TRANSACTION COSTS AND OTHER DETERMINANTS OF CHOICE OF COMPLIANCE ARRANGEMENTS WITH GLOBALGAP STANDARDS AMONG SMALLHOLDER FRENCH BEAN FARMERS: THE CASE OF KIRINYAGA SOUTH DISTRICT, KENYA

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Declaration

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

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Recommendation

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DEDICATION

This work is dedicated to my family for all the support they have afforded to me throughout the course of this study. May God bless you all.

The work is also dedicated to all those with a passion to learn for they make the world a better place to live in.

"If the misery of our poor be caused not by the laws of nature, but by our institutions, great is our sin" ***(Charles Darwin)***

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ABSTRACT

Compliance with various food safety standards has continued to gain significance in the international agri-food trade arena. Although considered voluntary, farmers involved in agri-trade have to comply with safety standards to access international markets. One of the private food safety standards that Kenyan horticultural farmers have to adopt to remain in production is the GLOBALGAP (formerly EUREPGAP). Smallholder farmers in Kenya can comply with the GLOBALGAP either through exporter-individual farmer (private) partnerships or group-based institutional arrangements. Currently, there is no evidence of factors driving farmers to choose any of these arrangements or any other compliance mechanism. Moreover it is not known whether transaction costs have an influence on the choice of compliance arrangements adopted by farmers. So far there is no study that has quantified both visible and hidden transaction costs incurred due to compliance with the food safety standards.

This study is an attempt to: describe the different compliance arrangements prevalent among smallholder farmers; compare transaction costs across the different arrangements and identify factors influencing the choice of compliance arrangement selected by smallholder French bean producers in Kirinyaga South District. The District was selected because not only does it have large numbers of smallholder farmers growing French beans but also all the compliance arrangements are prevalent making it a good case study area. The factors hypothesized to influence the choice of compliance arrangement with the standards were age, gender, household size, education, social capital, income, farm size, transaction costs, market access and availability of credit and extension as well as inputs.

The study was conducted in three villages which have the highest production of French beans in terms of area under the crop in Kirinyaga south District. Purposive sampling was first employed to select the French bean producing villages, a census was then done with the help of village elders and systematic random sampling was used to select 100 farmers for the survey. The census was carried out to enable sampling from the population in order to capture all categories of farmers All the 29 individually compliant farmers in the District were selected. Descriptive statistics and regression analysis (binary logit) were used to analyze the data. Descriptive analysis and empirical estimation was done using SPSS and STATA statistical packages. The findings show that both visible and hidden transaction costs of compliance were higher for an individual than a group farmer. The binary logit results show that recurrent transaction costs and income had a positive influence on individual compliance. Distance to the market, age of household head, numbers of groups the households belong to and household size negatively influenced individual compliance. Hence markets should be brought close to the farmers to reduce transaction costs. Policy should also aim at assisting farmers in compliance e.g. through credit and input support. Smallholder farmers should be encouraged to form groups in order to comply with the standards and to avoid their exclusion from the market. An understanding of the above aspects is critical for both the private and public sectors to inform the formulation of policies and strategies to aid the French bean sector as it provides foreign exchange, employment and food to the Kenyan economy.

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LIST OF ABBREVIATIONS

DAO	District Agriculture Office
EAG	East African Growers
EUREPGAP	Euro- Retailer Produce Working Group on Good Agricultural Practices
FPEAK	Fresh Produce Exporters Association of Kenya
FSS	Food Safety Standards
Global GAP	Global Good Agricultural Practices
GOK	Government of Kenya
GTZ-PSDA	German Technical Co-operation-Private Sector Development in Agriculture
HCDA	Horticultural Crops Development Authority
ICIPE	International Center for Insect Physiology and Ecology
KHE	Kenya Horticultural Exporters
MoA	Ministry of Agriculture
NGO	Non Governmental Organization
NIE	New Institutional Economics
UK	United Kingdom
UNTS	United Nations Trade Statistics

CHAPTER 1: INTRODUCTION

1.1 General background

Fruits and vegetables have some of the fastest growing agricultural markets in developing countries with production increasing by 3.6 and 5.5 percent per annum respectively over the 1980-2006 period (World Bank, 2008). During this period, China had the greatest increase of horticultural production (58%) followed by other developing countries (38%) and the remaining 4% came from developed countries. This shows that the boom in horticulture is mainly occurring in developing countries. In India, fruits and vegetables were the most important growth sector for crop production in the 1990's (World Bank, 2008).

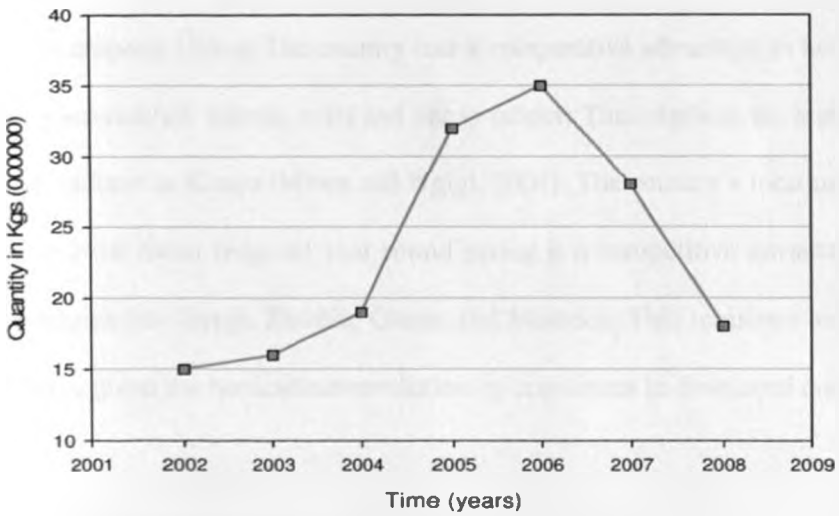
Sub-Saharan African countries have not been left behind. To reduce poverty and achieve higher rates of growth, they have diversified their export portfolio away from primary commodities like coffee, tea and cocoa into non-traditional exports with more propitious market trends (Asfaw et al., 2007). Empirical literature pinpoints the success of horticulture in Kenya, Ghana, South Africa, Egypt and Morocco. In these countries, horticulture or high value crops have contributed to increased rural incomes and reduced rural poverty, through both direct production effects and linkage effects, as horticultural incomes are re-spent in rural areas (Muriithi, 2008).

The agricultural sector is crucial in the Kenyan economy as it provides a source of livelihood to majority of the population. The sector provides food, raw materials, employment, markets and foreign exchange. It accounts for 24% of Gross Domestic Product (GoK, 2009). The majority of the population resides in the rural areas and depends on agriculture as a source of livelihood

directly through farming or indirectly through employment in agro-processing and rural industries. Hence the sector is essential for poverty reduction and increased food security which lead to development.

Horticulture is the fastest growing agricultural sector in Kenya and is a major foreign exchange earner. It is the country's most important foreign exchange earner in the agricultural sector (GoK, 2009). The main export crops are cut flowers, fresh fruits and vegetables. Large-scale producers mainly grow the cut flowers while medium scale and smallholder farmers dominate in production of fresh fruits and vegetables. Frozen and fresh beans are one of the most important vegetable exports from Kenya. The quantity of beans exported have been increasing over time but slowed down in 2006 when it was mandatory for all horticultural produce exported to the European market to be compliant with food safety standards in that market as evident in Figure 1.

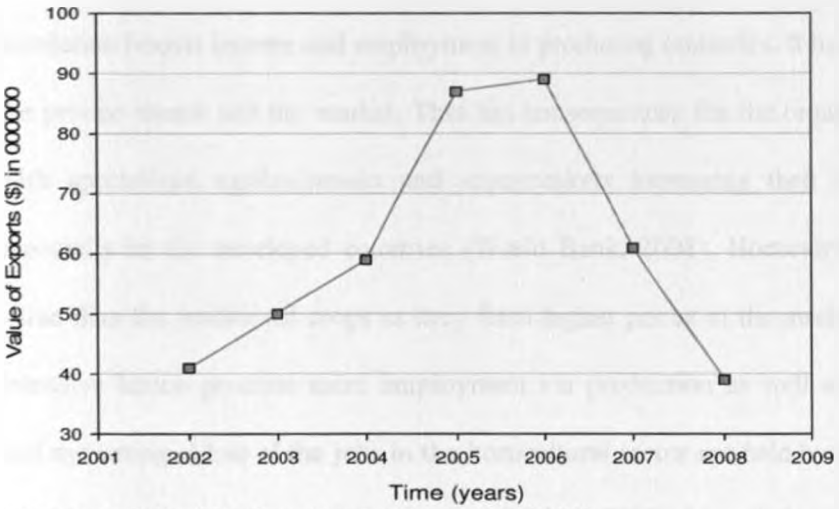
Figure 1: Export quantities of Kenyan frozen and fresh beans



Source: United Nations Trade Statistics (2009)

This pattern in quantity of exported beans has created fluctuations in the value of exported beans as demonstrated in Figure 2. Despite this pattern in quantity of bean production, beans are an important export crop which brings in substantial foreign exchange and provide a livelihood for many Kenyan families.

Figure 2: Value of exported fresh and frozen Kenyan beans



Source: United Nations Trade Statistics (2009)

Kenya has been one of the developing world's most successful exporters of fresh vegetables to the European Union. The country has a comparative advantage in horticulture production due to good rainfall, terrain, soils and cheap labour. This explains the highly acclaimed success of horticulture in Kenya (Minot and Ngigi, 2004). The country's location near the equator allows it to grow these crops all year round giving it a competitive advantage over other producing countries like Egypt, Zambia, Ghana and Morocco. This translates to a horticultural boom for Kenya given the horticulture revolution by consumers in developed countries markets.

The horticulture revolution is a change in consumer diets away from traditional crops like cereals, roots, tubers and pulses to livestock products, vegetable oils, fruits and vegetables (Humphrey, 2008). This is as a result of rapid income growth, increased health awareness, affluent lifestyles, globalization and increasing urbanization. Consumer preferences in industrial countries for variety, convenience, specialty products and year round supplies of fresh produce create global markets for horticultural products (Jaffee et al., 2005). This revolution boosts income and employment in producing countries. It has been driven largely by the private sector and the market. This has consequences for the organization of value chains with specialized agribusinesses and supermarkets increasing their share in these markets especially in the developed countries (World Bank, 2008). Horticultural crops are of higher value than the traditional crops as they fetch higher prices in the markets. They are also labor intensive hence generate more employment via production as well as processing, packaging and marketing. Most of the jobs in the horticultural sector are held by women thereby creating gender equality and empowering women (Mbithi, 2008). Nonetheless, horticultural production is management intensive with heavy use of capital and chemicals. It is a risky business due to pest outbreaks and price volatility. It can inflict considerable harm to the environment through the use of pesticides.

French beans constitute the greatest majority of exported fresh vegetables. They are a highly asset specific vegetable mainly grown for export. They are grown by both large-scale and small scale farmers in various parts of the country. The dominant growing regions are Central and Eastern provinces. French beans are graded according to size and shape. Food safety standards (FSS) require that the beans are not infected by insects. The beans are packed in boxes in extra-

fine and fine grades and shipped by air mainly to Europe. Value addition to the beans involves washing, chopping, packing and labelling. The beans can be packed with other produce like carrots, baby corn, leeks broccoli and cauliflower to create a convenience ready to cook dish (Mbithi, 2008).

The major markets are European countries with the Netherlands and the UK being the dominant buyers. According to the Horticultural Crops Development Authority (2007), the country's exports of fine and extra fine beans were 13,668,330 and 9,635,128 kilograms respectively. These were mainly exported as fresh and canned French beans. Smallholders play an important role in production of French beans for export. Kenya's French bean industry started in the colonial era when colonialists exported this product to their home countries. The practice still continued post independence and expanded rapidly in the 1970's and 1980's. However, the expansion in trade plummeted in the 1990s due to imposition of international FSS in western countries. The industry has since recovered and even increased its volume of exports (McCulloch and Ota, 2006; Okello et al., 2008). However, due to the strict requirements of complying with the standards, some farmers have exited production of the crop while others prefer to grow without complying and sell in the local markets.

Initially, Kenya's French beans exports were limited to the winter-spring months when European producers could not supply. However, the advantages of lower labor and land costs, combined with the rising need for suppliers that could provide produce throughout the year resulted in a shift towards sourcing French beans and other vegetables in North Africa and Sub-Saharan Africa (Minot and Ngigi, 2004). There is a huge demand for this vegetable in both

fresh and processed form in European countries. However, in the local markets, there is a limited but growing demand mainly in the urban areas (Muriithi, 2008).

1.2 Origin of international food safety standards: GlobalGAP standards.

Food safety has become an issue of concern over the last few decades and this has resulted to major changes in the food and agriculture sector. The most prominent change has been the shift from traditional export crops to high value crops with stringent agronomic and processing practices. The increase in these high value crops is attributed to several reasons namely: agricultural reforms and liberalization of trade policies, increased market access, privatization and high prices which serve as a production incentive. In addition, there are changing consumer preferences due to increased incomes, health awareness and changes in dietary habits (Prema - Chandra et al., 2003; Dolan and Humphrey, 2004).

The increasing concern on food and environmental safety by European consumers led to the passing of the United Kingdom food safety Act in 1991, which obliged food retailers to demonstrate "due diligence" to ensure safety of food. Hence, the responsibility of assuring food safety shifted from the public sector to private food retailers and farmers (Okello, 2006). Supermarkets have therefore become much more involved in imposing requirements on how food is to be produced throughout the commodity supply chain, even to the degree of monitoring and controlling horticultural production in developing countries like Kenya (Dolan et al., 2000,; Humphrey, 2008). They have put in place rigorous food production and handling rules which must be strictly adhered to throughout the food supply chain. The new regulations on product traceability and high standards of social and environmental compliance as detailed

in the Global Good Agricultural Practice (GlobalGAP) standards have stimulated the reorganization and development of institutional framework to govern production and marketing of fresh fruits and vegetables.

