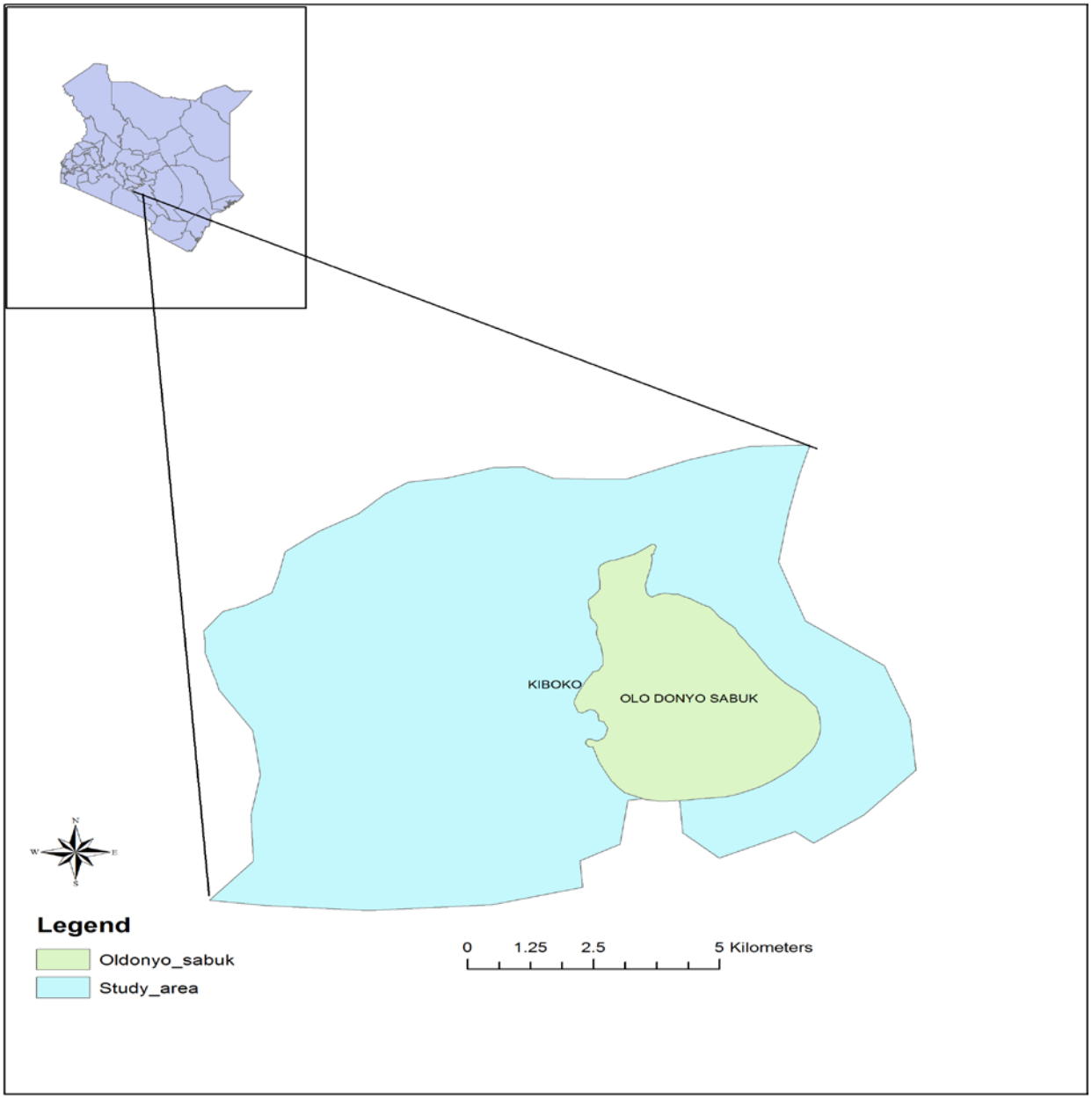

Figure 2: Study area (Ol-Donyo Sabuk French bean producers along the River Athi)

3.2.2 Climate of Ol-Donyo Sabuk, Machakos County

Generally the climate of Machakos County can be classified as hot and dry for most of the year and can be characterized by high rate of evaporation in most parts of the county. In Ol–Donyo Sabuk, January-March is hot and dry with April-June being hot and wet, while July-October is very warm and dry. November and December are warm and wet. The county experiences two rainy seasons, with long rains in April and May and short rains in November and December. The dry periods are August to September and January to February. The amount of rainfall follows topographical features of the landscape. The Chazabe hills In Ol-Donyo Sabuk give a characteristic conducive weather condition coupled with permanent water from Athi River across the region.

Machakos County has a variety of topographical features. The landscape is largely a plateau that rises from 700m to 1700m above sea level and is interrupted by an escarpment and series of hill masses, the highest of which is Kilimambogo or Ol-Donyo Sabuk, which rises to 2,144m above sea level. The County is bound in the western part by the Kapiti and Athi Plains, in the north by the Athi River which curves round the solitary hill of Ol-Donyo Sabuk to flow to the south east. Rising steeply to the north east of Athi River is the Yatta Plateau, which is broken by occasional hills. This plateau extends into the basin of River Tana.

In the central part of the County is a striking series of hill masses that stretch in a roughly north-south axis. This series includes the Ol- Donyo Sabuk, Kanza ranges, Kangundo, Mua, Mitaboni, Iveti hills and Kiima Kimwe (GOK, 2001). The district is generally hot and dry. It has two rainy seasons, the long and the short rain Seasons. The long rains seasons starts at the end of March and continues up to May, while the short rains season starts at the end of October and lasts till December. The annual average rainfall ranges between 500mm to 1300mm (NEMA, 2005).

There are significant regional and seasonal variations within the district and rainfall reliability is quite low. The high altitude areas of Matungulu, Kangundo, Kathiani, Central and Mwala divisions receive slightly higher rainfall than the low land areas. Mean monthly temperatures vary between 18^0C and 25^0C. The coldest month is July

while October and March are the hottest. The highland areas which receive higher rainfall are more suitable for rain-fed agriculture than the lowland areas, while the plains support ranching.

3.2.3 Geology

Ol-Donyo Sabuk is a remnant of Africa's oldest erosion surface, generally regarded as late Jurassic. Being the residual hump of metamorphic rock, the mountain is surrounded by the monotonous lava plateau of the Athi plains, which formed around the mountain when lava (molten rock) escaped from fissures in the earth's crust, gradually filling the valleys and smoothing the contours of the original landscape (UNEP, 2010). The Fourteen Falls in the River Athi are located half-way between Makutano and Ol-Donyo Sabuk. The falls are signs posted to the left just before the bridge crossing the Athi River, and lie 1km down a track (Njoroge *et al*., 2004).

3.2.4 Economic Activities

A majority of the people in the study area depend on agriculture (crops and livestock production) related activities for their livelihood. Generally, according to the welfare monitoring survey (WMS II) of 1994 and WMS III of 1997, the former Machakos district had 68.7 percent and 63.3 percent respectively of its population below the poverty line. During the poverty assessment exercise carried out in the year 2000, the district was estimated to have 66.2 percent of the population as poor (GOK, 2000). The surveys were carried out under different circumstances which influenced the results. The 1994 survey was carried out when the district was experiencing very severe drought and as such most of the households could not afford basic essential needs. The 1997 survey was carried out in the March to May period when the district had just harvested crops thus most of the households tended to be more food secure, while the 2000 poverty assessment was carried out against a background of severe drought when most of the households were dependent on relief food.

From the statistics of the survey carried out in the March to May period, it can be deduced that over 63 percent of the people in the district were poor (GOK, 2000). The

results also indicate that the district contributed about 4.4 percent to the national poverty. People in this area define poverty as the inability of families to meet their basic needs such as food, clothing, housing, health and education for children. The great majority of the poor households are found in the drier regions where frequent droughts have affected their livelihoods. Areas like Masinga and Yatta have experienced perennial droughts that have made the people dependent on relief food. Traditional coping mechanisms like sheep, goats and poultry rearing are no longer viable, leaving most of the families destitute.

Lack of water is perceived to be the great cause of poverty in Machakos County (GOK, 2000). There is a perennial shortage of water throughout the County due to frequent droughts. The average walking distance to a source of Table water is 5km (NEMA, 2005). This makes most families spend much of the time searching for water leaving very little time for other productive activities. Agricultural production is also greatly affected leading to low yields and perpetual food shortages. Livestock production is affected since the drought depletes pasture leading to body weight loss as the animals travel for long distances to watering points.

Narrowing down to Ol-Donyo Sabuk, there is an irrigation scheme along Athi River where there is growing of vegetables including brasicca, French beans, sugar snaps, capsicums, tomatoes, onions, courgettes and coriander for home consumption, local market, Thika market and the export market. The main food crops include maize, dry beans, pigeon peas, sweat potatoes cassava and cowpeas. Tobacco growing is being reintroduced in the area as one of the cash crops. Livestock herds are composed of goats, cattle, donkeys and sheep. Rearing of indigenous chicken and beekeeping are also important farm enterprises. A majority of the farmers work with *Delmonte*, coffee or Veg. pro Kantara farms as casuals and work after the job in their farms and or use other family members to tend the French bean crop. Export vegetables such as okra, capsicum, chillies, French beans, sugar snaps, mangetout, eggplant, baby corns, and courgettes are grown along River Athi.

3.3 METHODS OF DATA COLLECTION

3.3.1 Types and Sources of Data

Two data sources were used to achieve study objectives, namely primary data, which is information gathered directly from the source for the purposes of the study, and secondary data, which is information gathered from published and unpublished works of other authors (Wilson, 2010), including previous reports (unpublished and published), peer review journals, books, theses/dissertations and magazines. Primary data were obtained from French bean producers through interviews by administering questionnaires and on-the-spot field observations with key farmers and contact farmers assisting in data collection. Secondary data were sourced through desktop review and published works to appreciate previous research findings on the issue. Secondary data is important because they act as a support arm of the primary data; they provide background information on the research topic and serve as a check and standard for evaluating primary data. Secondary sources of data used in this research included journal articles, research theses, magazines, horticultural manuals and reports, and the internet.

3.3.2 Data Collection Instrument

This study utilized a questionnaire as a tool for primary data collection. A questionnaire is a schedule of various questions intended for self-completion by survey participants (Brace, 2008). A questionnaire is an effective method for acquiring information especially from a large or sparsely located group of respondents.

3.3.3 Pre-testing

Before research tools were administered to participants, pre-testing was carried out to ensure that the questions were relevant, clearly understandable and sensible. The pre-testing aims at determining the reliability of the research tools including the wording, structure and sequence of the questions. Pre-testing involved 20 respondents from the target population. The respondents were conveniently selected since statistical conditions were not necessary in the pilot study. The purpose was to refine the research tools so that respondents in the major study would have no problem in answering the questions. Expert opinion was requested to comment on the representativeness and suitability of questions, and gave suggestions of corrections to be made to the structure of the research

tools. This helped to improve the content validity and reliability of the data that would be collected.

3.3.4 Sampling Design

The sampling design for this study was purposive. The choice of the households to be interviewed was based on systematic sampling procedure (Prewitt, 1975). The location of the study sample was purposively chosen on the basis of the proximity to exporter's collection centres and or grading shed. The households in each irrigation site of the sub-units were listed from 1 to N (N being the sample population) and then systematic selections of the households were carried out. A random start was used in choosing the first household to be interviewed. A sample of 120 households was interviewed from Kathama, Mithini, Kate-nzoni and Kithama, along the River Athi irrigation sites for farmers in the production of French beans. The size of the sample depended on the requirement to have a statistically large sample of at least 30. These survey spots were purposively selected because most of the French beans producers were concentrated in such areas. This technique ensured a more representative sample was derived from a relatively homogeneous population (Babbie, 2010).

3.3.5 Data Collection

Both primary and secondary data were collected by administering a questionnaire. The researcher obtained an introductory letter from the university to collect data from farmers. One enumerator with Kenya certificate of secondary education certificate was recruited from the local community and trained on relevant aspects of the study to assist in the participatory surveys. This was to ensure ownership, minimize language barrier and that the information obtained would be as accurate as possible. Being a resident of the area, the enumerator knew the terrain and farmers of the study area very well and easily created rapport with the respondents. Training on the subject matter including techniques of administering questionnaires was provided to the enumerator before embarking on the exercise. Efforts were made to keep the interview period as short as possible while at the same time capturing all the desired information. Questions were posed in the local dialect and the answers recorded in English. The sequence of the questions was such that those that would easily establish rapport with the farmers came

first while the more sensitive questions came towards the end of the interview. The researcher worked with the enumerator during the entire period of data collection.

3.4 DATA ANALYSIS AND REPORTING

Data collected through personal interviews were subjected to statistical analysis using the Statistical Package for Social Sciences (SPSS) version 17.0 and summarized in terms of descriptive statistics, namely, means, percentages and frequencies. Descriptive analysis provided an explanation on how certain variables influenced the adoption of French beans marketing intelligence systems. The effect was compared with past studies that were related to the field of study. A comparison of data from the respondents was analyzed through percentages and means. The likely reason for direction and magnitude of each variable was explained. Data presentation was done using Tables derived by cross tabulating each variable with the adoption of marketing intelligence systems.

3.5 CONCLUSION

This study focused on farmers within Ol-Donyo Sabuk area by primarily using survey type of research since the area has a long history of growing French beans crop. One of the main advantages of this approach is that it enables the researcher to collect sufficient data for the purposes of describing a population, which is too large to observe directly (Rossi *et al.,* 1983) the survey approach was complemented by qualitative approaches, namely case study and key informant interviews. The following data collection tools were used: i) a questionnaire that was administered to sampled households; ii) face to face key informant interviews with farmer household heads, the area extension officer, and farmer group officials.

The case study method was employed in identifying and describing the nature of institutional arrangements - whether farmers are selling their pods as a group to an exporter, or individually to an exporting company or broker, thus establishing the marketing channels in the study area. The sample size for this study was 120 French bean households which were consistently involved in French bean production. The sampling procedure used for this study was systemic random sampling, in order to achieve a high degree of representation. Farmer's stratum dependent on the area where one comes from.

Finally, the study area was described in details and methods of data collection and analysis discussed, including the use of descriptive statistics and return on capital analysis to achieve study objectives.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 INTRODUCTION

In this chapter, the results of the study are presented and discussed. There is in-depth descriptive statistics on French beans marketing channels with an attempt to establish the various marketing institutional arrangements that are used by small-scale farmers involved in export French bean value chain and the factors that enhance their participation in the sector in order to ensure that farmers derive sustainable livelihoods from this sub-sector. Comparative analysis of French beans sales revenues from farmers with and without access to market intelligence in Ol-Donyo Sabuk area of Machakos County has also been done. The chapter further gives analysis and presents returns on capital for different actors involved in French beans value chain,

4.2 RESULTS OF DESCRIPTIVE DATA ANALYSIS

4.2.1 Description of French Beans Marketing Channels

In general, the geographic dispersion of production, local and overseas consumers, the varied number of producers and scale of production, the interrelationship with agro chemical industries, and the high degree of agronomic practices involved with subsequent post-harvest technology contribute to a long and complex French beans marketing channel. This is best explained in the flow chart in Figure 4 where the chief agencies in this channel are farmers - as producers and sellers - hawkers who can be farmers themselves or other parties, processors, exporting companies, and brokers. French beans are channelled to rural assemblers, graders, sorters, and purchasing agents who take them to rural urban wholesalers and brokers, though the produce from company farms is exported directly to international markets like the EU market. Produce is also marketed through open air markets, kiosks (mid class green grocers), supermarkets and hotels. Later the produce goes through regional fresh produce markets and or rural and urban consumer markets from where it reaches the international consumers. Figure 4 shows the

flow of French beans produce within the existing French beans marketing channels in Kenya.