The institutionalization of FSS especially in developed country markets is attributed to several reasons. First increased awareness of food safety risks particularly those associated with imports originating from developing countries has prompted food retailers to impose standards on food production and handling. This was evident when E.coli was detected in hamburger meat in the U.S, dioxin in poultry meat, Salmonella in eggs and cholera causing organisms in imported fish from East Africa (Spencer and Mitullah, 2004). Secondly, FSS are seen as a way of brand protection by firms. Compliance with FSS reassures consumers on the safety of the food they purchase thereby protecting the retailer's reputation. They also shield retailers from liability in the case of food risks. Thirdly, food retailing in the western countries is highly oligopolistic with a few retailers controlling a large part of the market share thereby giving them power to impose any requirements they want on suppliers and producers. Hence the highly buyer driven FSS witnessed in international food markets (Ignacio, 2007). Fourthly, there are major and increasing changes in governance and regulation of markets. This has led to reduced public control and increased private control of market operations which in turn has led to the amplification of private FSS. Lastly, intensified globalization and trade liberalization has escalated food diversity in global markets. Traceability of the origin of all the food stuffs, especially with food scares like mad cow and salmonella, therefore becomes problematic for the public sectors. Hence the private sector is accorded the duty of ensuring the safety of the

food they vend. This is the so called "due diligence requirement" for food retailers (Eaton et al., 2008).

The GlobalGAP standards formerly known as the Euro Retailer Produce Working Group on Good Agricultural Practices (EurepGAP) is the most widely known example of a common international food standard (McCulloch and Ota, 2006). Though a private and voluntary standard, it is regarded as a condition of entry to European markets and does not provide price premiums. It was originally initiated in 1997 by retailers belonging to the Euro-Retailer Produce Working Group (EUREP) and developed into an equal partnership of agricultural producers and their retail customers. The aim was to develop widely accepted standards and procedures for the global certification of Good Agricultural Practices (GAP). The development of GlobalGAP was driven by the desire by retailers and producers to reassure their consumers of food safety following scares such as mad cow diseases (BSE) and foot-and-mouth epidemic in the U.K (Frohberg et al., 2006). Other concerns include pesticide levels in food products and the rapid introduction of genetically modified foods (Minot and Ngigi, 2004; Asfaw et al., undated). The GlobalGAP protocol has 250 rules or control points. The goal of this protocol is to provide the tools that objectively verify best good agricultural practices to reduce the risk in agricultural production in a systematic and consistent way throughout the world (Spencer and Loader, 1999).

GlobalGAP membership is open to all relevant food retailers, producers and suppliers who agree to the terms of reference of the organization. Membership is divided into three groups. These are retailers, producers/suppliers and associates. According to Wouters et al., (2008),

associates are members engaged in activities related to the food industry or exercising standardization-related activities. GlobalGAP's mission is "to respond to consumer concerns on food safety, environmental protection, worker health, safety and welfare and animal welfare'. To achieve its goals, GlobalGAP developed the "Integrated Farm Insurance Standard", which is product-oriented and contains requirements specific to each concerned agricultural product group. The standard is "a pre-farm gate standard that covers the whole agricultural production process of the certified product from before the plan is in the ground (origin and propagation material control points) or from when the animal enters the production process to non-processed end-product"(Wouters et al., 2008).

Farmers have two options with which to comply with the standards: individually or in groups. They are required to observe hygiene in food handling and to strictly follow outlined agronomic and food processing practices. To be compliant, farmers are required to: adopt alternative ways of managing pests, implement safer ways of handling, storing and disposing pesticides, set up hygienic packing conditions, and establish a traceability system. These standards require that food products meet prescribed pesticide residue levels and care be taken by farmers to reduce exposure of farm workers and other non-target plant and animals to pesticides (Spencer and Jaffee, 2007). Emphasis is placed on consumer safety by using only approved (less toxic) pesticides and strict observance of the pre-harvest interval which prescribes the latest date for pesticide use for ensuring safe residue levels. Farm worker safety especially safe handling, storage of pesticides and disposal, and the use of protective devices and alternative pest management practices is also stressed. This implies switching to new and safer but more costly pesticides, investing in assets such as grading sheds, charcoal coolers,

pesticide disposal pits and pesticide storage area along with keeping technical records of pesticide use and application (Okello, 2006). Failure to comply with these set standards leads to loss of incomes for farmers hence compliance is necessary to ensure market access.

Compliance arrangements as used in this study refer to the various ways farmers choose to comply with standards either individually or in group. The capital costs of compliance, increased bureaucracy and the costs of certification itself are beyond the reach of most small scale farmers. This in turn reduces market access of these farmers and excludes them from the markets. The end result is decreased agricultural production and increased rural poverty. Group compliance is especially encouraged for smallholder farmers to reduce transaction costs, enhance their access to information and inputs as well as increasing their bargaining power in contract negotiation (Narrod et al., 2007).Transaction costs are the costs of information search, contract negotiations and enforcement costs to ensure that both parties to a transaction stick to the agreement. In addition, group compliance guards against quantity risks as crop failure in one farm is compensated by other farms thereby cushioning farmers against contract termination and income scarcity (Okello, 2006). In reducing transaction costs, group compliance contribute to reduction of total costs of French beans production and since farmers are rational they select marketing channels that have higher net benefits or lower total costs (Kirsten et al., 2009).

1.3 Problem statement

A lot of research has been carried out on the Kenyan horticultural sector and particularly on determinants of compliance with international FSS (Okello, 2006; Muriithi, 2008). This is

because compliance is a major determinant of market access as most of the fresh produce is sold in the global markets. Lack of compliance lead to exclusion of small farmers from the market with the consequence being loss of incomes and amplified poverty as indicated in section 1.2. There are two major compliance arrangements with GlobalGAP standards; individual compliance and group compliance. Group compliance is mainly associated with out growers of export companies. The key difference between individual and group compliance lies in the ownership of the buildings and facilities required for compliance. Under individual compliance, these facilities are owned by the individual farmer while under group compliance they are jointly owned by group members. Past research has focused on why farmers comply but not why they choose any of the arrangements making it difficult to devise policies to aid farmers. The study will fill this gap in knowledge.

Various factors determine the compliance arrangement selected among them transaction costs. Transaction costs are either visible or hidden. Visible costs are observable in the market and include: costs of construction of buildings and facilities, equipments (such as sprayers), needs assessment, technical assistance/service, protective gears, inputs used, initial auditing, certification/external auditing and record keeping (Muriithi, 2008). Hidden costs on the other hand are non observable in the market and include information search costs, group membership fee, contract making costs, legal fees on loans for use in compliance and opportunity cost of participating in compliance related activities like meetings.

Most of the research has concentrated on the visible costs while ignoring the hidden costs. Okello (2006), in his study on comparison of small and large scale farmers indicated that

transaction costs are important in determining compliance but failed to separate visible and hidden costs. Similarly, Muriithi (2008), in her study on determinants, costs and implication of compliance with profitability did not consider hidden costs and dwelt mainly on the visible ones. Hence, little is known about the relative importance of hidden transaction costs of compliance and whether they differ across the two arrangements. Moreover, these previous studies on costs of compliance elicited their data from key informants and therefore failed to capture variations of these costs among households. Differences in both visible and hidden costs may determine farmers choice of a given compliance arrangement. Hence, this study will fill this gap in knowledge by estimating and comparing not only the visible transaction costs of compliance in the two arrangements but also the hidden transaction costs.

1.4 Objectives

The overall objective was to assess both visible and hidden transaction costs and other determinants of choice of compliance arrangements with GlobalGAP standards by smallholder French bean producers in Kirinyaga District in Kenya.

Specific objectives

1. To empirically measure and compare visible and hidden transaction costs incurred by farmers when complying with GlobalGAP standards between individual and group compliance arrangements.
2. To assess how transaction costs and other factors influence the choice of compliance arrangements adopted by farmers.

1.5 Hypotheses

1. Individual compliance arrangements have higher visible transaction costs per farmer than group compliance arrangements.
2. Individual compliance arrangements have lower hidden transaction costs per farmer than group compliance arrangements.
3. Socioeconomic, demographic characteristics and transaction costs of farmers have no influence on the choice of compliance arrangement adopted.

1.6 Justification

While over 60% of green beans were produced by smallholders in Kenya in 1980s, this share had dropped considerably as small holder farmers continue to be marginalized from global markets due to non compliance with standards (Spencer and Jaffee, 2007). An understanding of farmers' choice of compliance arrangement with international FSS is imperative as it boosts compliance which in turn enhances consumer confidence and loyalty in their horticultural produce. This in turn guarantees market access for small holder farmers and reduces their exclusion from international markets. Compliance with FSS also contributes to the modernization of industries in developing countries, fosters foreign direct investment and helps developing country products to access higher priced markets and enables producers to enter into more stable business relationships in cases where price-based competition is reduced. Since these FSS are mainly buyer driven and given the oligopoly power of food retailers in Europe, our major buyer, appropriate choice of compliance arrangement is mandatory if small holders are to remain in the export business. Kenya's vision 2030 aims at maintaining the existing markets, developing new markets as well as promoting local markets for horticultural

produce. Appropriate choice of compliance arrangement with standards therefore assures market for French beans thereby helping in the realization of vision 2030.

It is therefore essential to understand the different compliance arrangements that smallholder farmers can adopt and the factors that drive farmers to embrace a given arrangement. This will aid both the government and industry stakeholders in devising strategies that promote smallholder farmer compliance with GlobalGAP standards. The study will provide knowledge on the determinants of choice of the different compliance arrangements adopted by farmers. In addition, the study will not only quantify and compare the direct and indirect transaction costs of compliance between the various arrangements but also assess whether these transaction costs influence the choice of compliance arrangement. Knowing which compliance arrangement has higher transaction costs and the factors determining the choice of compliance arrangement will inform policy with regard to targeting on relevant instruments to employ to promote the French bean sector given its importance in providing foreign exchange and employment.

1.7 Scope of the study

The study was confined to Kirinyaga South District in Central province. The results could not be generalized since this was a case study involving only 130 respondents and therefore could only find limited application to other French beans producing Districts in Kenya and especially those with similar socio-economic characteristics as Kirinyaga South District. The study was done within a larger project investigating the drivers, viability, and livelihood impact of compliance with private food safety standards among smallholder horticultural producers in Kenya. Hence the results fed into a larger study on costs and benefits in the French bean sector.

CHAPTER 2: LITERATURE REVIEW

2.1 International food standards and their effect on smallholder farmers' livelihoods

Various studies have indicated that smallholder farmers are not necessarily marginalized by food standards. On the contrary, they benefit through higher incomes and increased agricultural productivity (Barret et al., 1999; Dolan and Humphrey (2000); Humphrey (2008)).There is also improved health due to adherence to pesticide regulations in Kenya (Okello, 2006). Asfaw et al., (undated) in a study on economic impact of GlobalGAP standards on Kenyan horticultural producers indicated that compliance assures farmers of markets and higher price as well as timely payment by exporters. Compliance increases the quality of production and reduces the amount rejected by buyers and since under GlobalGAP, agrochemicals are stored and handled by trained individuals, there is improved health. Likewise the installation of disposal pits for the waste generated on the farm. clean toilets, baths and hand-washing facilities creates better hygienic conditions. Moreover compliance improves farm neatness as well as increasing farmers' bargaining power with their buyers thereby enabling them to switch from one buyer to another more easily.

However, other studies have reported marginalization of small farmers from global markets due to their inability to afford the heavy investments that accompany compliance as a serious threat to poverty reduction in Africa (Muriithi, 2008; Okello et al., 2006). The failure to comply with FSS results in loss of markets and incomes for farmers as well as retailers of the products (supermarkets). Compliance with these standards for smallholders entails costly investments in variable inputs for example approved pesticides and long term structures like grading sheds, disposal pit and pesticide store (Ogambi, 2006). These investments are lumpy and mostly

specific to the fresh export vegetable business. It is uncertain whether small-scale farmers have the resources and skills to comply with the standards. The high costs of implementing the standards may drive them out of the profitable export market for horticultural produce.

The decrease in smallholder participation in global markets is attributed to the exorbitant costs of adjusting production to line up with international FSS standards provisions as well as the costs associated with actually demonstrating compliance (Okello et al., 2007). The major costs of compliance are investments in requisite facilities, the cost of switching from toxic to less toxic pesticides, changes in productivity arising from the adjustments, and the costs of establishing traceability. On the other hand, the costs of demonstrating compliance include: investment in training and quality assessment manuals, pre-audit costs and certification costs. These costs vary depending on farm size. Researchers, development practitioners, and government are concerned that these changes in requirements by the international supply chains for horticultural and other high-value agricultural products will make it increasingly difficult for smallholders to maintain their position in the export market trade (Dolan and Humphrey, 2000; Jaffee, 2005).

2.2 Determinants of choice of compliance arrangements with food safety standards

Studies have been done on the determinants of compliance with standards but none on factors determining the choice of compliance arrangements. It is plausible that these determinants of compliance with standards in general could also be responsible for the choice of compliance arrangement. According to Okello (2006), in a study on determinants of degree of compliance with food standards by Kenyan farmers, endowments of physical, human and social capital increase the degree of compliance among farmers. Size of land holdings and wealth or

possession of physical assets both increases the degree of compliance with food standards. The study showed that an increase in farm size by one acre increases the degree of compliance by 7 percent while an increase in the value of physical assets by Kshs 100,000 increases the degree of compliance by 12 percent. Farmers with large farm sizes have lower production costs due to economies of scale associated with bulk purchasing of inputs. Wealthy farmers can afford the heavy investments required in compliance with FSS unlike their less wealthy counterparts. Compliance with standards influences profitability of the French bean enterprise by smallholder farmers for rural development and poverty alleviation.

Previous studies on adoption of GlobalGAP standards have identified lack of information access and good networks with exporter enterprises as major barriers to compliance with the standard. Poorer and smaller producers are disadvantaged in accessing information. Exporter enterprises play an important role in the adoption of the standards by the producers by providing them with the necessary information, influencing their decision making and supporting in the implementation. Thus exporter enterprises are a key aspect in the adoption of the standard and its diffusion. Producers who are well networked with exporters are able to get information on the required standards compared to those without a good relation with exporters (Kleinwechter and Grethe, 2006; Chemnitz, 2007).

Institutional arrangements like contract farming also increase smallholder compliance with FSS. Contract farming helps poor smallholders by facilitating their access to inputs and reliable output markets. It permits them to access technical information on pesticide usage, hygiene requirements and agronomic practices that eases compliance with GlobalGAP standards. Technical information is in the form of handouts, training and field extension services. They

also receive quality seeds and in some cases protective clothing under coordinated credit arrangements (Okello et al., 2007).In addition, contract production enables buyers to monitor and enforce GlobalGAP compliance at lower transaction costs under a longer-term relationship.

Farmer's characteristics such as education and experience in farming and human capital attributes are important determinants of compliance (Roy and Thorat, 2008). Given that farmers need capacity to meet the requirements of the product standards, the age of the farmer (proxy for experience) and his/her education level is influential in determining compliance. Younger farmers are more accommodating to change than older farmers who are more risk averse. In addition; they are more educated hence easier to understand the advantages of adopting FSS than their older counterparts. Unlike older farmers, younger farmers are less financially independent hence the tendency would be for them to form groups to be able to comply with standards.

Compliance with FSS is positively influenced by socio-economic factors such as income and farm characteristics such as area under production, and availability of external support like credit and extension services, but negatively influenced by access to off-farm income. High costs of compliance such as the cost of recommended chemicals and that of hiring expert personnel hinder compliance with standards particularly for small holder farmers (Muriithi, 2008).These factors could also determine the choice of compliance arrangement adopted by farmers. High input costs are likely to cause farmers to group in order to enjoy economies of scale in bulk purchasing of inputs and to hire extension personnel. Due to the high risks involved in agricultural production, credit institutions tend to shy away from agriculture. This

may impel smallholder and resource poor farmers to group in order to access credit from microfinance institutions and donors.

2.3 Transaction costs and compliance with standards

The theory of transaction costs economics (TCE) is based on the new institutional economics which asserts that institutions matter for proper functioning of the market. Institutions are the rules that provide a framework of social incentives that shape economic, social and political organization (Kirsten et al., 2009). Transaction costs are costs that are incurred when there is an economic exchange of a good or service and they are mostly independent of the market price of that good or service (Williamson, 1985). They include the costs of information search, bargaining, contract making, monitoring, enforcement and protection of property rights. Transaction costs in simple terms can be viewed as the resources expended in exchange relations that is, buyer-seller relations or agreements to exchange goods or services. They consist of the efforts devoted to finding a market, negotiating, signing a contract, controlling contract compliance, switching costs in case of premature termination of the contract, and any lost opportunities.

Williamson (1991), argues that two human aspects lead to the occurrence of transactions costs. The two human factors are: opportunism and bounded rationality. Opportunism arises due to the self seeking interest of human beings. It asserts that humans will act to further their own self-interests. Opportunism refers to a state where parties to a transaction have damaging and unpredictable behaviour like reneging on contracts. Opportunistic behaviour includes hiding features or preferences, distorting data, concealing issues and otherwise confusing or deceiving partners in exchange. Combined with asymmetric information, it becomes very costly to

distinguish opportunistic from non-opportunistic behaviour ex ante. Bounded rationality affirms that humans are unlikely to have the abilities or resources to consider every outcome associated with a transaction that might arise. This implies that economic agents experience limits in formulating and solving complex problems and in processing (receiving, storing, retrieving, transmitting) information (Eaton et al., 2008). The main consequence of these two assumptions for economic organization is that all complex contracts are unavoidably incomplete and thus many complex incentive alignment processes cannot be implemented. Hence relying on "contract-as-promised" is filled with transaction risks due to opportunism (Williamson, 1991; Williamson, 2000).

The Transaction Costs Economics (TCE) theory defines a transaction cost as a cost incurred in making an economic exchange (Williamson, 1985). A number of different kinds of transaction costs exist. Search and information costs are costs such as those incurred in determining that the required good is available on the market, which market has the lowest price, etc. Bargaining costs are the costs required to come to an acceptable agreement with the other party to the transaction, drawing up an appropriate contract, etc (Dorward, 2001). Policing and enforcement costs are the costs of making sure the other party sticks to the terms of the contract, and taking appropriate action (often through the legal system) if this turns out not to be the case. Transaction costs consist of costs incurred in searching for the best supplier/partner/customer, the cost of establishing a supposedly "tamper-proof" contract, and the costs of monitoring and enforcing the implementation of the contract. Transaction costs occur in markets that fail to meet the requirements of perfect markets.

TCE assert that the total cost incurred by a firm can be grouped largely into two components; transaction costs and production costs. Production costs are the costs incurred in the physical or

other primary processes necessary to create and distribute a good or service. Transaction costs on the other hand are the costs of processing information necessary to coordinate the work of people and machines that perform the primary processes. Empirical measurement of transaction costs is difficult due to: lack of a clear-cut definition of transaction costs; difficulties in separating transaction costs from production costs as they are often jointly determined. Moreover, many forms of transaction may not take place when the cost of transacting is very high and many estimates may be required as individuals and groups in any given society face various opportunities and thus transaction costs. Following North and Wallis (1994), transaction costs and production costs have to be studied simultaneously because it is the total of the production and transaction costs that determines the efficiency of a governance structure if benefits are held constant.

High transaction costs constrain farmer's participation in compliance with FSS. They arise due to asset specificity, uncertainty, information asymmetry and opportunism (Kirsten et al., 2009). Uncertainty arises due to unpredictability in weather, yields, pest or disease attack and prices. Uncertainty exacerbates the problems that arise because of bounded rationality and opportunism. On the other hand, information asymmetry occurs when one party to a transaction has more information over the other with regard to prices, product quality and availability. Asset specificity refers to where the value of an asset may be attached to a particular transaction that it supports. The party who has invested in the asset will incur a loss if the party who has not invested withdraws from the transaction. The possibility (threat) of this party acting opportunistically leads to the so-called "hold-up" problem.

Transaction costs can be categorized into two dimensions: visible versus hidden, fixed versus variable costs. Fixed transactions costs are independent of the quantities sold or bought in the transaction while variable transactions costs change according to quantities sold or bought in the transaction for example, price premiums deriving from bargaining capacity (Fabozzi et al., 2006). Information costs occur before the exchange takes place and include aspects such as searching for attributes that could facilitate the transactions, seeking better prices, and looking for potential buyers (Key et al., 2000). Bargaining or negotiation costs are incurred during the exchange and include the time taken to negotiate a contract, reach an agreement, and make arrangements for payment. Both of these categories are expected to be mostly fixed, although there may be economies of scale in doing multiple contracts at the same time. Measurement and monitoring costs are incurred to ensure that the conditions of an exchange are met for example, enforcing the specified attributes of the product. These costs will have both a fixed component for each project and a variable component depending on the size of the areas that must be measured. Most fixed and variable costs such as information search costs, bargaining and enforcements costs are visible in the market. Transaction costs also depend on observability.Visible transaction costs are those cost that are observable in the market and known upfront such as a commissions and fees, and taxes. Hidden transaction costs, on the other hand, are unobservable in the market and are unknown in advance. Some transaction costs that fall in this category are market impact costs and trading opportunity cost (Ortega-Pacheco, undated).

Ownership of assets such as arable land and livestock contribute to the economies of scale of production, which leads to lower transaction costs per unit output sold while off farm income alleviate variable transaction costs in markets. In addition, larger sized household tend to increase the transaction costs in marketing. Female farmers appear to be constrained in their

participation in horticultural markets, ostensibly due to problems of access to irrigation resources as well as cultural and legal perceptions (Makhura, 2001).

Landowners' transaction costs can be influenced by factors such as attributes of the transactions, bio-physical and ecological/resource factors, community organizational conditions, the co-management arrangements resulting from negotiations and the characteristics of the landowners (Mburu et al., 2003). The landowners' characteristics include human, social and financial capital, and land tenure conditions. Age as an indicator of human capital has a positive influence on the willingness to bear transaction costs in places where community members have an already established power structure and the leadership by the elderly is recognized (Mburu et al., 2003). Active membership in local groups, which is an indicator of social capital, has a significant influence in areas where groups play an important role.

Information access, speed of payment and distance to the market are major determinants of the level of transaction costs and the marketing channel chosen by farmers (Nkhori, 2004). The further the distance to market the higher the transaction costs. This is because buyers will use a lot of money and time to travel in search of goods. This is particularly hard for agricultural products as the buyer will incur heavy losses to and fro the farm enquiring about availability and yield of produce. However, technological advancement like use of mobile phones and investment in physical infrastructure like tarmac roads can reduce these transaction costs (Zoss and Pletziger, 2007).

Most transaction costs studies have concentrated on the visible transaction costs while ignoring the hidden transaction costs of compliance with GlobalGAP standards. Other studies have been done on the indirect/hidden costs but not in the French bean sector. For instance Hernan et al.

(2006), in a study on compliance in the beef sector in Argentina concluded that level of commitment, leadership, trust and size of farm per producer have high influence on the success of collective action in compliance. Hence, there is need to investigate and estimate these visible and hidden transaction costs in the French bean sector to determine whether they have an influence on the choice of compliance arrangement which in turn affects the level of compliance with GlobalGAP standards.

CHAPTER 3: METHODOLOGY

3.1 Area of study

The area of study is Kirinyaga South District in Central province of Kenya. It has two divisions (Mwea East and West), 7 locations and 24 sub-locations. It lies in the mid-altitude range, 1000 to 1400 meters above sea level. It has an estimated population of 137,581 persons with a density of 236 persons per square kilometer (District Agricultural Office, Kirinyaga South, 2010). Kirinyaga South District has a varied tropical climate. The pattern of rainfall is typically equatorial, since the District is situated within the highlands of Kenya and near the Equator. It has annual average rainfall ranging from 400-1200 mm. The average annual temperature range is 20.1-24°C (Kirinyaga District Development Plan 2002-2008).

The District is divided into two main agro-ecological zones: upper middle and lower middle. The zones are suitable for growing maize, cotton, coffee and sunflower depending on rainfall levels and soil types. There are several types of soils in the region; red soils, black cotton soils, sandy soils and loam soils. Soil fertility varies considerably from one area to another. Most of the District is covered by black cotton soil which is suitable for rice production. (Kirinyaga District Development Plan 2002-2008). It is an agricultural based District with both crop and animal production being dominant. Rice growing and horticulture are the major economic activities in the area although horticulture is emerging as an activity with higher prospects in the District. Among the most important horticultural crops are tomato, French bean, onions, banana, mango, pawpaw and avocado (District Agricultural Office, Kirinyaga South, 2010).

Kirinyaga South District was purposively selected for this study due to its unique agricultural practices. First, the area grows large quantities of French beans that are exported to

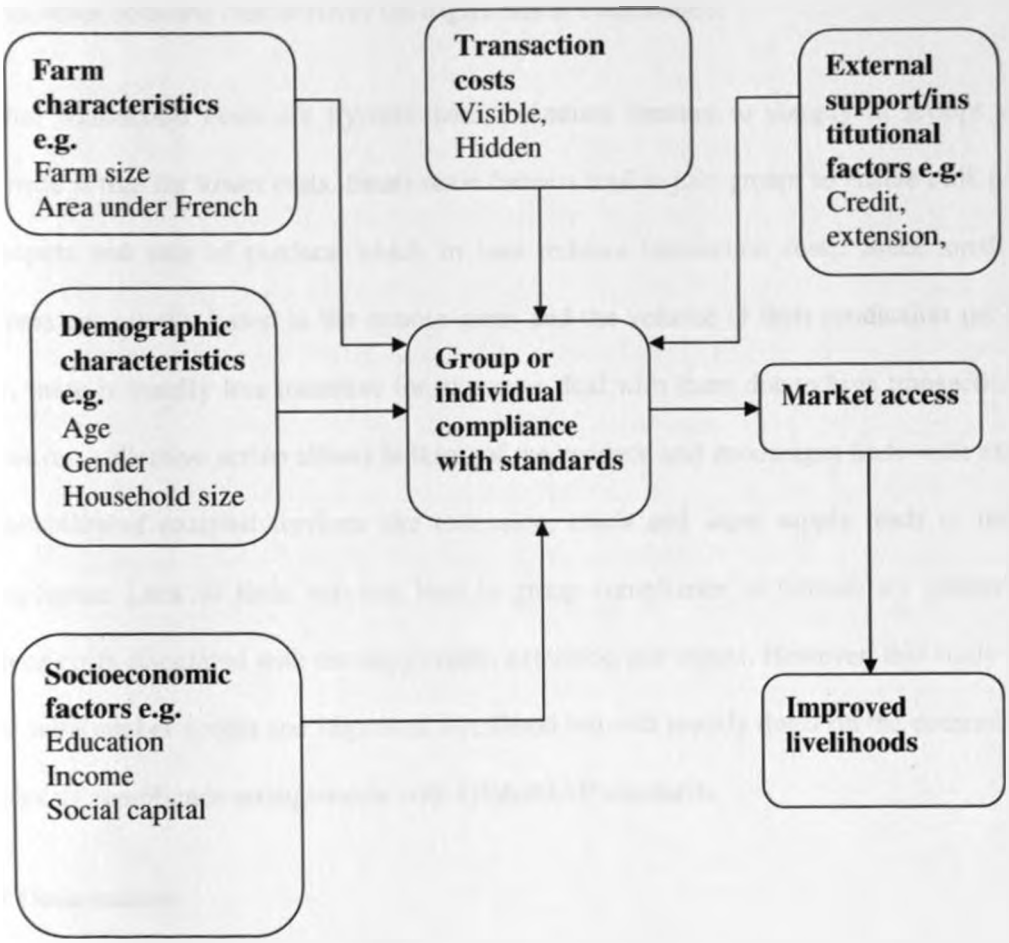
international markets. Secondly, the crop is mainly grown by smallholder farmers and all the compliance arrangements are common thus making the District a good case study for understanding the determinants of choice of compliance arrangement with food safety standards by smallholder farmers.