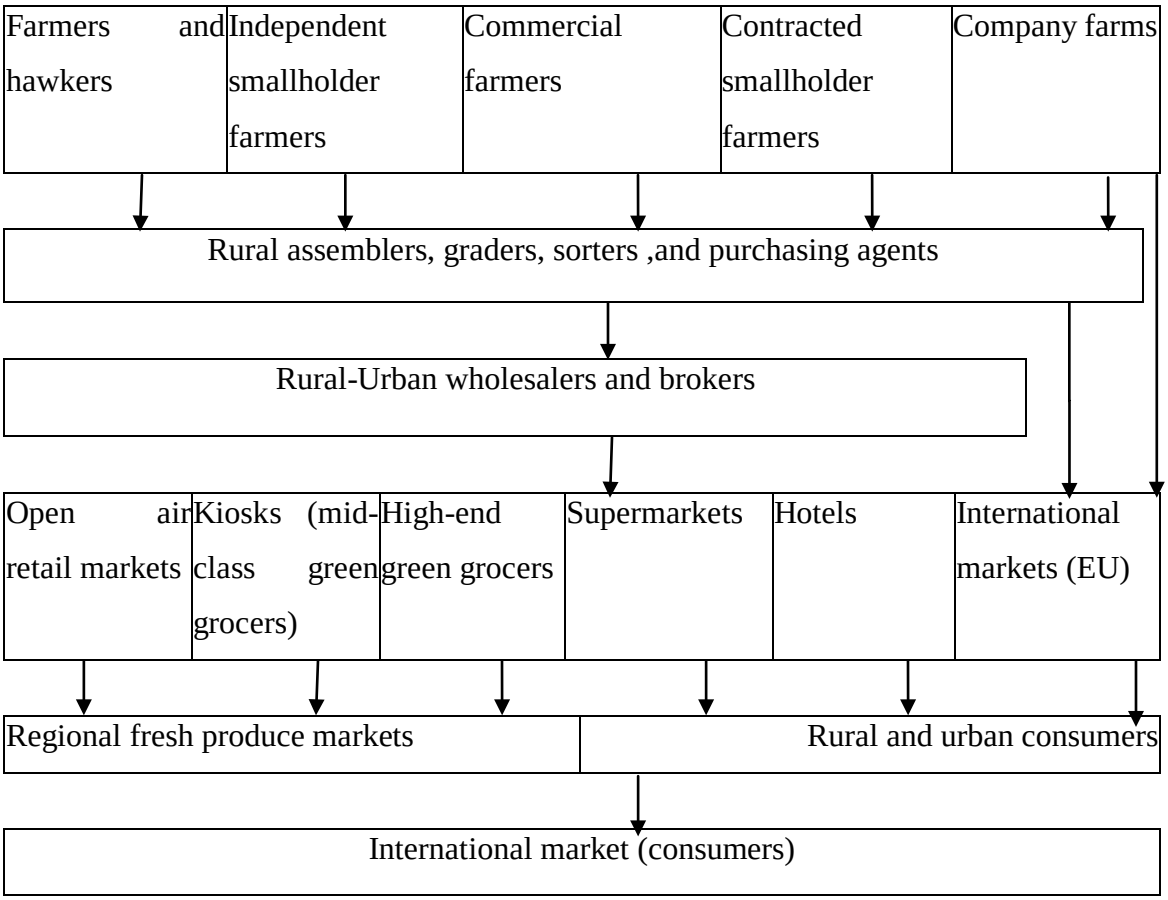

Figure 3: Domestic, Regional and International Marketing Channels for French Beans Production in Kenya. (Dijkstra, 1997)

4.2.2. French Beans Marketing Channels in Ol-Donyo Sabuk

The institutional arrangement and marketing channels adopted by French bean farmers in Ol-Donyo Sabuk include selling individually to middlemen and selling as a group to exporting companies. The individual-broker selling of the French beans is characterized by small volumes of produce, no rejects or discards and cash on delivery, which attract most of the French bean producers to sell through this channel. On the other hand, individual selling of French beans to brokers is the most dominant arrangement in the study area. The main advantage of this arrangement is that it often offers prompt payment than most of the other marketing channels. However, its inability to help farmers participate sustainably over a long period of time in the export of French beans poses two

setbacks. One, it does not have a secure marketing arrangement as no long-term relationship is established between the buyer and the seller. Besides, the arrangement is usually more active when there is a scarcity of produce. Also this marketing option does not provide farmers with the necessary technical assistance to stay competitive in the global markets. Specifically, it does not provide a means for farmers to obtain certification necessary for the food and safety standards that are a requirement for the export markets, thus making the future of farmers bleak.

The second most dominant arrangement is the selling of produce as an organized group to an exporter. This arrangement is similar to that reported in Kirinyaga West where the canning variety of French bean is grown. This was also the most preferred arrangement where farmers cultivated more than one variety of French beans. This arrangement has several advantages, namely, access to technical assistance, international certification and a guaranteed market. Despite the many benefits associated with this group arrangement, farmers still preferred the individual-broker arrangement due to ready cash on delivery.

Therefore, there is need for sensitization and awareness creation among farmers to make the group arrangement more attractive to farmers. More specifically, the exporters should be held accountable to the terms of agreement and contracts such as buying produce in the quantities, prices and frequencies agreed on (Graffham *et al*., 2007). The third arrangement for French beans marketing channel in the study area is the sale of the produce by individual farmers to the exporting company or exporting agent. Progressive individual farmers opt to sell their produce individually to a promising market like the exporters and exporting companies whenever they have high produce orders from their clients; they source for produce from individual farmers to meet the order tonnage. This arrangement makes farmers to have two marketing channels at the same time depending on their tonnage and preference. French beans produce in the study area is either sold directly to brokers or to small exporting companies like Avenue fresh, Everest and KHE or, in a case where farmers have formed a self-help group, the produce is sent to collection centres for grading. From the collection centres the produce is sold to an exporting company after grading. The exporting company can export directly or sell to

giant exporters like Finlay who later sell to international consumers. The three marketing channels in the study area are summarized in Figure 5.

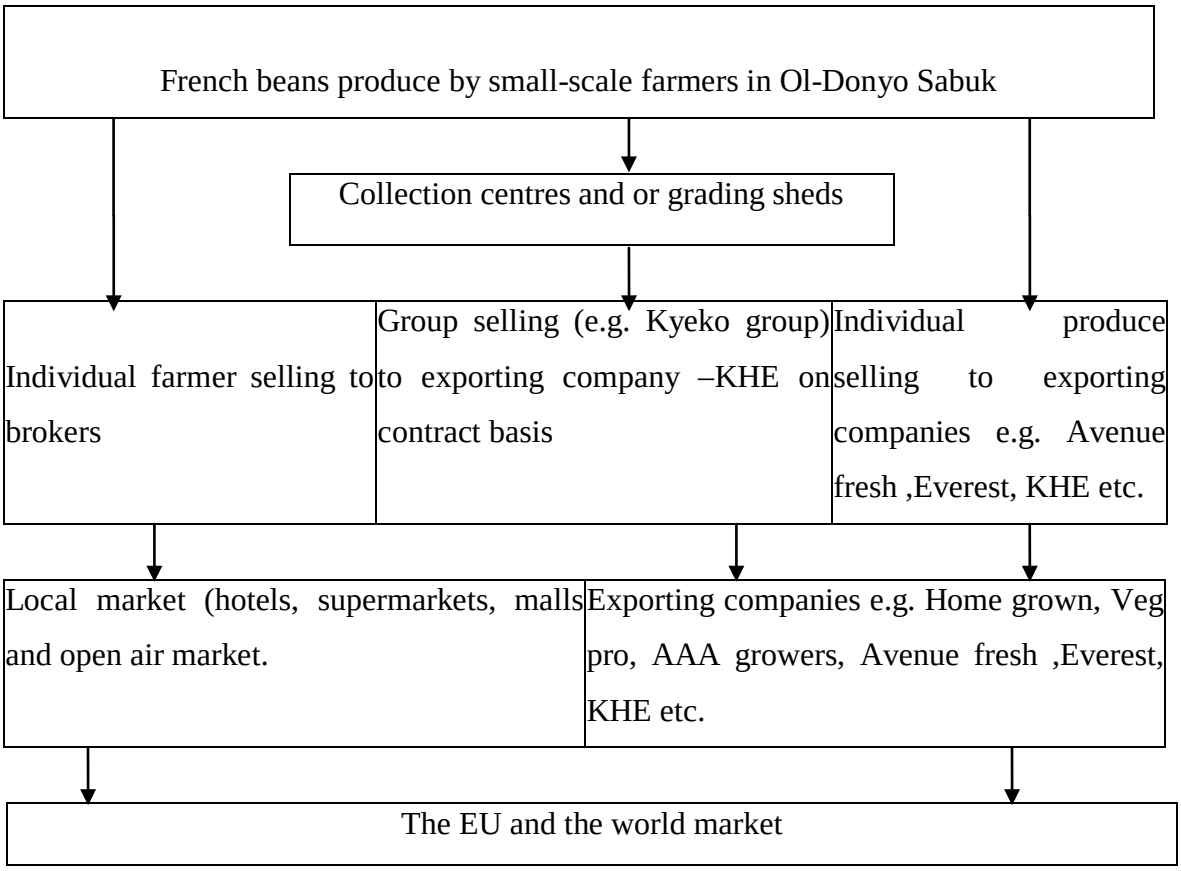

Figure 4: French Bean Marketing Channels in Ol-Donyo Sabuk. (Dijkstra, 1997)

4.2.3 Comparative Analysis of Sales Revenue among French bean Farmers

Farmers with French bean market intelligence in Ol-Donyo Sabuk are the individuals who have come together to form farmer groups for easy selling of their produce, and in the process have benefited from exporting company technical support. The technical staffs from these companies have managed to train farmers on the stringent global market requirements like GlobalGAP, the Good Agricultural Practices to reduce Maximum Residual Levels (MRLs) to acceptable levels, produce traceability, recipe specification, and produce quality requirements. Subsequently, such farmers are able to produce high quality French beans that are able to fetch the best prices in the market, thus improving household incomes and livelihoods. For instance, considering sales revenues from the 36

farmers with French beans marketing intelligence and other 36 farmers with no access to French beans marketing intelligence systems, the 36 farmers with access to market intelligence systems show higher revenues as is shown in Table 4.

Farmers belonging to a group and selling their produce as a group benefited from trainings by the exporters field technical staff as well as Agricultural Extension Officers from the Ministry of Agriculture. Such farmers who had formed farmer groups were trained on produce traceability, that is, from the farm to the fork and other stringent world market requirements. Table 4 gives the distribution of sales revenues of French beans from the 36 farmers who have been trained on French beans market intelligence systems and other 36 farmers without access to marketing intelligence systems. Comparing the two groups of farmers, those farmers with access to French beans market intelligence earned them higher revenues by far compared to those who did not have access to market intelligence systems, as is evident in Table 4.