3.2 Conceptual framework

The conceptual framework for the choice of compliance arrangement in the French beans sub sector is represented in Figure 3. Farmers' choice of arrangements is a function of their individual characteristics and the costs of compliance i.e. they want to maximize their utility. The study borrows from the transaction costs economics (TCE) theory within the new institutional economics (NIE) to explain the behavior of farmers as they choose the compliance arrangement that best suits them. This survey is based on the fact that the farmer's choice of compliance arrangement with GlobalGAP standards is dependent on an array of individual and institutional factors.

Compliance through groups or individual arrangements is hypothesized to be determined by various factors. These include: individual characteristics of the farmer like age and gender, socio economic characteristics of the farmer like income, education level and social capital as well as farm characteristics such as farm size and area under French beans. In addition, transaction costs, market access and external support like credit, extension and input supply influences the farmers' choice of compliance arrangements. Farmers' education, income and social connections have a great influence on compliance. Wealthy and more educated farmers with good social networks are more likely to comply individually rather than in groups. This is because they can afford the lumpy investment costs associated with compliance and they

Figure 3: Determinants of choice of compliance arrangements with GlobalGAP standards among smallholder farmers



Source: author's conceptualization, 2010

understand the rigorous compliance requirements better. On the other hand, poor illiterate and non networked farmers will lean towards group compliance to enable combined purchase of inputs and sale of outputs (Okello, 2006).This in turn reduces their transaction costs. Farmers with larger farm sizes and greater area under the crop will more likely comply individually as opposed to those with smaller farm sizes. This is because they are able to produce higher

quantities of the crop consequently higher incomes which surpass the high costs of compliance. For small farm sizes, it is not economically practical to invest in compliance individually since the incomes obtained cannot cover the high costs of compliance.

Higher transaction costs are hypothesized to induce farmers to comply in groups and the opposite is true for lower costs. Small scale farmers tend to join groups to enable bulk purchase of inputs and sale of produce which in turn reduces transaction costs. Since small holder farmers are usually based in the remote areas and the volume of their production per farm is low, there is usually less incentive for exporters deal with them due to high transaction costs. However, collective action allows bulking of the produce and encourages trade with exporters. Availability of external services like extension, credit and input supply leads to individual compliance. Lack of these services lead to group compliance as farmers act collectively to reduce costs associated with securing credit, extension and inputs. However, this study will not deal with market access and improved livelihood but will mainly dwell on the determinants of choice of compliance arrangements with GlobalGAP standards.

3.3 Data sources

The study utilized cross sectional primary data collected among smallholder farmers. A preliminary survey was done to obtain general information on both the study area and French bean production by conducting focus group discussions and key informant interviews. Focus group discussions were held with farmers, group officials, extension agents, MoA staff and exporters to elicit information on general perception, constraints and viability of the GlobalGAP standards. A semi structured questionnaire was then administered to collect household socioeconomic data, costs of compliance and other data needed for modeling factors

influencing the choice of compliance arrangements with the standards. The questionnaire contained both open ended and closed questions with regard to age, gender, education level of farmers, household size, farming experience, farm size, area under French beans, total output, transaction costs incurred during compliance, availability of credit, extension services, input supply, fixed assets, type of certification, compliance arrangement, membership in local groups, additional costs of adopting GlobalGAP standards, benefits and constraints of compliance. The household survey questionnaire is attached in Appendix 3. Primary data from the study was reinforced by secondary data from the Horticultural Crops Development Authority (HCDA), Ministry of Agriculture (MoA), exporters and government publications. Three administrative locations within Kirinyaga South were covered: Nyangati, Tebere and Kangai locations. These locations fall in the same agro-ecological zone and therefore were treated as one unit in this study.

3.4 Sampling procedure

Purposive sampling was first carried out to select Kirinyaga South District due to its suitability to the study. With the help of the Ministry of Agriculture (MoA) officials from the District, three dominant French bean growing locations were identified. The dominant growing villages in each location were selected and a census conducted for each village. The census involved listing all the households in the 9 villages with the help of the chiefs, sub chiefs and village elders. Village maps were first drawn and the household names were listed systematically from one side of the village to the other. A sampling frame of 1000 small scale farmers was made and through the use of systematic random sampling, a representative sample of 100 group compliant, non compliant and non growing farmers was selected by choosing every tenth farmer. Due to time and budget constraints, a large sample size was not affordable.

For the individual compliant farmers who are outgrowers of exporters, since they are not many, a sampling frame was created with the help of exporters and all the 30 farmers selected for the study. Hence the sample consisted of 100 randomly selected farmers and the whole population of individually compliant farmers which was 30. The village census and focus group discussions were done in January 2010 while data collection was conducted in February 2010.The survey was executed with the help of 7 trained enumerators.

3.5 Data Analysis

3.5.1 Descriptive Analysis

For the first objective of describing the different compliance arrangements prevalent in Kirinyaga South District and the second objective of measuring and comparing transaction costs between group and individual compliance arrangements, descriptive statistics were used. Descriptive statistical methods were employed in capturing the qualitative and quantitative variables that are important in explaining the choice of compliance arrangement adopted by farmers. Means, modes, frequencies, percentages, standard deviations and medians of various variables were obtained. T-tests were used to compare demographic, household, farm and other external characteristics between the various compliance arrangements.

Several methods were used in estimation of transaction costs. The visible costs which were mainly additional costs due to compliance and maintenance of compliance were elicited by asking the costs of these components. To estimate the hidden costs such as opportunity costs of attending meetings, farmers were requested to estimate both the time spent traveling to meetings and the time spent in either group meetings or individual meetings with exporters and the time value was calculated using the wage rate in the area. Opportunity cost was taken as returns from time spent in meetings which on a normal day would be allocated to other

economic activities such as farming. The other costs were estimated by asking farmers to state their monetary value of aspects like refreshments, group communication costs, transport costs, group maintenance costs among others. Then a comparison of the different transaction costs was made between individually compliant and group compliant farmers. The t test of mean difference was used to show whether there was significance difference between the means of visible and hidden transaction costs across the two compliance arrangements.

3.5.2 Regression analysis

For the third objective of assessing how transaction costs and other factors influenced the choice of the compliance arrangements adopted by farmers, discrete choice modeling was applied through the use of a binary logit model. As the compliance arrangements are two, it is a discrete choice decision which can be estimated using either binary logit or probit regression. The two models are based on the random utility model (McFadden, 1973, Gujarati, 2004). The binary logit assumes that the error terms are logistically distributed while the binary probit assumes a normal distribution of error terms. The two models yield similar results but the logit model was chosen because of its simplicity. Due to the dichotomy of the dependent variable, ordinary least squares (OLS) cannot be used for estimation as dependent variable is not continuous and the relationship between the dependent and independent variables is non linear. Estimation can only be done using maximum likelihood method. Using OLS might result in estimates being inefficient and heteroscedastic (as the dependant variable is binary) hence hypothesis testing would be inaccurate and misleading (Gujarati, 2004). The estimation of this type therefore entails the use of binary response models: the binary logit and binary probit.

Binary logistic regression applies maximum likelihood estimation after transforming the dependent into a logit variable (the natural log of the odds of the dependent occurring or not). In this way, logistic regression estimates the odds of a certain event occurring. Logistic regression has many analogies to OLS regression: logit coefficients correspond to β coefficients in the logistic regression equation, the standardized logit coefficients correspond to beta weights, and a pseudo R^2 statistic is available to summarize the strength of the relationship between the explanatory and explained variables. Unlike OLS regression, however, logistic regression does not assume linearity of relationship between the independent variables and the dependent, does not require normally distributed variables, does not assume homoscedasticity, and in general has less stringent requirements. It does, however, require that observations be independent and that the independent variables be linearly related to the logit of the dependent.

The utility of a farmer to an alternative is specified as a linear function of his/her individual characteristics, the attributes of the alternative plus an error term. In the case of two alternatives there are two random utilities for each alternative each with its own error term (Greene, 2008). The probability that a farmer will choose a given alternative is given by the probability that the utility of that alternative to him/her is greater than the utility of all the other alternatives. He/she chooses the alternative that maximizes his utility (McFadden, 1973). The alternative chosen depend on both the non error term component of the utilities and the values of the error terms associated with these utilities for that farmer (Maddala, 1986). The farmer chooses a single alternative from a number of distinct alternatives by weighing the attributes of each available arrangement and picking the alternative which maximizes utility. If farmer i is faced with j different compliance arrangements, he/she chooses the one that maximizes his/her utility subject to his economic constraints on expenditure. The decision is determined by the utility

level U_{ij}, an individual i derives from choosing alternative j. The random utility model for farmer i can be given as:

$U_{ij}=x_{ij}\beta_j+\varepsilon_{ij}$ where i=1,... N individuals; j=1,....J alternatives

Hence an underlying unobserved or latent variable Y_i^* can be defined to denote the level of indirect utility associated with the j^{th} choice. The unobservable variable is related to the actual decision to comply individually or in a group with the GlobalGAP standards. The observed variables are defined as:

$Y_i=1$ if $Y_i^* = \max(Y_1^* Y_2^* ..... Y_m^*)$

$Y_i=0$ otherwise

Assuming there are no ties, then $Y_i^*=x_i\beta_i+\varepsilon_i$ Where Xi represents a set of independent variables influencing the decision of the i^{th} farmer like transaction costs, age, gender and education level. β_i are the estimated parameters and ε_i is the residual that captures unobserved variations in farmers tastes and in the attributes of alternatives as well as errors in perception and optimization by farmers (Maddala, 1986).

The binary logistic regression model, which examines farmers' choice between individual and group compliance with GlobalGAP standards is given by Equation 1:

$$E[y \mid x] = F(\beta' x) = \frac{e^{\beta' x}}{1 + e^{\beta' x}} \quad \text{.....Equation 1}$$

If the residuals are independently and identically distributed with a cumulative distribution function given as $F(\varepsilon_i<E)=\exp(-e^{-E})$ and whose probability density function is $F(\varepsilon_j) = \exp(-$

$\exp(-\varepsilon_{ij})$), an analytical solution exists and the probability of a given choice alternative for the i^{th} individual is given by

$$P(yi=j) = \frac{\exp(X_{ij}\beta_j)}{1 + \sum_{k} \exp(X_{ik}\beta_j)}, \qquad k=i,\ldots,j \quad \text{..... Equation 2}$$

Where y_i is the observed outcome i.e. choice of compliance arrangement j for the i^{th} farmer and X_i is a vector of explanatory variables. The unknown parameters β_j are typically estimated by maximum likelihood (ML) estimation method.

Binary logistic regression can yield either odds ratio or marginal coefficients. Odds ratios are interpreted such that if an explanatory variable changes by one unit, the probability of choosing individual compliance changes by a factor of exp β. In short, significant variables with an odds ratio greater than (less than) one will increase (decrease) the probability of selecting individual compliance. Marginal coefficients indicate how changes in explanatory variables influence the probability of selecting the compliance arrangement holding all other variables constant and are interpreted as typical beta coefficients in a linear regression model. Marginal probabilities were used due to their ease of interpretation.

The choice of a given compliance arrangement was hypothesized as follows;

$COMPARR_i = a_O + \beta_1 ED_i + \beta_2 Y_i + \beta_3 SC_i + \beta_4 FS_i + \beta_5 AF_i + \beta_6 A_i + \beta_7 G_i + \beta_8 HHS_i + \beta_9 C_i + \beta_{10} EX_i + \beta_{11} IS_i + \beta_{12} ITC_i + \beta_{13} RTC_i + \varepsilon_i$ ..... Equation 3

Where:

COMPARR$_i$ is the farmer's decision to comply with standards either individually or in a group. $\mathbf{a_0}$ is the constant term, **β's** are the parameters to be estimated, $\mathbf{Ed_i}$ is the education level of farmer *i*, ***Yi*** is the income of farmer *i*, ***SCi*** is the farmer's social capital, $\mathbf{FS_i}$ is the size of the farm owned by farmer *i*, $\mathbf{AF_i}$ is the area under French bean in farmer *i's* farm, $\boldsymbol{A_i}$ is the age of

farmer *i*, G_i is the gender of farmer *i*, ***HHS*** is the household size in farmer i's home, C_i is credit availability to the farmer, Ex_i is extension services availability to farmer *I*, IS_i represents input supply to farmer *i*, ITC_i is the farmer's investment transaction costs while RTC_i represents his recurrent transaction costs and ε_i is the error term. Taking individual compliance as positive and group compliance as negative, the hypothesized sign of the variables are as seen in Table 1. More educated farmers who have higher incomes are expected to comply individually as they can afford the high cost inputs required for compliance and they understand the strict regulations in a better way. Farmers who belong to many groups are expected to comply collectively due to trust and similarity of interests. Growers with larger farm sizes and area under French beans are expected to comply individually since the larger quantities harvested cover up for the heavy costs of compliance. Younger farmers are expected to comply in groups as they are not yet financially stable. Smaller household are expected to comply individually since the dependency rate is low hence they have more money at their disposal to invest in compliance. Male headed households are expected to comply individually because they are more endowed with resources. Households that have access to credit, extension and input supply services are expected to comply individually since they can afford the inputs and have sufficient information to invest in compliance. Those without these services are expected to act collectively to access credit, extension and to purchase inputs in bulk. High visible and hidden transaction costs are expected to induce farmers to comply collectively to reduce the costs and maximize profits.