Access to market intelligence systems in French beans production is paramount in profit maximization and improved farmer returns. Information on stringent market requirements, off-season, selling prices and currency exchange rates helps farmers to plan their production for premier quality in order to fetch high market prices. Table 4 show 30 percent farmers with access and 70 percent farmers with no access to market intelligence system and their influence on sales revenue.

Table4: Influence of Market Intelligence Systems on French Beans Sales Revenue

Sales revenue range (Ksh)	Number of farmers with MIS	Number of farmers without MIS
5000-10,000	0	81(67.5)
10,000-20,000	0	3(2.5)
Over 20,000	36(30)	0
Total	36(30)	84(70)

***Figures in brackets represent percentages**

From the study findings in Table 4, about 30 percent of the farmers who had access to market intelligence system earned over Kshs. 20,000 on average while 67.5 percent farmers without access to market intelligence systems earned as little as Kshs. 5,000 on average from one cropping. It is only 2.5 percent of farmers without market intelligence that earned over Kshs. 10,000 on average an indication that market intelligence system is a prerequisite to better returns and profit maximization in French beans production.

4.3 Factors Influencing Use of Market Intelligence Systems by French Bean Farmers

According to farmers in Ol-Donyo Sabuk, French beans business has been a source of fast cash, and so most farmers around the study area grow French beans along with other staple food crops. Moreover, many of the farmers had not known whether French beans are a high value crop, and rejects can be used as fodder, vegetables and manure until i explained to them about non cash benefits of the crop. Farmers gave varied reasons why they were or were not using the market intelligence systems. These factors include the demographic characteristics of the respondents and associated factors, access to credit facilities, lack of market linkages, and high cost of production that the technology requires.

4.3.1 Demographic Characteristics of Respondents

4.3.1.1 Gender of Household Head

The term gender refers to non-biological differences between women and men(Zevallos, 2014). The roles in farming and household decisions in developing countries differ by gender. Generally, women manage household and farm affairs. In agriculture, gender is important as one of the several socio-economic characteristics that influence the adoption of new technologies.

An analysis of the study data shows how gender has influenced the adoption of market intelligence systems in the study area (Table 5). Most of the households sampled were male-headed (71.67 percent). These results indicate that a larger proportion of French beans producers were among the male-headed households compared to the female-headed households, although women actually did the farm work but men received the

cash. This likely explanation for involvement of more males than females is the fact that French beans being a fast and rapid cash crop, men would engage in its production in order to earn a living. From the 36 farmers with access to market intelligence, 10 were females and 26 males (Table 5). The male headed households were able to have access to market intelligence systems unlike female headed households because of the male's flexibility to attend market intelligence systems trainings.

French beans were grown under contract with smallholders, which enable export companies to control the production process without the need to own land or supervise labour. Export companies pay contracted French beans growers on the basis of the amount harvested, regardless of the labour involved, thus taking advantage of the poor farmers' situation to meet the companies' production objectives. However, it was women who provided French beans production labour during planting, weeding, picking and transportation to collection centres .This finding is consistent with that of Graffham *et al.* (2007) who found out that women provided 72 percent of the labour for the beans yet they only received 38 percent of the income.

Before the introduction of export horticulture, women's plots were allocated to local vegetables grown for household consumption or local sale. However, the profitability of French beans coupled with land scarcity have caused men to claim land formerly used by women for food production and to divert the land to French beans, a high value crop. While most women had accepted the situation, others consider male appropriation of French beans income and land as a break with cultural norms that undermines their material and food security.

This survey found that 86 percent of the farmers were males who were the main decision makers while women and children provided much of the labour. Approximately 70 percent of the population sampled sold their produce to brokers of whom 99 percent of them were male farmers. This is attributed to their lack of patience for delayed payment by exporters. Of the 120 households interviewed, 70 percent were male headed while the remaining 30 percent had female headship as is evident in Table 5. This implies that

majority of the French bean farmers were male. This trend may be attributed to the fact that French beans were a high value cash crop and often the male gender goes for them to obtain money mostly for non-food items. In contrast, there was less female gender in French bean production because the females concentrated more on food crops for household consumption.

Although most of the French bean producers were male, women and children provided labour during picking while transportation to the collection centres and payment for the produce was the men's job, thus reducing women to labourers without wages. Therefore, the gender of the household head has links with market intelligence among French beans producers in Ol-Donyo Sabuk. This finding is also consistent with the findings of Ouma *et al.* (2002) who noted that gender was significant in explaining the adoption of improved maize variety in Embu District, Eastern Kenya. Table 5 gives the percentages of farmers with access to MIS and those without access to MIS based on gender, with 26 males and 10 females having access to MIS. Many farmers did not have access to MIS including 50 percent males and 20 percent females as per Table 5.

Table 5: The Link Between Gender and French Beans Market Intelligence System

Gender	Number of farmers with MIS	Number of farmers without MIS	Totals
Male	26(21.67)	60(50)	86(71.67)
Female	10(8.33)	24(20)	34(28.33)
Totals	36(30)	84(70)	120(100)

***Figures in brackets represent percentages**

The findings of this study indicate that half of male farmers (50 percent) sold their produce individually and to brokers and 21.67 percent sold their produce through farmer self-help groups, with access to French beans market intelligence systems. Slightly over eight percent of the females sold their French beans as a group to exporters. This gives a smaller percentage of the females having access to French beans market intelligence systems. Although women are key in French beans production and faster in technology adoption, men showed higher interest in French beans market intelligence. This can be

attributed to the fact that the crop is a fast source of income and men will be interested to exploit French beans production techniques, including Market Intelligence Systems, in order to have the best French beans to fetch the best prices.

4.3.1.2 Age of the Household Head

The ages of the household heads were categorised into four age groups, that is; 20-30, 31-54, and 55-65. The 20-30 age group was the youngest and 55-65 age groups was the oldest. The middle aged households were the majority taking 72.49 percent of the sampled population followed by the old 5 percent, then the youngest 22.49 percent and the oldest age group (65). The impact of age on technology adoption is critical when it comes to French beans MIS as those farmers of age category of 55-65 didn't have access to MIS, as shown in Table 6. This is because the number of years the respondent has lived describes the experience, the wealth status, the energy level, the attitude, the mental outlook and the general social interaction. Studies done by several researchers give different results on new technology adoption rate among different age groups. Table 6 shows age distribution and percentages based on French beans market intelligence systems with 4.16 percent farmers of the age category of 20-30 and 25.83 percent farmers of age set 31-54 having access to market intelligence systems.

This study found out that the age of French beans farmers were diverse, ranging between 20 and 65 years. The majority (72.5 percent) of the French bean producers in the study area were aged from 31-54 years. The likely explanation is that this age group represents people in their reproductive age and with unemployment in the country and many dependants who rely on them for food, school fees and other family needs, they focused on French beans as an opportunity to meet their family economic obligations. This age group (31-54) gives 25.83 percent farmers who have access to MIS which is the highest number as compared to other age groups. Thus with access to MIS this age group is actually actively engaged in French beans production as a way of generating enough income to meet their basic needs. This finding is consistent with that of Mwanthi, (2009) who found out that the adoption of range resource management technologies in Kibwezi was by those in the age category of 31-50 years. This is an indication that age had links with the adoption of French beans market intelligence systems.

The results also confirm recent observations that the youth within the 20 to 30 years of age may often be unwilling to engage in agricultural production such as French beans farming. The likely explanation is that youths have formal education and often prefer white colour jobs which may not be forthcoming. This age group often ends up not getting the preferred jobs, and by the time they turn 31 years of age they start engaging in French beans production to earn a living. Table 6 shows the distribution of French beans farmers based on their age groups. Also, the Table indicates that most of the French bean producers were below 54 years and above 20 years old. Only 36 of 120 farmers are using market intelligence systems within the study area.

Table 6: Distribution of Respondents Based on Age and Market Intelligence Systems

Age group	Number of farmers with MIS	Number of farmers without MIS	Totals
20-30	5(4.16)	22(18.33)*	27(22.49)
31-54	31 (25.83)	56(46.66)	87(72.49)
55-65	0(0.00)	6(5.00)	6(5.00)
Totals	36 (29.99)	84(69.99)	120(99.98)

***Figures in brackets represent percentages**

4.3.1.3. Education Level of Household Head

Education is here taken to mean the level of formal schooling. The level of education attained influences individual decision-making because it tends to reduce farmers' risk aversion, thus enabling them to try out new innovations (Asambu, 1993). Besides, individuals who are well educated acquire enhanced information processing capabilities that enable them to demand and utilize agricultural technologies. Education level according to this study was categorized as 'none' for those who did not go to school, 'primary' for those with basic education, secondary for those with form four education, and tertiary for those with post-secondary education. Table 7 gives respondent education level and percentages in relation to French beans market intelligence systems.

Table 7: Education Levels in Relation to Market Intelligence Systems

Education level	Number of farmers with MIS	Farmers without MIS	Totals	Mode of selling
None	0(0)	10(8.33)	10(8.33)	Broker
Primary	5(4.17)	30(25.00)	55(45.83)	Broker/group
Secondary	31(25.83)	40(33.33)	71(59.16)	Group/broker
Tertiary	0(0)	4(3.33)	4(3.33)	Group/broker
Totals	36(30.00)	84(69.99)	120(99.98)	

***Figures in brackets represent percentages**

According to the current study and as summarized in Table 7, about 8.33 percent of the respondents had no formal education, 45.83 percent had basic primary education, and 59.16 percent had secondary education while 3.33 percent had attained tertiary education. Among those who had primary education, 4.17 percent sold their produce as a group, and 25 percent sold to brokers. The reverse was true for those who had above secondary education; 25.83 percent sold their produce through groups while 33.33 percent sold individually to brokers. Education level of the respondents had greatly contributed to the adoption rate of French beans marketing intelligence systems in the study area. This is because farmers with secondary education and above had formed groups, thus having access to market intelligence systems, and were benefiting from the exporters' technical support and other extension services from the Ministry of Agriculture. Farmers who had not adopted the French bean market intelligence did so either out of ignorance or had not gone to school and depended on farming experience and traditional methods of farming, and thus had poor quality pods which ended up being rejected.

This implies that education level had influence on the choice of marketing channels and the application of market intelligence systems for the produce. The likely explanation is that French bean is a high value and fast cash crop that requires technical backup. Thus production based on technical expertise and education and/or trainings in best agricultural

practices and stringent market requirements allows for skills and subsequent reasoning to make sound decisions. Hence the secondary school leavers engaged themselves in forming groups more than other respondents in this study in order to have access to market intelligence systems for the best quality French beans.

4.3.1.4. Household Size

Household size was measured by the total number of household resident members. The household size on average is about six members per household. Table 8 summarizes some of the household characteristics. French bean producers with large family size were likely to adopt and implement French beans marketing intelligence systems, because it helps them fetch higher prices to satisfy the needs of their families. They were also able to provide the extra labour that the technology may demand. Hence, it was hypothesized that the larger the household size, the higher the likelihood of adoption of market intelligence systems in French beans marketing which is evident in Table 8.

Table 8: Household Sizes in Relation to Market Intelligence Systems

Household size	No. of farmers with MIS	No. of farmers without MIS
0-4	5(4.16)*	1(0.83)
5-14	21(17.5)	53(44.16)
+15	10(8.4)	30(25)
Total	36(30)	84(69.99)

***Figures in brackets represent percentages**

4.3.2 French Beans Income Levels

Income per week from French beans was grouped into two: households with an income of Kshs 10,000 or less from French beans were considered low and those with more than Kshs 20,000 were considered high income earners. Sale of French beans is done three times per week because when the crop reaches harvesting stage, it is picked three times in a week, that is, Monday, Wednesday, and Friday for three months. Therefore it is easy for a farmer to calculate his/her French beans incomes per week or per month. French bean producers with access to market intelligence systems showed higher household income compared to those that had no access to market intelligence systems. All farmers with

access to market intelligence systems earned themselves profit of over and above Ksh 20,000 while those without access to market intelligence systems had incomes below Ksh10, 000. Table 9 shows the distribution of income from French beans based on French beans market intelligence systems.

Table 9: The relationship between household income levels and market intelligence systems

Income levels	Number of farmers with MIS	Number of farmers without MIS	Marginal benefits(Ksh)
<or =10,000	0	84(70)	Below 10,000
>20,000	36(30)	0	Above 20,000
Totals	36(30)	84(70)	

***Figures in brackets represent percentages**

Most (70 percent) of the farmers are found to be producing within <0.5 and 2 tonnes. Produce sales revenue and subsequent marginal benefits were proportionate to tonnage in production and farmers with MIS had the highest tonnage; hence they earned profit of more than Ksh 20,000 per week.

4.3.3 Access to Extension Services

Extension services, be they from private service providers or from the government agricultural extension officers, contribute to technology adoption. This is because farmers who have been given technical assistance or advice were practising market intelligence systems to market their French beans. This conforms to observations by Ouma *et al.* (2002) that access to extension services plays an important role in influencing the adoption of agricultural innovations.

For those who had taken up French beans marketing intelligence, 30 percent had been visited by extension workers and had benefited from on-farm trainings and extension services in the production year as shown in Table 10. Among the recipients of training services from the extension workers, 16.67 percent were selling to brokers while the rest 53.33 percent were selling to brokers and through other small channels like the local open

air market and supermarkets. Therefore 70 percent of the respondents were still selling their French beans to brokers due to lack of access to other markets and prompt payment by brokers.

Table 10: **Access to Extension Services in Relation to Market Intelligence Systems**

Access to extension services	Number of farmers with market intelligence systems	Mode of selling	Number of farmers without market intelligence systems	Mode of selling
Yes	36(30)	Group	20(16.67)	Brokers
No	0		64(53.33)	Brokers
Totals	36(30)		84((70)	

***Figures in brackets represent percentages**

4.3.4 Mode of Selling French Bean Produce

In order to understand the marketing intelligence system, marketing channels and mode of selling were used as indicators of marketing intelligence system. In this case the mode of selling is either selling as a group or individually to brokers. Farmers selling through a farmer group had access to market intelligence systems, and benefited from exporter technical officers.

Table 11 shows the relationship between mode of selling and the use of market intelligence systems. The Table shows that most of the French beans farmers who did not use MIS were selling their French beans to brokers while those using MIS sold their French beans through groups. Thus, the broker marketing channel is the major channel of marketing French beans in the study area. The motivation of farmers to sell their produce to brokers could be attributed to factors such as prompt cash payment on produce delivery, lack of produce rejection due to no or limited grading by brokers, and provision of transportation services by the brokers which are not provided by the exporting companies. Besides, these farmers are rarely provided with any information or technical assistance. These brokers operate seasonally, especially when there is scarcity of French

beans; they are able to acquire produce from farmers by buying at higher prices compared to the exporting companies especially when produce supply is low and demand is high.

Table 11: Links Between Channel of Selling and Use of Market Intelligence Systems

Channel of selling	Number of farmers with MIS	Number of farmers without MIS
Broker selling	0(0)*	84(70)
Group selling	36(30)	0(0)
Totals	36(30)	84(70)

***Figures in brackets represent percentages**

4.3.5 Access to Credit Services

According to Feeder *et al.* (1985), a credit program enables farmers to purchase inputs or acquire physical capital needed for technology adoption. Credit service is essential in the adoption of market intelligence systems because adopting the technology will increases cost of production and is through credit services farmers are able to meet this high cost of production in terms of acquiring farm inputs, which the farmers perceive to be a costly activity to engage in (Workneh, 2007). Table 10 shows the links between access to credit services and market intelligence systems.

Table: 12 Links Between Access to Credit Services and Market Intelligence Systems

Did you ever receive any credit/loan	Number of farmers with MIS	Number of farmers without MIS	Totals
Yes	29(24.2)*	10(8.33)	39(32.53)
No	7(5.8)	74(61.66)	81(67.46)
Totals	36(30)	84(70)	120(100)

***Figures in brackets represent percentages**

The study findings indicate that only 32.53 percent of the French bean farmers had access to credit facilities in the previous year. However, a majority (74.4 percent) who had access to credit were French beans farmers using Market Intelligence Systems. Therefore, access to credit enabled the French beans farmers to purchase crop protection products,

fertilizers and hiring of labour, and consequently had a higher tonnage of the crop and higher marginal benefits compared to farmers without the credit services.

4.3.6 Access to Market Linkages

Marketing plays an important role in agricultural production. Lack of market or low prices for the French beans produce may act as a disincentive towards French beans farming in the study area. Results in Table 13 shows that the main marketing channel in the study area was through middle men or brokers with 70 percent of the respondents selling their produce to brokers. About 60 percent of the respondents cited the provision of seeds by brokers as a loan and this amounts to one of the reasons as to why these farmers sold their produce to brokers. Prompt payment by brokers (cash on delivery) was a major reason behind selling the produce to brokers and also lack of market intelligence systems in the area. A cross tabulation of the survey data has shown that 70 percent of the farmers sell their French beans produce to brokers because it was the only channel they knew and the only channel that was accessible to them. Table 13 shows the relationship between choice of marketing channel and marketing intelligence systems.