3.6 Data analysis techniques

Data analysis was done using descriptive and econometric techniques. The software packages used for data management and analysis were Statistical Package for Social Sciences (SPSS), STATA and Ms Excel.

Table 1: Hypothesized variables and their signs

Variable	Measurement	A priori sign
1. Socioeconomic factors		
Education	years of schooling	+
Income	shillings	+
Social capital	No. of groups household belong to	-
2. Farm characteristics		
Farm size	acres	+
Area under French beans	acres	+
3. Demographic(farmer) characteristics		
Age	years	–
Gender	sex of household head:	
	Male =1, female = 0	+
Household size	number	–
4. Support services		
Credit	Did you obtain credit for use last year:	
	Yes=1, No = 0	+
Extension	Did you receive extension contact last year:	
	Yes=1, No = 0	+
Input supply	Is input available at all times:	
	Yes=1, No = 0	+
5. Transaction costs		
Direct/visible	shillings	–
Indirect /hidden	shillings	–

Source: Author's Computation, 2010

CHAPTER 4: RESULTS AND DISCUSSION

4.0 Descriptive statistics

4.1.0 General information on compliance

From preliminary information gathered established that the major horticulture producing areas in Kirinyaga region are Mwea, Ndia, Kirinyaga Central and Gichugu. Fruits, vegetables and flowers were the main horticultural crops. These included French beans, bananas, mangoes, avocadoes, butternuts, pawpaw, baby corn, morbydicks, tomatoes, onions, melons, passion fruits and cabbages. The production of these crops is both rain fed and irrigated. French beans are the dominant crop grown in 2,474 hectares with an average production of 2 tonnes per hectare (DAO, Kirinyaga South, 2010). Tomatoes are also common in the mid to lower zone but are mainly produced for local market. There are about 79 groups involved in fruits and vegetable production for export. The availability of many water sources such as rivers, canals and dykes enables horticultural production throughout the year. However, this production is constrained by non binding contracts, rejection of produce, high input prices but low output prices, lack of a clear grading system and difficulty in obtaining credit. This is as narrated by farmer groups in Kirinyaga South District. But there is acknowledgement that compliance enables market access, increases employment and enhances community development as well as agricultural production.

Training on GlobalGAP was conducted in 2005 by MoA and HCDA and most farmers complied from 2006. Farmers have complied either individually in groups or under exporters. Initially, group compliance was facilitated by GTZ-PSDA, ICIPE and Agribusiness and Allied with farmers contributing a small portion of money. The major export companies include Homegrown, Saccofresh, Sunripe, Frigoken, Kenya Horticultural Exporters (KHE), Indufarm

and East African growers. Compliance financing was done using donor/exporter support, farmers own savings or loans from commercial banks and microfinance institutions. The horticultural crops for export are marketed through contractual arrangements with exporters. These contracts are signed between the exporter and farmers. Farmers also sell their produce to brokers who in turn sell to exporters in Nairobi. Brokers pay in cash for the produce. Payments to individually compliant farmers are made to direct to their bank accounts. For group compliant farmers, payments are made to the group account then the group officials distribute the money to the individual farmers.

4.1.1 Compliance status of farmers

In the randomized sample, 36% were complying with the GlobalGAP standards in groups as outgrowers of exporters. About 23% of farmers were exitors i.e. they had initially complied with the standards but then abandoned compliance while 33% were non adopters i.e. they had never adopted the standards even though they grew French beans. [1]. Exitors and non adopters produce French beans without complying. Around 8% of the farmers did not grow French beans. The individually compliant farmers were 30 but one was a large scale farmer hence was removed from the analysis. The compliant farmers sold their produce to exporters while the exitors and non adopters sold their produce to brokers who in turn sold to exporters. For the non growers of French beans, 3% indicated that they were not growing the crop due to low returns, 2% cited high production costs while 1% indicated that they were not interested in growing the crop. For the exitors', 9% cited the key reason for abandoning the standards was

[1] Later in the econometric model, only two of the compliance categories were used because data was not large enough to consider the other categories i.e. only compliant farmers are considered in the model

large amounts of the produce being rejected by exporters, 6% said it was due to low profitability of the crop and 3% abandoned due to many compliance requirements.

The level of awareness of GlobalGAP standards was very high (100%) in the survey area .The bulk of the individually compliant farmers started complying with GlobalGAP standards in 2006 while those in group compliance started complying in 2005.

4.2 Demographic characteristics of household head

4.2.1 Age

The individually compliant household heads were younger in general than the group compliant ones as evidenced in Table 2. The t-test reveals that there is a significant difference in age of farmers within the two compliant categories. This is in line with findings by Muriithi (2008) and Okello (2006) that younger farmers comply individually. Younger farmers tend to be more risk taking and hence may opt for individual compliance while the older ones act collectively to reduce risks. On the other hand the non compliant farmers and the non growers were relatively younger than the compliant farmers on average. This may be explained by the fact that these farmers are not as established economically as their older compliant counterparts hence they cannot afford the costs of compliance with standards. Hence they may opt to grow the crop and sell to brokers or not grow at all and instead grow competing crops like tomatoes and rice.

Table 2: Descriptive statistics of selected variables

Variable: Mean (Std Dev.)and %	Random sample n=100	Individually compliant n=29	Group compliant n=36	Exitors' n=23	Non adopters n=33	Non growers n=8
Age (years)	43(11)	43(8)	46(10)	42(11)	41(11)	42(12)
No of groups the household was part of	2(1)	1(1)	2(1)	2(1)	1(1)	1(1)
Education (years)	8(3)	11(3)	8(4)	8(2)	8(3)	7(4)
Household size	4(1)	4(1)	4(2)	4(1)	4(1)	3(1)
% of males	92	90	92	96	91	88
% membership in groups	81	73	100	87	70	50

Source: Author's computation from Survey data, 2010

4.2.2 Education

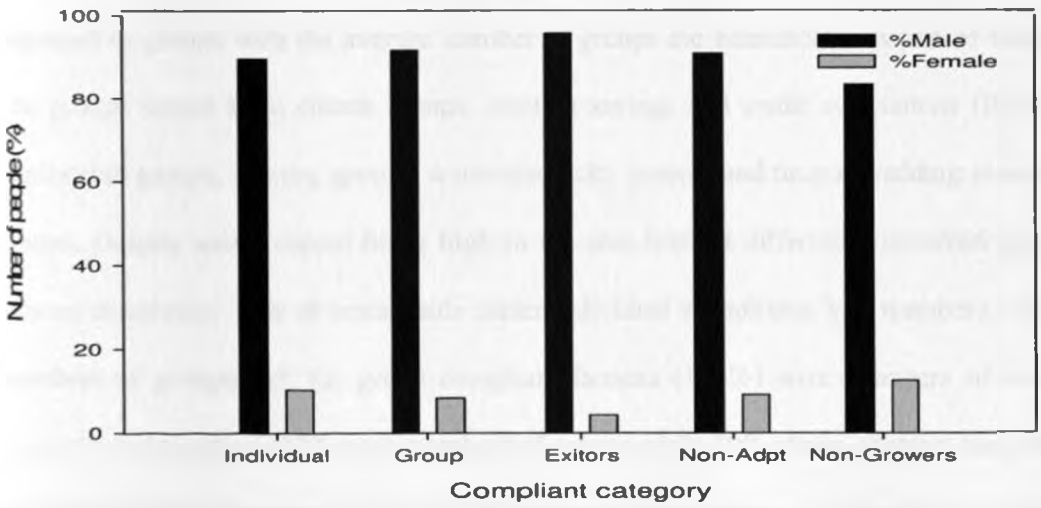
For the randomized sample, the average years of education for the household head were eight years with the most educated farmer having a degree and the least educated having no formal schooling. The most educated farmers were the individually compliant farmers whose average number of education in years was eleven years as shown in Table 2. For the group compliant farmers, the average number of education in years was eight and the least educated was zero years of schooling and the most educated having 16 years of schooling (a bachelor's degree). For the exitors, the average number of education in years was 8 while the non adopters had an average of eight years of education. The non growers had the lowest education levels with an average of seven years .These findings concur with those of Muriithi (2008), who found that compliant farmers were generally more educated than non compliant farmers. Due to the lower levels of formal education by these farmers, they may not be able to comprehend the importance of compliance with standards and the rigorous requirements that have to be followed in complying with the standards compared to the compliant farmers. The fact that French bean production is highly asset specific and technology intensive may explain why non

compliant and non growing farmers who have fewer years of education than the compliant French beans growers may opt to produce other crops with less stringent obligations.

4.2.3 Gender

About, 92 % of the randomly sampled households were headed by males. Generally the female headed households were fewer in the area of study as shown in Table 2. Majority of the households in the area were male headed with a few female headed households as evident in Figure 4. The non growers category had the highest percent of female headed households (12%) followed by individual compliance, non adopters, group compliance and the category with the least female heads being the exitors.

***Figure 4*: Gender distribution of household heads in the various categories**



Source: author's computation from survey data, 2010

4.2.4 Household size

Overall in the random sample, the average members in a household were four people with the maximum being eight members and the minimum being one member. Comparisons of the

household sizes in the various categories are shown in Table 2. The mean number of people in the household for the compliant and non compliant categories was four although the standard deviation for the group compliance category was higher. The average size for the non growing household was three members which may be explained by the fact that the non growers of French beans are younger persons who have either not established families or who have young families. The growers of French beans had bigger households and hence more labour for production. Under both individual and group compliance, there was no single person household.

4.2.5 Social capital

The results showed that the level of social capital as proxied by membership in groups in the survey area was high. In the random sample, about 81% of households had members who belonged to groups with the average number of groups the household was part of being two. The groups varied from church groups, rotating savings and credit associations (ROSCA's), family/clan groups, farming groups, water/electricity groups, and funeral/wedding arrangement groups. Despite social capital being high in the area marked differences occurred across the various categories; 73% of households under individual compliance had members who were members of groups. All the group compliant farmers (100%) were members of economic groups. For the exitors, 87% were members of groups while 70% of non adopters had members of household being members of groups. In the case of non growers, membership in groups was 50% .The average number of groups the household belonged to was two within group compliant farmers and one in individual compliance category. The average number of groups among the exitors and non adopters' categories were two and one respectively as shown in

Table 2. Farmers with lower social capital tended to comply with the standards under individual compliance. This agrees with findings by Muriithi (2008), which showed that the higher the membership in groups, the higher the probability of compliance under groups. The majority of the groups for the group compliant farmers were farming or water groups. In contrast, membership in groups for the individually compliant farmers was mainly in family groups, ROSCA's and church groups. All the individually compliant farmers indicated that they were non members of farming groups as they were not sure of the benefits hence they were not interested in joining any.

4.2.6 Income

Since compliance with standards is expensive, income is a great determinant of choice of compliance arrangement adopted by farmers. As expected, individually compliant farmers had higher levels of income than all the other categories with 60% earning more than Kshs 30000 per month compared to only 2.8% who earned this amount under group compliance. No individually compliant farmer earned less than Kshs 5000 while 5.6% of group farmers earned between Kshs 2500 and 5000 as shown in Table 3. Under group compliance, 38.9% of farmers earned between Kshs 5000 and 10000 as compared to 7% of individual compliance. Only13% of individually compliant farmers earned between Kshs 10000 and 20000 compared to around 28% of group farmers. Under group compliance there was no farmer who earned less than Kshs 2500 per month.

This result is in line with findings by Muriithi (2008) and is important because wealthier farmers are more able to cater for the numerous and expensive requirements of compliance with GlobalGAP standards. The income levels of the non compliant farmers and non growers were remarkably lower compared to those of the compliant farmers. For exitors, 39% of

farmers earned between Kshs 10000 and 20000 per month. For the non adopters, more than 50% earned less than Kshs 10000 per month while 6.1% earned more than Kshs 30000. Unlike under compliance, the non compliant categories had farmers who earned less than Kshs 2500 per month indicating that they were very poor. These results show that overall; the compliant farmers had higher levels of income than their non compliant colleagues. For the non growers, 25% earn between Kshs 2500-5000, 25% between Kshs 5000-10000, 37.5% earn between Kshs 10000-20000, and 12.5% earn more than Kshs 30000.