Table: 13: Marketing Channel in Relation to Marketing Intelligence Systems

Why the preferred marketing channel	Number of farmers with MIS	Number of farmers without MIS	Totals
Reliable	6(5)	0(0)*	6(5)
Profitable	30(25)	5(4.16)	35(29.16)
Only channel I know	0(0)	79(65.83)	79(65.83)
Totals	36(30)	84(69.99)	

***Figures in brackets represent percentages**

4.3.7 French Beans market Intelligence Systems Training

Training in market intelligence is a prerequisite in French beans production for profit maximization. French bean producers in Ol-Donyo Sabuk were only trained if they were members of a Self-Help Group contracted by an exporting company. The trainings were conducted on stringent market requirements and compliance criteria for a produce specification, safe pesticide application, Integrated Pest Management (IPM), recipe presentation, hygiene for food handlers, and post-harvest produce handling.

Table 14: Training on French Bean Marketing Intelligence

Have you been trained on MIS	Number of farmers trained on MIS	Number of farmers not trained on MIS
Yes	36(30)*	0(0)
No	0(0)	84(70)
Totals	36(30)	

***Figures in brackets represent percentages**

According to Table 14 farmers interviewed, only 30 percent had received some training on French beans. All those who had received training were using MIS. Studies have shown that acquisition of technical skills through training and workshops had potential to increase adoption of agricultural technologies and innovations (Zegaye *et al.,* 2001). These results suggest that acquisition of skills and knowledge on French beans farming and market intelligence had contributed to the adoption of French beans marketing channels, thereby improving farmers' income.

4.3.8 Choice of French Beans Varieties Grown

About 55.6 percent of the farmers interviewed were growing Teresa variety, while 24.4 percent were growing Alexander variety and the rest planted Army. Most farmers having above one tonnage per acre were planting Teresa variety. It was also noted that most of the brokers were providing seeds for Teresa and Alexander Varieties, with 75 percent of the farmers mentioning that they were being given seed loan by brokers in order to supply brokers with the produce later when the produce is ready for harvest.

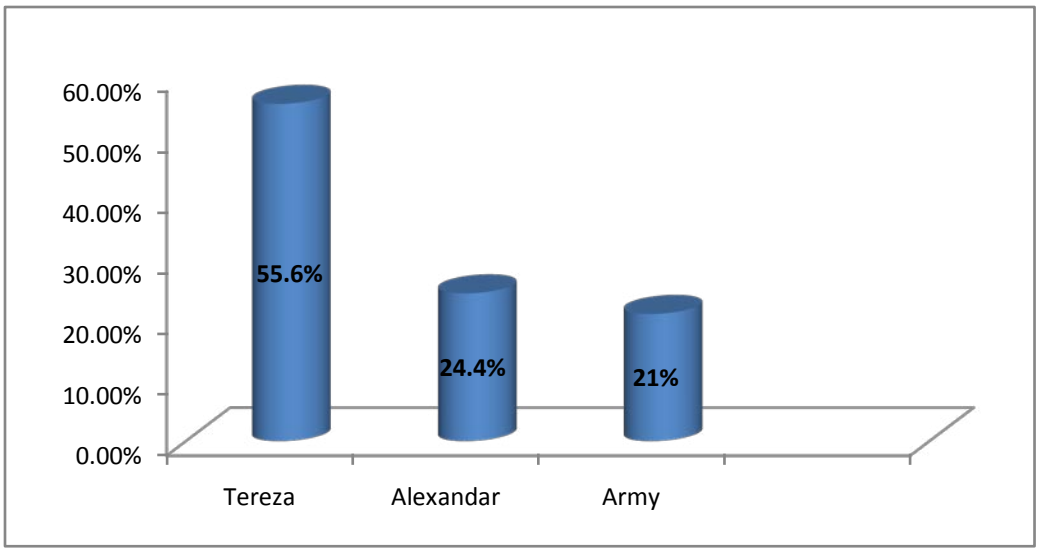

Figure 6: Percentages of French beans varieties grown

Table 15 shows the choice of French beans variety grown by the respondents in relation to market intelligence systems. Figure 15 shows 30 percent farmers with access to market intelligence systems chose to plant Alexander variety which is high yielding and resistant to rust whereas 55.6 percent Teresa and 21 percent army was planted by farmers without MIS . Only 4.17 percent farmers without MIS chose to plant Alexander variety. Therefore access to MIS contributed to the choice of the best French bean variety to be grown.

Table15: Choice of French Bean Variety Compared to Marketing Intelligence Systems

Do you plant Alexander variety?	Number of farmers with MIS	Number of farmers without MIS
Yes	36(30)*	5(4.17)
No	0	79(65.83)
Total	36(30)	84(70)

***Figures in brackets represent percentages**

4.4.0 Non-Cash Benefits of Adopting Market Intelligence Systems

All the respondents acknowledged that, apart from cash income, there were many other benefits accruing from adopting market intelligence systems among French

beanproducers. All mentioned the use of French beans as vegetables and making manure while 35 percent used the crop as fodder for livestock. These results are illustrated in Figure 5. When these non-cash benefits were ranked in terms of percent usage, from the top most priority benefit to the least, vegetables (47 percent) were ranked first, followed by fodder (30 percent), manure (15 percent) and over laps (eight percent).

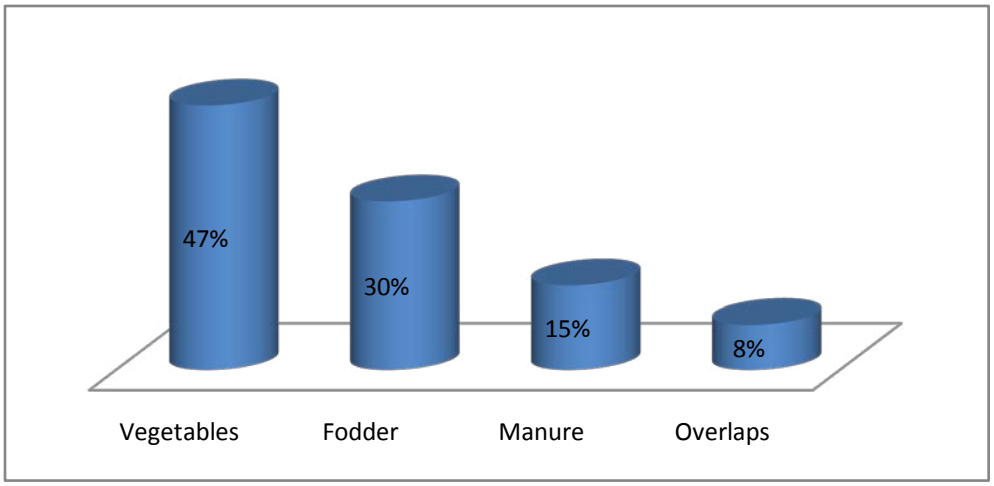

Figure 7: The non-cash benefits of French beans

On average, 30 percent of the total French beans producers in the study area had been trained on how to make compost manure, and were using the produce rejects to feed their livestock and as vegetable. Table 16 gives the analysis of French beans non cash-benefits with farmers using the crop to make manure, livestock feed and use as vegetables.

Table 16: French Beans Non-Cash Benefits in Relation to Market Intelligence Systems

Non cash benefit	% farmers with MIS	% farmers without MIS
Manure	30	70
Fodder	30	70
Food/vegetable	30	70
None	0	70
Mean%	30	70

4.4.1 Challenges in Production of French Beans

The study documented the challenges facing the French beans farming industry in the study area. These included constraints in marketing, possible causes of the constraints, constraints to do with produce rejects and reject sharing, and future expansion plan for the French beans production.

4.4.1.1Constraints in French Bean Marketing

The major constraints noted were related to low prices of the produce, poor quality produce, poor and seasonal markets, poor transport, limited capital, effect of off-seasons, and exaggerated produce rejects. Table 17 summarizes the constraints encountered in the French beans value chain in Ol-Donyo Sabuk.

Table: 17: Constraints Faced in Marketing French Beans in Relation to Market Intelligence Systems

Constraint type	Farmers with MIS	Farmers without MIS	Totals
Lack of enough capital	20(16.67)	12(10.00)	32(26.67)
Poor quality	0	31(25.83)	31(25.83)
Produce rejection	16(13.33)	41(34.17)	57(47.5)
Totals	36(30)	84(70)	120(100)

***Figures in brackets represent percentages**

There was often a breach of contract on either the producer's side or on the processor's side, which was a major constraint in marketing of the produce. This was on the producer's side whereby the producer decides not to adhere to contract demands or on the exporting company.

4.4.1.2 Breach of Contract on the Producer's Side

Farmers often sold their produce outside the contract to other traders when offered a better price and or when offered cash on delivery. Farmers sometimes divert the inputs they have been given (such as fertilizer, pesticides, Irrigation facilities) to other products on their land not cultivated under the contract, thus resulting in lower yields for the

contracted crop than expected. When not able to supply the contracted amount of produce, farmers sometimes buy from other farmers in order to fulfil their quota. In this way, the quality is likely to be compromised and the sustainability of the contract is at risk.