Table 3: Percentages of income levels in each category

Estimate of total monthly income bracket(%)	Individually compliant farmers n=29	Group compliant farmers n=36	Exitors n=23	Non adopters n=33	Non growers n=8
1500-2500	-	-	8.7	9	-
2500-5000	-	5.6	13	21	25
5000-10000	7	38.9	17.4	25	25
10000-20000	13	27.8	39	30	37.5
20000-30000	20	25	17.4	9	-
>30000	60	2.8	4.3	6	12.5

Source: author's computation from survey data, 2010

4.2.7 Occupation

Majority of the household heads (95%) in the randomized sample were mainly farmers in terms of time i.e. the activity in which they dedicate most of their time to, 4% were salaried workers while 1% were self employed in non farm activities. The trend was similar when comparisons were made across the various categories. For individually compliant farmers, 83% were mainly farmers and 17% were salaried workers. This may be explained by the fact that these farmers were relatively younger and more educated hence their chances of formal employment were higher. For group compliant farmers, 92% were farmers and 8% were employed. The number of household heads who were in salaried employment was higher in individual compliance than in group compliance. Hence these farmers have another source of income from where they can

source some extra money to finance compliance with standards unlike their group compliant counterparts. In the exitors' category, all the household heads were farmers while in the non adopters' category, 97% were mainly farmers and 3% were self employed in non farm activities. For non growers, 88 % were primarily farmers and 12 % were self employed as shown in Table 4.

Table 4: Occupation of the household head

	Main occupation of household head (%)		
Compliance category	Farming	Salaried worker	Self employed
Randomized sample	95	4	1
Individual compliance n=29	83	17	0
Group compliance n=36	92	8	0
Exitors n=23	100	0	0
Non adopters n=33	97	0	3
Non growers n=8	88	12	0

Source: author's computation from survey data, 2010

4.3 Institutional, farm and market characteristics

4.3.1 Credit

In the randomized sample, 60 % of household heads indicated that they had not received any form of credit to use in French beans production in the last one year while about 32 % had received some form of credit for use in production. The remaining 8 % of the farmers were non growers of French beans. Across the categories comparison revealed that all the individually compliant farmers (100%) had received credit for use in French beans production compared to 58% under group compliance in the previous year. The non compliant farmers had received relatively lower levels of credit than the compliant farmers. Only 17% of the exitors and 21% of the non adopters had received any form of credit for use in French beans production. Table 5 shows the exact number of farmers who had received credit in each category. This agrees with

findings by Herman (2006), that credit availability enables the purchase of costly inputs for compliance. Since credit access is lower for group farmers, there is the tendency to act collectively to purchase inputs and market their produce. In general the compliant farmers had higher access to credit than the non compliant farmers hence they are more able to afford the strict requirements of compliance. The major form of credit for the group and individually compliant farmers was materials mainly from exporters followed by money from commercial banks, informal lenders and relatives/friends. The exitors and non adopters sourced their credit from relatives and friends mainly in form of cash. All the compliant farmers are aided by exporters in compliance through input and extension provision, auditing fee with none acknowledging that exporters provide credit or money support. The major exporter for the individual compliant farmers is Homegrown (K) Ltd. For the group compliant farmers, 75% sold their produce to Kenya Horticultural Exporters (KHE), 14% to Sunripe, 6% to Blue cargo and 5% to East African growers.

4.3.2 Extension

In the random sample, 58% of the sample had received extension advice on French beans production in the last year while 34 % had not and 8% were non growers of the crop. However access to extension services varied across the categories. All the individually compliant farmers had received extension services in the last year while 94% of the group compliant farmers had received extension services. The non compliant farmers had lower levels of access to extension services with only 30% of exitors' and 51% of the non adopters having received extension services. Overall the access to extension services was higher for the compliant farmers and lower for the non compliant farmers. The major source of the extension services was exporters for group and individually compliant farmers while input dealers, local traders and other

farmers were the providers of extension for exitors and non adopters. The main services provided by exporters included product handling, pest management, soil and water use chemical handling, record keeping and field hygiene while the input dealers mainly gave advice on pest management and chemical handling.

4.3.3 Farm size

All the selected farmers were also the owners of their land. For the random sample, the average size of the farms was 2.1 acres with the farmer with the largest piece of land having 8 acres and the one with the smallest piece having a quarter acre. Individually compliant farmers had the largest farms with the average being 9.4 acres while group compliant farmers had relatively lower pieces of land compared to their individually compliant colleagues with the average being 2.3 acres. Thus individually compliant farmers, who have larger farm sizes, are able to enjoy economies of scale in production. For the group compliant farmers the tendency was to practice partial compliance with the facilities such as the charcoal coolers, grading shed and pack house being owned by the group while the farmer purchased the required inputs. Farm sizes reduced further under non compliance as exitors had an average of 2.1 acres and the non adopters had an average of 1.9 acres. For the non growers the average was 1.1 acres. Compliant farmers had larger pieces of land than the non compliant farmers. The non growers had very little pieces of land such that negligible portions remained after deducting the land used as homestead.

4.3.4 Area under French beans

Overall in the random sample, the average area under French bean production was 0.7 acres. Individually compliant farmers had the largest areas under the crop with the average being 5.5

acres. The average for group compliant farmers was 0.9 acres while that of exitors and non adopters, was 0.7 and 0.6 acres respectively. The exact figures in each category are as shown in Table 8. Hence compliant farmers had larger areas of their land under French beans compared to the non compliant farmers.

Table 5: Farm and external support variables

Variable (%)	Random sample n=100	Individually compliant n=29	Group compliant n=36	Exitors n=23	Non adopters n=33	Non growers n=8
Extension on French beans Production in the last year	58	100	94	30	51	-
Credit for use in French beans production in the last year	32	100	58	17	21	-
All year long availability of inputs	100	100	100	100	100	-
Average size of farms in acres	2.1	9.4	2.3	2.1	1.9	1.1
Average area under French beans in acres	0.7	5.5	0.9	0.7	0.6	-

Source: author's computation from survey data, 2010

4.3.5 Access to markets and infrastructure

Overall, individually compliant farmers had better access to input markets and infrastructural facilities than group compliant farmers as shown in Table 6. The average distance to the main market, bean collection point, nearest input store was lower for the individually compliant than the group compliant farmers. The distance to the main input market was lower by an average of 1.75 km for individually compliant farmers compared with the group farmers. This concurs with Makhura (2001) who found that poor access to markets increases transaction costs and discourages horticultural production. Access to better roads was higher for individual farmers whereby 37% had access to a tarmac road as the main road to the market thereby easing transport to the market at all seasons. Among the group compliant farmers there was no case where the main road to the market was a tarmac road hence their ease of access to input

markets is lower than that of individually compliant farmers. This coupled with the fact that the costs of transport of the produce to the market was higher by Kshs 17 compared to the individually compliant farmers makes the group compliant farmers to be at a disadvantage in terms of market and infrastructural access. Hence it is possible that these reasons were partly responsible for farmers who are a bit far from the market to form groups to reduce the costs of transport by purchasing inputs in bulk.

Table 6: Markets and infrastructure variables

Mean distance to (km) and cost	Individuall y compliant	Group compliant	exitors	Non adopters	Non growers
Main market	5.25	7	5.3	5.1	5.6
Nearest input store	1	1	1	0.5	1
Nearest bean collection centre	0.5	1.3	1.7	1.7	1.8
Most important town	107	105	107	100	85
Cost of transport to main market (Kshs)	86	103	72	83	98

Source: author's computation from survey data, 2010

4.4. Costs of compliance with standards for the various compliance arrangements

4.4.1 Production costs

These costs were calculated based on the immediate previous growing season at the time of data collection. Farmers stated the costs of fertilizers, seed, chemicals, equipment as well as costs of labor used in all the agronomic processes from the time the crop is planted to when it reaches the exporter. Production costs, total revenue and profits for the whole farm realized for individual farmers were significantly higher than for the group farmers. Individually compliant farmers incurred an average of Kshs 77,687 to produce French beans while group compliant farmers incurred about Kshs 41,213.This makes sense since under individual compliance, the farm size and area under the crop are larger than under group compliance. However, individual farmers were more efficient in

production than group farmers as the average production costs per acre for the individually compliant farmers were Kshs 9,990 while that of the group farmers was Kshs 24,068. Hence they incurred about Kshs 14,078 less in production per acre than the group farmers. The exact values of these costs and revenues for each category are represented in Table 7.

Table 7: Production costs for individual and group compliant farmers

Variable (for the previous growing season) per acre	Individual compliance (n=29) Mean (Std Dev.) in Kshs	Group compliance (n=36) Mean (Std Dev.) in Kshs
Per acre: Production costs	9,990(6,118)	24,068(19,548)
Total farm: Production costs	77,687(55,0091)	41,213(25,934)

Source: author's computation from survey data, 2010

4.4.2 Visible/direct transaction costs.

This sub-section tests the Hypothesis 1 that "Individual compliance arrangements have higher visible transaction costs per farmer than group compliance arrangements." Visible transaction costs are observable and they fall into two categories: investment and recurrent costs. Investment costs are the additional costs due to compliance or establishment of arrangements while recurrent costs are the costs of maintaining compliance. Hence visible transaction costs comprises of initial costs of compliance requirements together with the maintenance costs. Since some farmers were already growing French beans before compliance, investment costs were taken to be the additional costs of buildings, equipment, inputs and service provision that were incurred as a result of compliance.

The recurrent costs are the costs of either replacing or renovating the buildings, equipment and technical services or repeating the purchase of inputs annually. Farmers were requested to state the period in which they renovated or replaced these items and how much it costs them to do each time and the annual costs of maintenance were calculated based on this information. Tables 8 and 9 show the investment costs of initial compliance and recurrent or maintenance of compliance costs incurred per year by the farmers. The Tables show the cost items, additional costs, maintenance costs and the total direct costs incurred. From Table 8, an individual farmer used approximately Kshs 64,410 to set up required buildings and facilities. Group compliant farmers incurred less in this category due to collective action with the average costs being approximately Kshs 8,330 These buildings and facilities include chemical and fertilizer stores, pack houses, grading shed, toilet facilities, and irrigation station. The additional cost of compliance incurred in purchasing additional equipments such as pesticide delivery and irrigation equipment cost each farmer an approximate amount of Kshs 30,431 for individually compliant farmers and Kshs 6,872 for group compliant farmers.

Another component of GlobalGAP compliance was the technical services such as soil and water analysis. Under group compliance, this process was mainly paid for by other parties mainly the exporters and not the farmers. Individual farmers reported that they pay an average of Kshs 657 for this service annually. For certification, the farmers were also required to purchase protective gears like face masks, gloves, aprons, and gumboots to protect themselves during spraying of chemicals. From the survey it cost each farmer an average of Ksh.3, 543 for individual farmers and Kshs 1,378 for group farmers to buy these protective clothes per year.

Further, to be certified, the farmers were also required to change some of the inputs from what they used before. These included chemicals such as insecticides, fungicides and fertilizers.

Table 8: Investment costs of compliance

Investment cost	Individual compliance(n=29) Mean (Kshs)	Group compliance(n=36) Mean (Kshs)
Pesticide store	11,207	4,665
Storage room for fertilizers	5,150	1,446
Pack house	11,981	-
Toilet	4,431	2,720
Irrigation station	1,142	-
Grading shed	34,931	3,666
Pesticide delivery equipment	2,573	2,747
Irrigation equipment	27,858	4,125
Soil and water analysis Equipment	657	-
Masks	674	170
Gloves	585	256
Apron and or boots	2,284	952
Costs of insecticides per season	4,944	2,641
Costs of fertilizers per season	7,179	2,197
Initial cost of record keeping	3,728	53
Total investment costs	119,324	25,638

Table 9: Recurrent costs of compliance

Maintenance costs per annum	Individual compliance (n=29) Mean (Kshs)	Group compliance (n=36) Mean (Kshs)
Pesticide store	826	435
Storage room for fertilizers	473	484
Pack house	732	0
Toilet	510	630
Irrigation station	528	0
Grading shed	925	1,566
Pesticide delivery equipment	641	665
Irrigation equipment	2,750	3,595
Soil and water analysis equipment e.g. augers	642	0
Masks	761	766
Gloves	585	439
Apron and or boots	1,431	590
Costs of insecticides per season	51,420	24,500
Costs of fertilizers per season	68,717	25,722
Annual cost of record keeping	44,855	1,106
Total maintenance costs	175,796	60,498

Source: author's computation from survey data, 2010

Farmers in the study area noted that the current recommended chemicals cost them much more than before. The average additional costs of inputs for the individual compliant and group compliant farmers were approximately Kshs 12,123 and 4,838 respectively. However it's not possible to conclude that this high cost has been contributed by the standards alone. Other factors such as change in prices of chemicals may have resulted to this incremental cost.

For a farm to be certified, it must undergo internal and external certification audits both of which are rather expensive particularly for smallholder farmers. From the study, the auditing cost was paid by either the exporters or NGOs on behalf of the farmers hence were not included in the calculations. Discussions with exporters revealed that the internal auditing process cost an individual independent farmer about Ksh.3, 800 while external or certification audit cost about Ksh.6, 000 on a yearly basis. Internal and external auditing cost each farmer in a group Kshs 3,155 and Kshs. 2, 373 respectively. This cost however may be higher or lower across different farmers contracted by different exporters or across different certification bodies.

To maintain the certification with the standards, farmers are required to keep records of all their activities involved from land preparation to harvesting and sale of the French beans for easy traceability of the origin of the product. Such records includes: date of planting, variety of beans planted, chemical applied, amount applied and date of application, date of harvesting and amount harvested and many other aspects. Individual farmers are required to hire clerks to keep their records while farmers organized in groups hired clerks jointly. The average cost of record keeping for individual farmers was Ksh.3, 728 per month while that of group farmers was Kshs 53 per month. Group compliant farmers therefore incurred less record keeping costs by about Kshs 3675 per month.