4.4.1.3 Breach of Contract by the Exporting Company/Processors

The processor might not pick up some of the produce or the entire amount of produce as agreed; may fail to pay the price agreed in the contract; or might complain about the quality of the produce and reject it even though all standard shave been met. The reason for the rejection however may not be the quality but the marketing or processing limitations of the processor.

4.4.2 Possible Causes of the Constraints

The root causes of the constraints mentioned above were basically lack of steady market and limited access to marketing information and knowledge. This prompts the conclusion that market intelligence systems affect the farmers in the study area. Limited access to the market and marketing information had created a bad economic situation for the marketing of this produce. Table 18 shows this descriptive statistics, with lack of market access, lack of capital, the problem of low prices of the produce, and lack of market information as the possible constraints the French beans farmers face in the study area. Most of the farmers (16.67 percent) though with access to Market Intelligence Systems expressed lack of capital as the major constraint they face in the study area.

Table 18: Causes of Constraints Faced by French Bean Farmers

Cause of constraint	Number of farmers with MIS	Number of farmers without MIS
Lack of market access	0(0.00)*	24(20.00)
Lack of capital	20(16.67)	30(25.00)
Low prices	16(13.33)	10(8.33)
Lack of market information	0 (0.00)	20(16.67)
Totals	36(30.00)	84(70.0)

****Figures in brackets represent percentages**

4.4.3 Causes of Produce Rejection

The causes of French beans rejection included harmful pest and disease control products, dehydration, physical damages, off seasons, lack of proper crop management, and poor grading.

Table 19: Causes of French Bean Produce Rejection in Relation to Market Intelligence Systems

Causes of rejection	Percent farmers with MIS	Percent without MIS	Totals
Expensive pest and disease control products	10	40	50
Dehydration	0	5	5
Physical damages	10	0	10
Off seasons	10	10	20
Lack of proper crop management	0	5	5
Poor grading	0	10	10
Totals	30	70	100

Table 19 shows causes of produce rejection namely expensive pest and disease control products, dehydration, physical damages, off seasons, lack of proper crop management, and poor grading. Half of the respondent farmers cited expensive pest control products which contributed to poor quality of the produce due to pest and disease attacks, with crop off-seasons as major factors contributing to produce rejection. Table 20 gives the relationship between market intelligence systems and produce rejection.

Table 20: French Bean Rejection in Relation to Marketing Intelligence Systems

Produce rejection	Number of farmers with MIS	Number of farmers without MIS	Totals
Rejected	3(2.5)*	40(33.33)	43(35.83)
Not rejected	33(27.5)	44(36.66)	77(64.16)
Total	36(30)	84(69.99)	120(100)

***Figures in brackets represent percentages**

There was a distinct relationship between French beans market intelligence systems and produce rejection. Farmers with access to market intelligence systems didn't have rejects of the produce meaning they had been trained on how to produce good quality produce for the export market.

4.5 Return on Capital Analysis

Return on Capital (ROC) is a percent financial ratio given by net margin is to total cost of production. It measures profitability of an investment and is usually useful where there is performance comparison of different actor:-

$$\text{Return on Capital (ROC)} = \frac{\text{Net Margin (NM)} * 100}{\text{Total cost production.}}$$

In this case study actors involved in French bean value chain include;

- Individual farmers selling their produce to brokers
- Individual farmers selling their produce to exporters
- Group farmers selling their produce to exporters
- Group farmers selling their produce to brokers
- French beans exporting companies (exporters)
- Brokers (middlemen)

Table 21: Return on Capital for Different Actors within French Beans Value Chain Analysis.

Item cost description	Individual Farmer		Group Farmer		Broker	Exporter
	Selling to exporter	**Selling to brokers**	**Selling to broker**	**Selling to exporter**		
Cost of leasing land in Ksh/acre(leased)	5,000	5,000	5,000	5,000	-	-
Fertilizer use in Ksh/acre	5,000	5,000	5,000	5,000	-	-
Cost of seeds in Ksh per acre,	9,600	9,600	9,600	4,800	-	-
Pesticide application in Ksh	12,000	7,000	6500	8,000	-	-
Cost of labour	60,000	60,000	60,000	45,000	196,200	129,000
Transport cost of produce in Ksh	60,000	60,000	60,000	25,000	45,200	87,000
Facility hire	-	-	-	-	45,000	90,000
Freezers charges	-	-	-	-	15,000	60,000
Shipment cost	-	-	-	-	-	120,000
Cost of irrigation/acre	3,000	3,000	3,000	3,000	-	-
Cost of packaging in Ksh	10,000	10,000	10,000-	10,000	20,000	60,000
Cost of buying from farmer in Ksh,	-	-	-	-	126,500	280,000
Total Cost of production in Ksh, (a)	164,600	109,600	159,100	115,800	447,900	826,000
Total Produce per acre in Kg	2,800	2,800	2,800	2,750	-	-
Total Sales in Ksh per acre, (b)	2800*80 = 224,000	2800*80 = 224,000	2,800*70 = 196, 000	2750*70= 192,500	759,000	1,525,000
Net margin in Ksh, (c) = (b) – (a)	224,000-164,600= 59,400	224,000-177,600= 46,400	196,000-159,100 = 36,900	192,500-115,800=76,700	759,000-447,900=311,100	1,525,000 - 791,000=699,000
Return on capital, (d)= (c)/a*100	59,400 /164,600*100= **36.1%***	46,400/177600*100 = **26.2%***	36,900/149,100*100= 24.7%	76,700/135,800*100= 56.5%	331100/447,900*100 = **69.5%***	699,000/826,000*100= **84.6%***

***Returns on capital for different actors**

According to Table 21, return on capital differs from one actor to another across the value chain with exporters having 84.6 percent, brokers 69.5 percent, group farmers selling to exporter at 56.5 percent, group farmers selling to broker at 24.7 percent, individual farmers selling to exporters at 36.1 percent and 26.2 percent return on capital for individual farmers selling their produce to brokers. Produce transportation was high (Ksh60,000) to individual farmers and also to group farmers who sold their produce to brokers because they had to hire transportation means unlike group farmers selling to exporters where exporters could pick the produce from a collective grading shade. With exception of brokers and exporters, the cost of certified seeds and other farm inputs were high to farmers and this meant low net margins and thus subsequent low return on capital.

Group farmers selling their produce to an exporter had relatively high return on capital of 56.5 percent because their produce was of the best quality for they received technical support from the exporter personnel and thus fetched better price and more so the farmer group had high bargaining power as compared to an individual farmer during contract negotiations. Group selling would be the best option for French beans producers but the delays in payment makes farmers sneak their produce and sell to brokers for prompt payment to address their pressing needs. Also, farmers were not comfortable with the produce rejection within group selling. The explanation was no proper reject traceability rather all produce rejects was for all group members instead of being traced back to the rightful group member.

Individual farmers selling directly to exporters showed high cost of production because they planted certified seeds which are expensive and also produce transport cost was high because they had to arrange for their own means of transport to reach exporter and cost of labour was also high for they employed casual labourers and graders using technical expertise from private service providers. Expect brokers the cost of labour was high to all actors involved in the real production of the produce because French bean is a high value and labour intensive crop. Brokers did not incur high cost of production because theirs was collecting produce from farmers and selling to exporter at high price, hence

high return to capital. The exporter did value addition and or processing of the produce thus fetching high prices in the World Market with subsequent high return on capital.

Though the cost of value addition is high, I would suggest the government establishes a French beans value addition plant that will cater for all farmers in French beans production and a high return on capital will go to Kenya economy but not to foreigners who own most of the value addition plants. The brokers should be removed from the production chain because they misuse farmers making profits where they did not invest and exporters would be advised to improve on their mode of produce payment and produce rejection handling.

4.6 CONCLUSION

The results of this study have revealed that there were only 30 percent of the 120 sampled farmers in the study area that had access to French beans marketing intelligence. Young and energetic age set of 31-54 years with 45.83 percent having basic primary education, and 59.16 percent with secondary education, 3.33 percent with tertiary education and 8.33 percent with no education. Male headed households represented 71.67 percent of the French beans producers were male headed households with women and children providing much of the labour needed. Market intelligence systems had influenced sales revenues and return on capital among French bean producers in Ol-Donyo Sabuk because on average return on capital differs from one actor to another across the value chain with exporters having 84.6 percent, brokers 69.5 percent, group farmers selling to exporter 56.5 percent, group farmers selling to broker 24.7 percent, individual farmers selling to exporters 36.1 percent, and r individual farmers selling their produce to brokers 26.2 percent.

The results also indicate that the main market in the study area was through middle men or brokers with 70 percent of the respondents selling their produce to brokers and 30 percent selling to exporters through organized farmer Self- Help Groups. The broker marketing channel specifically, the selling individually was the most dominant marketing channel in the study area. The main advantage of this arrangement was that it offered

prompt payment than most arrangements, though through this arrangement farmers can participate sustainably over a long period of time in export French beans trade, this arrangement has two major disadvantages. One, it is not a secure marketing arrangement as no long-term relationships are established between the buyer and the seller, and the arrangement is usually active when there is a scarcity of produce and higher demand in the export market. Two and perhaps more importantly, this arrangement does not provide farmers with assistance necessary to stay competitive in global markets. Specifically, this arrangement does not provide a means for farmers to obtain international certification to the food and safety standards.

As a result, the future of the participants of this arrangement is insecure. The second most dominant arrangement is the selling as a group to an exporter. It is the most dominant arrangement in Ol-Donyo Sabuk where most farmers had organized themselves into groups to sell their produce under the arrangement of an exporting company. This arrangement was also the most preferred one where farmers participated in more than one. Given the advantages associated with this arrangement, including access to technical assistance, international certification and the possibility of a guaranteed market, perhaps more needs to be done to make it more attractive to farmers.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATION

5.1 CONCLUSION

The main objective of this study was to assess the impact of market intelligence systems on French bean sales revenue among the French beans producers in Ol-Donyo Sabuk Machakos County, Kenya. This was done through survey research going for original data to give the best results. Besides, the performance of different actors in French beans value chain was analysed. Market intelligence systems was found to be an important parameter in assessing the sales revenues from French beans production.

It sums up to integral part of sustainable rural livelihoods by defining market intelligence systems in relation to the household incomes from French bean sales revenue. This is because revenue from French beans sales had improved farmer livelihoods through school fees paying and meeting subsistence household requirements and with the problem of unemployment in the country at large French beans production gives a self-employment option to youth and reproductive age as revealed by the study findings. The two prominent types of French beans marketing channels in Ol-Donyo Sabuk were through brokers-middlemen and as a group to an exporting company and the exporting company may also act as a broker in one instant or the other. Market intelligence systems influences French bean sales revenue. For instance, in instances where farmers sell their produce to broker there was lack of technical support and trainings on market intelligence and characterized by small produce of poor quality which discourages brokers from paying much money.

The results of this study revealed that there were only 30 percent of 120 sampled populations in the study area having access to French beans marketing intelligence. Young and energetic age set of 31-54 years with 45.83 percent having basic primary education, and 59.16 percent with secondary education, 3.33 percent with tertiary education and 8.33 percent with no education 71.67 percent of the French beans producers are male headed households with women and children providing much of the

labour needed. Market intelligence systems had influenced sales revenues and return on capital among French beans producers in Ol-Donyo Sabuk because on average farmers with access to market intelligence had a return on capital of 56.5 percent and those without access to market intelligence systems had low return on capital. Results also indicate that the main market in the study area was through middle men or brokers with 70 percent of the respondents selling their produce to brokers and 30 percent selling to exporters through organized farmer Self- Help Groups.

The broker channel specifically, the selling individually was the most dominant marketing channel in the study area. The main advantage of this arrangement was that it could offer higher prices than most arrangements, Though through this arrangement farmers can participate sustainably over a long period of time in export French bean trade, this arrangement has two major disadvantages. One, it is not a secure marketing arrangement as no long-term relationships are established between buyer and seller and the arrangement is usually active when there is a scarcity of produce and higher demand in the export market. Second and perhaps more importantly, this arrangement does not provide farmers with assistance necessary to stay competitive in global markets. Specifically, this arrangement does not provide a means for farmers to obtain international certification to the food and safety standards. As a result, the future of participants of this arrangement is insecure.

The second most dominant arrangement is the selling as a group to an exporter. It is relatively dominant arrangement in the Ol-Donyo Sabuk where some farmers had organized themselves into groups to sell their produce under the arrangement of an exporting company. This arrangement was also the most preferred arrangement where farmers participated in more than one. Given the advantages associated with this arrangement including access to technical assistance, international certification and the possibility of a guaranteed market perhaps more needs to be done to make it more attractive to farmers.

More needs to be done to ensure that exporters are held accountable to terms of agreement such as buying produce in the quantities and frequencies agreed on. In

addition, there is need for transparency in determining the grading and the subsequent rejection of produce. Furthermore, many of these exporters tend to offer a fixed price for the produce which many farmers feel is too low. It is one of the reasons why farmers - sold their produce to brokers. This is one area that requires urgent attention. Finally there is need to educate farmers on the need to use their collective bargaining power to negotiate contracts effectively and ensure that all members of their groups keep to the contract terms.

5.2 RECOMMENDATIONS

In view of the study findings, a number of recommendations are suggested to help French bean producers embrace market intelligence systems in production for improved sales revenues in the study area as listed below:

1. There is need to promote compliance to GlobalGAP, in establishment and conformance to produce traceability system so that produce rejects are trucked back to the rightful owner and that customer complaint(s) can be traced and addressed with ease.

2. There is need for small-scale farmers to embrace market intelligence systems for French beans production, for effective adoption, Participatory extension approach should be adopted, and drawing French beans producers from target communities and first training them in French bean market intelligence systems. They should then be trained as trainers and placed in charge of model farms for the purpose of training interested French beans producers because this is very important crop for income generation and is an employment option.

3. There is need to train and eventually introduce the concept of collective selling to farmers and to use their collective bargaining power to negotiate contracts effectively and ensure that all members of their groups keep to the contract terms and don’t sneak produce to sell to brokers. This is advantageous since households practicing group selling have high return on capital, of the produce have a

permanent market and have access to technical support from extension officers or private service providers.

4. The government needs to establish a French beans value addition plant that will cater for all farmers in French beans production and a high return on capital will go to Kenya economy but not to foreigners who own most of the value addition plants. The brokers should be removed from the production chain because they misuse farmers making profits where they did not invest and exporters would be advised to improve on their mode of produce payment and produce rejection handling.

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APPENDICES

APPENDIX 1: SURVEY QUESTIONNAIRE

1) Date of the interview----------Questionnaire No ----------

2) Name of enumerator----------

3) Name of respondent----------

4) Age ---------- Tel/Mobile No----------

1) Gender 1) Male 2) Female

2) Marital status 1) Married 2) Single

5) Education level of respondent (0) none (1) Primary (2) Secondary (3) Tertiary

6) 1) Household size (1) 0-4 (2) 5-14 (3) +15.

2) Relationship of respondent to household head

7) Where do you sell your French beans?.....

8) How do your neighbours sell their French bean produce? .....

9) State reasons for the preference of the selected marketing channel…….

10) Do you sell your produce as an individual or group? 1) Yes and 2 (No) 11) If yes what is the name of the

group?.....

12) If as an individual please give

reasons……

13) Exporting

company…….

14) When did you start producing French beans?

(Year)…….

State the reasons

why.....

15) How many tones did you produce in the last season?

……...

16) What type(s) varieties of French beans did you have in this period? .....

Varieties of French beans	Tick where necessary	Tonnage/pick	Price /kg	Cost of inputs & labour	Marginal benefits
Army(extra fine beans)					
Teresa(fine beans)					
Alexander (both fine & extra fine beans).					
Monera					
Others (specify)					

17) Did you have any problem(s) in marketing of the French beans for the last one year?

1) No 2) Yes.

18) If yes, please state and explain the problems encountered prioritizing from the most important to the least

……

……

19a) what are the main reasons behind the problems of French beans marketing you encountered?

……..

……..

…….

……

b) How did you manage to resolve this problems?……

20) How many times did you sell your produce to brokers in the last one year?

……..

21) How many times did you sell as a group and as an individual?

.....

22) What are the sales revenue from both selling of the French beans that is for the group and the broker selling?

23). Do you have any French bean rejects? 1) Yes 2) No

If yes, what was the problem with the French beans- in the last one year?

1) ……..

2) ……...

3)……

4)……

24) Have you had any training on French bean marketing intelligence? 1) Yes 2) No

25) If yes, how many times did you have the trainings in the last one year?

……..

26a) Give sub headings of the trainings

1)……

2)……

3)……

4)……

b) Has the training been useful in helping improve your French beans production?

……

27) Are you planning to expand your French beans productions? 1) Yes 2) No

If yes, how are you doing it?

1) ----------

2) ----------

3) ----------

4) ----------

28) If No, what are the reasons for not expanding?

1) ----------

2) ----------

3) ----------

4) ----------

5) ----------

29) Are there any other benefits (non cash) that you can attribute to French bean production?

1) Yes 2) No

30) If yes, which are the major ones?

1) ……..

2) …….....

3) ……

31) What constraints did you face in the marketing of your French bean produce in the last one year?

1)……

2)……

3)……

4) ……

32) Did you ever receive any credit / loan for your French bean project in the last one year? 1) No2) Yes

33) If yes, from which institution did you get the credit?

…….

1) Government agency (2) Non-Governmental Organization (NGO)

3) Group (Merry Go Round) (4) Bank (5) any other source (specify)……

34) What is your view on the group or broker selling of the produce? …….

……

……

35) Comparing collective selling or group selling in contrast to the broker or middlemen selling practices?

1)Collective selling	2) Individual selling