Some cost categories like needs assessment of the farm were fully paid for by other entities mainly the exporters and not by the farmers hence they were not included. Needs assessment is a process done on the farm before the GlobalGAP certification process begins to ascertain whether the farm is suitable to be certified with the standards. It involves a general view of the farm in terms of location, landscape, distance from water source, farm management practices in place, and type of enterprises present in the farm plus other important aspects of the farm (Muriithi, 2008).

The total additional costs of compliance for an individually compliant farmer and a group compliant farmer were Kshs.119, 324 and Kshs. 25, 638 respectively. This implies that individually compliant farmers incurred about 79% more than farmers organized in a group. The average costs of maintenance per annum of all the compliance components were Kshs175, 796 for individual farmers and Kshs 60,498 for group farmers. Hence individual farmers incurred an average of Kshs 115,298 more to maintain compliance than group farmers. The average total visible transaction costs which is the sum of investment and recurrent costs was Kshs 295,120 for individually compliant farmers and Kshs 86,136 for group compliant farmers. These high direct transaction costs under individual compliance may stimulate the less wealthy farmers to comply collectively to share the costs. The mean difference test shows a t value of 9.663 with 64 degrees of freedom at 1% level of significance meaning that there is a significant difference in visible transaction costs between the two arrangements. Since the mean visible transaction costs for individual compliance and group compliance were Kshs 295,120 and 86,136 respectively, the null hypothesis was not rejected as indeed the direct transaction costs of individually compliant farmers were 71% more than for group compliant farmers.

4.4.3 Hidden transaction costs

This sub-section tests the Hypothesis that "Individual compliance arrangements have lower hidden transaction costs per farmer than group compliance arrangements". Hidden transaction costs are unobservable in the market. They are grouped into investment and recurrent costs. Hidden investment transaction costs are incurred before compliance and they include information search costs as well as contract making and negotiation costs. On the other hand, hidden recurrent costs are the unobservable costs of maintaining compliance such as the opportunity costs of participating in compliance related activities. The money value of time in activities related to information search and contract negotiation was obtained by adding up the total time spent traveling to and from the meeting and time spent in the meeting and the sum of the two was multiplied by the hourly wage rate for the farmer. The sum of money value of time spent in a compliance activity, transport costs and incidental expenses incurred while doing that activity gave the total hidden transaction costs for that activity. Information search activities included meetings with exporters, government officials and friends. The average transaction costs of information search were Kshs 2,633 for individual farmers and Kshs 1,526 for group farmers as shown in Table 10. After obtaining the information, the farmers then attended contract signing meetings. The average hidden transaction costs that individual farmers incurred during the contract making process was Kshs 452 while that of group farmers was Kshs 394.

To maintain compliance, obtain production and market information, farmers in groups have to attend group meetings either with or without exporters attend audit meetings and sometimes meet creditors in search of money to use in production. On the other hand, individual farmers have to meet with the exporter technical assistants' at least once a week depending on the

information needs of the farmer and their audit meeting takes place at least once a year with some meeting with creditors. The opportunity costs of participating in these compliance related activities or the total hidden recurrent costs were Kshs 11,955 and Kshs 7,442 for individually compliant farmers and group farmers respectively.

Table 10: Hidden investment and recurrent transaction costs of compliance

Variable		Individual compliance n=29	Group compliance n=36
		Mean (Kshs)	Mean (Kshs)
Investment costs	Information search	2,633	1,526
	Contract signing/bargaining	452	394
Recurrent costs	Opportunity costs of participation in compliance activities	11,955	7,442

Source: author's computation from survey data, 2010

Group membership fee ranged from Kshs 1000 to 2500 depending on the policy of the group. The average total hidden investment transaction costs for individual farmers from information search and contract making was Kshs 3085 while that of group farmers was Kshs 1,920. The mean difference test of hidden investment transaction costs gave a t value=6.28 with 64 d.f indicating a highly significant difference in these costs at 1% level. Since the mean hidden transaction costs for individual compliance was higher than that of group compliance, the null hypothesis was rejected and the alternative that individual farmers have higher hidden transaction costs than group farmers was accepted.

4.4.4 Revenues and profitability

Production costs, total revenue and profits realized for the whole farm for individual farmers were significantly higher than for the group farmers. Individually compliant farmers realized

an average of Kshs 671,913 in revenue while group farmers obtained about Kshs 105,376. The average revenue per acre for individual farmers was Kshs 75,086 with that of the group farmers being 54,382. This signifies a difference of about Kshs 20,704 more accruing to individual farmers per acre. After deducting production costs and recurrent transaction costs, the same trend is observed in profit levels with the average per farm for individual farmers being Kshs 420,217 while that of the group farmers being Kshs 6,944. The individual farmers therefore obtain profit levels which are on average way higher what the group farmers receive. The exact values of these costs and revenues for each category are represented in Table 11.

Table 11: Production costs and revenues for individual and group compliant farmers

Variable (for the previous growing season)	Individual compliance (n=29)	Group compliance (n=36)
	Mean (Std Dev.) in Kshs	Mean (Std Dev.) in Kshs
Per acre:		
Production costs	9,990(6,118)	24,068(19,548)
Total revenue	75,086(50,542)	54,382(36,660)
Total farm:		
Production costs	77,687(55,0091)	41,213(25,934)
Recurrent transaction costs	175,796(109,118)	60,498(35,673)
Total revenue	671,913(722,078)	105,376(77,357)
Profit	420,217(651,421)	6,944(69,340)

Source: author's computation from survey data, 2010

4.5 Evaluation of determinants of compliance arrangements

4.5.1 Selection of explanatory variables used in the model

The independent variables used in model were generated from literature review and focus group discussions. The variables and their expected signs are presented in Table 12.

Correlation matrices were used to show whether variables can be used in the model. The results of the correlation matrices generated are given as Appendix 1.Where two variables had a correlation of more than 0.6 one of the variables was dropped. From literature, educated farmers are found to be more able to process information and search for appropriate technologies to alleviate their production and marketing constraints than uneducated farmers (Muriithi, 2008). Farmers who have acquired more years of formal schooling tend to be more technically efficient and have better recognition of advantages of new technologies (Oladeebo and Fajuyigbe, 2007). It is believed that education gives farmers the ability to perceive, interpret and respond to new information much faster than their counterparts without education. A study by Asfaw (2007) on GlobalGAP standards shows that more educated farmers are more likely to adopt the standards than less educated ones.

Table 12: Description of estimated variables and their expected signs

Variable	*Description*	*Expected signs*
Age	Age of the household head in years	+
Education	Number of years of schooling for the farmer	+
Income	Household income in shillings	+
Household size	Number of people in the household who cook and eat together from the same pot	-
Transaction costs	Visible and hidden transaction costs in shillings	+
Distance	distance from farm to the market (KM)	-
Number of groups	Total number of groups which the household members are part of.	-

Source: Variables determined by the Author

Gender of the household is an important variable since horticultural farming is mainly done by women (Muriithi, 2008). It was therefore expected that the female headed households would have a higher probability of complying with the standards than the male headed ones.

It is expected that the older farmers are more risk averse than the younger farmers. Since individual compliance is costly, it is expected that older farmers will comply in groups to minimize the chances of losing large amounts of money in case of weather, theft or market risks like reduced prices. On the other hand, it is argued that the higher the age of the farmer, the more stable the household economy as older people also have richer experiences of the social and physical environments and farming activities. In addition older farmers have better access to land compared to their younger counterparts who have to wait for land allocation by their parents. Following this second argument, older farmer are more likely to comply individually than in groups because the general ability to supervise other group members decreases with advancement in age together with the fact that they are more experienced in farming.

The household income was included because the higher the income of the farmer, the more he is able to solely afford the expensive compliance requirements such as building and facilities, equipments and inputs. It is expected that the wealthier the farmer, the higher the tendency to comply individually with the standards and vice versa.

Distance to the main market is expected to influence the farmer's choice of group compliance positively. The greater the distance from the market, the higher the transport costs and the production costs. The further the distance to the input market the higher the transaction costs. This is because buyers and farmers will use a lot of money and time to travel in search of goods. Hence farmers who are nearer to the market are expected to comply individually while those that are further away are expected to join up in groups to reduce transport costs.

Visible plus hidden investment and recurrent transaction costs were also included in the model as they were expected to be significant determinants of the types of compliance arrangement

adopted by farmers. The higher the transaction costs in a given compliance arrangement, the lower the chances of farmers selecting that arrangement as it would lead to very high costs of production and marketing of the produce and vice versa. High visible transaction costs are hypothesized to encourage group compliance while high hidden transaction costs are hypothesized to encourage individual compliance.

The size of the family is hypothesized to be an important factor that would determine the household dependency rate. Families which are smaller are expected to have a lower dependency rate and less disposable labor to invest in individual compliance and the reverse is true for group compliance.

Since nearly all the households from both compliance arrangements had members who were part of groups, membership in group could not be included in the model. Moreover membership in farming groups did not show sufficient variation as the entire group farmers were members of farming groups and nearly all the individual farmers were non members of a farming group. However there was correlation between compliance arrangement and the total number of groups a household's members belonged to hence this variable was included. It is expected that if the household members are members of many groups, then they are more likely to comply in groups due to homogeneity of interests and norms as well as the higher level of trust they have in their fellow group members.

4.5.2 Binary logit model results

A binary logit model was estimated to investigate the factors that influence the decision of the farmers to comply individually or in a group with GlobalGAP standards. Hypothesis testing

was conducted and results presented. The results of the binary logit model are presented in Tables 13 and 14. Since the study is mainly dwelling on the determinants of choice of compliance arrangement with the GlobalGAP standards, only the compliant farmers were included in the model. Out of the 130 farmers, only 65 were compliant hence this was the sample size in the regression model. The dependent variable is the compliance arrangement adopted and it is a dummy variable with two categories of choices: 1 if the farmer is individually compliant with the GlobalGAP standards and 0 if the farmer complies in a group. Two models were run, one with investment transaction costs and the other with recurrent transaction costs. The results show the coefficients, marginal effects of the independent variables, standard error, Z and P values.

From Table 13 and 14, distance to the market, income, recurrent transaction costs, age of the household head, household size and number of groups the household is affiliated with had a significant influence on farmer's choice of compliance arrangement with GlobalGAP standards. Other variables such as investment transaction costs, education and gender were not significant. Income as well as both visible and hidden recurrent transaction costs positively influenced the decision of the farmer to comply individually with GlobalGAP standards. Distance to the main market, age of the farmer, household size and total number of groups for the household negatively influenced the decision of the farmer to comply individually.

Table 13: Maximum likelihood estimates of determinants of choice of compliance arrangements (Investment transaction costs)

Variable	Coefficient	Std error	z	P value	Marginal effects
Log H.I.T.C	-.6747	1 .323	-0.51	0.610	.8182
Age household head	-.0319	.0461	-0.69	0.489	-.0077
Education household head	.1868	.1661	1.12	0.261	.0456
Gender household head	-.7655	1.379	-0.55	0.579	-.1868
Household size	-.5814	.3455	-1.68	0.092*	-.1419
Income	.0082	.0030	2.66	0.008***	.0020
No. of groups	-1.504	.5726	-2.63	0.009***	-.3673
Distance to market	-.7416	.2496	-2.97	0.003***	-.1810
constant	7.983	5.088	1.57	0.117	-

n = 65 LR chi2(8) = 50.29 Prob > chi2=0.0000 Pseudo R2 = 0.5629
H.I.T.C=hidden investment transaction costs
***=significance at 1%,*=significance at 10%

Table 14: MLE estimates of determinants of choice of compliance arrangements (Recurrent transaction costs)

Variable	Coefficient	Std error	z	P value	Marginal effects
Log H.R.T.C	5.224	4.138	1.26	0.099*	.8182
Log V.R.T.C	19.496	10.179	1.92	0.044**	3.053
Age	-.2516	.1689	-1.49	0.072*	-.0394
Education	.2564	.2581	0.99	0.258	.0401
Household size	-.9169	.7944	-1.15	0.248	-.1436
Income	.0043	.0047	0.93	0.511	.00068
No. of groups	-2.210	1.579	-1.40	0.070*	-.3463
Distance to market	-.9734	.5305	-1.83	0.089 *	-.1524
Constant	-96.979	52.546	-1.85	0.065	-

n =65 LR chi2(8) = 72.30 Prob > chi2 =0.0000 Pseudo R2 = 0.8091
H.R.T.C=hidden recurrent transaction costs
V.R.T.C=visible recurrent transaction costs
**=significance at 5 %,*=significance at 10%

Source: Author's computation from survey data, 2010

4.5.3 Discussion of model results

This sub-section discusses Hypothesis 3 as stated in Chapter 1. The hypothesis states that, "Socioeconomic, demographic characteristics and transaction costs of farmers have no influence on the choice of compliance arrangements adopted". Socio economic factors included income, education and group membership. Demographic factors on the other hand included; age, gender of the household head and household size. The overall significance of the model was high (pseudo R^2 was 80% for recurrent transaction costs model) indicating that the most of the variation in the dependent variable was explained by the estimated independent variables.

Results of marginal effects in Table 13 and 14 shows that distance to the market was significant and found to negatively influence choice of individual compliance as prior predicted. As the distance from the market increases, the probability of the farmer to comply in a group increases. An increase in distance to the market by one kilometer reduces the chances of individual compliance by 18% and increases the chances of group compliance by the same value. The variable was significant at 95% confidence interval, therefore does not agree with the null hypothesis. This was in line with findings by Muriithi (2008), that distance to the market induces farmers to act collectively to reduce costs of production and marketing through collective purchase of inputs and sale of products.

The farmer's income had a significant and positive effect on individual compliance. An increase in income for the farmers increases the chances of the farmer selecting individual compliance by 0.2 %. High income acts as a catalyst to individual compliance as farmers are able to finance all the rigorous and costly compliance requirements on their own. Lack of income induces farmers to act collectively in groups to afford compliance. This is in line with findings by Makhura (2001) and Nkhori (2004) that income increases horticultural production.

Less wealthy farmers are induced to act collectively to enable joint purchase of inputs and marketing of produce thereby maintaining compliance.

Age of the farmer was found to negatively influence choice of individual compliance as older farmers tended to comply in groups. An increase in age by one year reduces the probability of individual compliance by 4% This is contrary to expectations as older farmers are expected to be well established economically but this was not so. This agrees with finding by Makhura (2001) who found that younger farmers are more risk loving hence will be more willing to adopt highly risky investments. The older farmers are risk averse hence will not practice individual compliance which is highly risky due to the massive amounts of money invested.

As earlier hypothesized, total number of group membership in the household was found to negatively choice of influence individual compliance. An increase in the number of groups the household members are associated with decreased the probability of individual compliance by 36% and increased group compliance by the same value. This is similar to findings by Muriithi (2008) which showed that high social capital encouraged compliance. The more the number of groups, the less the chance of complying individually due to homogeneity of interests and norms as well as higher levels of trust among members. When a household is in more groups, there is reduced fear on the probability of forfeiture by the other members as they already know them and their interests are similar.

The household size was found to negatively influence choice of individual compliance. An increase in the number of people in the household reduces the probability of individual compliance by 14% at 5% level of significance. This concurs with Makhura (2001) and Muriithi (2008) who found that household size influences compliance. This maybe explained

by the fact that small households not only have lower dependency rates but also have less disposable labour for use in production hence they comply individually.

Contrary to expectations, hidden recurrent transaction costs i.e. opportunity cost of participating in compliance activities positively influenced choice of individual compliance. An increase in these costs reduces the probability of group compliance by 81% and increased individual compliance by the same margin. These costs were generally higher for individual farmers as they participated in more of such compliance activities than group farmers. On the other hand, true to expectations, visible recurrent costs of compliance influence individual compliance positively. Humphrey (2008), also found that individually compliant farmers have higher visible transaction costs. The high costs of maintaining compliance encourage collective action through groups. Hence both visible and hidden recurrent transaction costs encouraged individual compliance. All the other factors included in the model were found to be insignificant in determining the choice of compliance arrangement adopted by farmers while complying with GlobalGAP standards. Based on these findings, the third hypothesis was rejected as income and hidden recurrent transaction costs were found to influence the choice of individual compliance positively. Age of the household head, household size, distance to the market and social capital of the household were found to influence the choice of individual compliance negatively. Hence the alternative that socioeconomic, demographic characteristics and transaction costs of farmers have an influence on the choice of compliance arrangement adopted was accepted.

CHAPTER 5: CONCLUSIONS AND RECOMMEDATIONS

5.1 Conclusions and policy implications

The study assessed the determinants of choice of compliance arrangements with GlobalGAP standards among smallholder farmers and also measured and compared both visible and hidden transaction costs of compliance with GlobalGAP standards between individual and group farmers. Furthermore the study identified the different compliance categories prevalent in Kirinyaga South District.

In the District, it was evident that the 51% of farmers were compliant, 43% were non compliant with standards and 6% were non growers of French beans. One of the country's goals in the vision 2030 is to maintain and increase existing markets as well as to create local markets for horticultural produce. Thus there is need to educate the farmers, especially the non compliant farmers on the importance of compliance in order to access and maintain the current markets. Alternatively, other markets with less stringent requirements can be sought to encourage production of French beans and other horticultural produce.

The survey found that income positively influences choice of individual compliance. Thus exporters and other actors promoting individual compliance can get results out of their promotion efforts if they concentrated on the wealthier farmers. But to avoid marginalization of small holder farmers, there is need to encourage them to form groups in order to enjoy economies of scale in input purchase to reduce both production and transaction costs and to maintain compliance.

The study also found that distance to the market discourages individual compliance and encourages group compliance. Hence there is need to open up more markets near the farming areas to encourage both compliance arrangements and subsequently to reduce unemployment. This can be done through government strategies like the economic stimulus package currently running in the country. Infrastructural improvement will aid a great deal in easing transport of both inputs and outputs.

The number of groups the household is part of was found to positively influence group compliance and deter individual compliance. Group compliant farmers were members of more groups than individually compliant farmers. Thus the private and public sectors should devise methods of supporting these smallholder farmers through input and credit subsidies to enhance compliance. Credit, extension and input supply should be stepped up to sustain the existence of these groups in order to maintain compliance. Since all the household in the survey were members of group, there is need to encourage members of these groups especially in the non compliant and non grower categories on the importance of compliance.

Both hidden and visible recurrent transaction costs were found to influence individual compliance and discourage group compliance. Thus it is not just enough to encourage farmers to comply with standards but also policies to ensure that they do not abandon compliance should be constituted. This may involve credit and input support but also collective action to reduce the compliance costs per farmer. Moreover, both visible and hidden transaction costs of compliance were found to be higher under individual compliance than in group compliance. This is because the individual farmers meet exporters' agents more often and spend more time

with them. Compliance with GlobalGAP standards is lumpy and expensive and this is a major hurdle to the smallholder farmers who cannot afford to pay from their own savings unless they join up in groups or they are assisted to do so by other parties such as NGO's, exporters, among others. Thus smallholder farmers should be encouraged to form groups to reduce both production and transaction costs.

Age of the household head and the household size negatively influenced individual compliance. Hence exporters and Government could get better results if they dealt with younger farmers with smaller households as they are more risk loving and ready to invest in compliance than the older farmers. However, to encourage group compliance, there is need to boost extension to educate farmers on the advantages of compliance. Finally, majority of the farmers complained about low prices despite compliance thereby calling for a public policy that would ensure that the right market prices are translated to the farmers who put tireless efforts in the compliance process.

5.2 Recommendations for further studies

The study focused on the farm, farmer, markets and institutional factors influencing the selection of compliance arrangements among smallholder farmer. Due to time and financial constraints, only a small sample size was used for the study. Better results could be generated using a larger sample size and more villages. Hence the study could be done with a larger sample size to give more elaborate results. Secondly, GlobalGAP standards are mainly for markets with very strict standards but majority of the smallholder farmers are either growing without compliance or have abandoned growing French beans altogether due to the stringent conditions of the standards. Hence there is need not only to look at the possibility of exploring other less strict markets for small holder farmers such as Asia but also to promote domestic

demand for the product ,which is very low, to generate more markets. There is also a need to delve into the possibility of linking farmers directly to the wholesalers in the importing countries by elimination of the exporter or brokers to improve the prices received by the farmers. Thirdly, the study found that high transaction costs discourage group compliance. Hence there is need to investigate the various mechanisms that can be employed to reduce transaction costs to enhance both compliant arrangements. Lastly, the study focused on the determinants of choice of compliance arrangement and not on market access and subsequent impact on livelihood of farmers. Thus, there is a need for a vibrant study to analyze the impact of GlobalGAP standards on the livelihoods of farmers for clarity on whether compliance is really for market assurance or for profits enhancement/livelihood improvement.

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APPENDICES

Appendix 1: Correlation matrices

	estimate of total monthly income	daily income from both farm and off farm for all	distance to the nearest main market	Type of road to market	type of road to main market	distance to bean collection centre	Cost of transport to main market
estimate of total monthly income	1	.407**	-.213	-.152	-.102	-.430**	.058
daily income from both farm and off farm for all	.407**	1	-.105	-.254*	.022	-.271*	-.030
distance to the nearest main market	-.213	-.105	1	.039	.075	.297*	.189
Type of road to market	-.152	-.254*	.039	1	-.808**	-.020	-.202
type of road to main market	-.102	.022	.075	-.808**	1	.160	.231
distance to bean collection centre	-.430**	-.271*	.297*	-.020	.160	1	.070
Cost of transport to main market	.058	-.030	.189	-.202	.231	.070	1

**. Correlation is significant at the 0.01 level (2-tailed).*. Correlation is significant at the 0.05 level (2-tailed).

Cont'd correlation matrices

	Years of French beans farming	Total number of groups in which the household members are part of	distance to the nearest main market	daily income from both farm and off farm for all	Highest level of education	Total size of farm in acres	age of the household head
Years of French beans farming	1	.177	.160	-.023	-.090	.033	.343**
Total number of groups in which the household members are part of	.177	1	-.004	.143	.006	-.161	.041
distance to the nearest main market	.160	-.004	1	-.105	-.238	-.262*	.208
daily income from both farm and off farm for all	-.023	.143	-.105	1	.339**	.488**	-.151
Highest level of education	-.090	.006	-.238	.339**	1	.375**	-.090
Total size of farm in acres	.033	-.161	-.262*	.488**	.375**	1	-.024
age of the household head	.343**	.041	.208	-.151	-.090	-.024	1

**. Correlation is significant at the 0.01 level (2-tailed).*. Correlation is significant at the 0.05 level (2-tailed).

Appendix 2: Focus Group Discussion: Checklist of Issues.

Government officials, Exporters and NGOs Officials.

i) Agro-ecological zones, soil types and major crops.

ii) Major economic activities

iii) Which export vegetables are mainly grown and the number of farmers involved in production of these vegetables for export in particular areas/sites

iv) Average acreages of each vegetable crop in each area/site and per farmer(this will aid in categorizing farmers into small and large scale farmers)

v) Scope of compliance with GlobalGAP standards in each area--how many farmers have complied in the area.

vi) Average duration since compliance (useful in gauging whether impact studies would be possible) –year when most attained compliance.

vii) Cases of dropout due to high maintenance costs

viii) Common types of compliance arrangements i.e. who facilitates farmers to comply

ix) External interventions causing compliance e.g. NGOs,Government

x) Major sources of compliance finances and their requirements.

xi) Are they sorting alternative markets i.e. local supermarkets especially for the non compliant farmers

xii) Are they applying the same export market standards for local markets.

xiii) External constraints hindering compliance i.e. infrastructure, input supply

Key informant

i) General perceptions of adopting the standards

ii) Have other researchers come to talk on vegetables, have they helped and perceptions on benefits of the research to the farmer.

iii) What other crops do they grow and for which markets or any other enterprise they are involved in.

iv) How would they want to be helped to move up.

Appendix 3: Household survey questionnaire

ENUMERATOR NAME _____
ENUMERATOR CODE _____

DATE OF INTERVIEW (DD/MM /YY) /___/___/2010
SUBLOCATION_____**VILLAGE**_____

Only the household head or spouse will be interviewed. Replacement of the household will be done systematically and only after consulting the supervisor.
Are you interviewing the household head or spouse [___] = YES [___] = NO (tick)

RESPONDENT'S NAME_____

RESPONDENT'S POSITION IN THE HOUSEHOLD [____] (code)

1 = Head	2 = Spouse

START TIME _____

END TIME _____

SECTION 1:
A: GENERAL INFORMATION ON FRENCH BEANS PRODUCTION:

A1.1 Do you grow French beans? [___] YES [___] NO (tick)

A 1.2. If No (question 1) why?

No market [__] High production costs [__] low returns [__]
Small piece of land [__] Not interested [__] other (specify) _____

A1.3. If No (question 1.1) were you previously growing French beans then abandoned production?

[___] YES [___] NO (tick)

A1.4. What were the reasons for abandonment? **Rank with the most important first**

Many compliance requirements [___] low profitability (losses) [___]
Low productivity of the crop [___] large amounts of rejects by exporters [___]
Lack of buyers [___] lack/unavailability of required inputs [___]
High costs of required inputs [___] other (specify)_____

A1.5. If yes (question 1.1), when did you start producing French beans? Year _____

A1.6. Do you sell to exporters or brokers/locally? [___] export [___] local market (tick)
A1.7 If selling to brokers, did you use to comply with EurepGap (GlobalGAP) requirements then stopped? [___]Yes [___] No
A1.8 If yes, what were the reasons for abandoning compliance? **Rank** with the most important first

Many compliance requirements [___] low profitability (losses) [___]
Low productivity of the crop [___] large amounts of rejects by exporters [___]
Lack/unavailability of required inputs [___] other (specify)_____

A1.9.1 Please provide the following information on production costs for the last growing season
(APPLIES TO ALL FARMERS GROWING FRENCH BEANS)

Inputs used	State the main source of each input listed: 1=Agrovet /stockists/agent 2=Government 3=Exporter 4=Farmer group 5=Own source 6=General market/shop 7=Cooperative 8=Other (specify)	Is the input available at all times? 1=Yes 2=No	Input cost(KSh)
Seeds			
Chemicals			
fertilizers			
Equipment(last 1 yr)			

A 1.9.2 Labor use in production

Activity	***Labor Quantity(hrs)***	***Major Source of labor (1=Family 2=Hire)***	***Value/Expense(Kshs)***
Land preparation			
Planting			
Weeding			
Irrigation			
Spraying			
Harvesting			
Transportation			

A 1.10 Please indicate below the quantity (kgs) of each grade of French beans you sold and the price you received for each grade during the last crop season.(1 carton=15kgs)

Extra fine beans		Fine beans		Bobby beans	
Quantity(kgs)	Price (Kshs/box)	Quantity(kgs)	Price (Kshs/box)	Quantity(kgs)	Price (Kshs/box)

A2.1 Are you a member of French bean producers' marketing group?
[___] YES [___] NO (tick
A2.2 If **No** (question 2.1), Why haven't you joined a group?
Never heard of one [__] Membership too costly [__]
Not interested [__] Not sure of the benefits [__]
No change for those who are members [___]
Other (specify) [_____]

A2.3. If **Yes** (question 2.1), what is the name of the group _____

A2.4. How long have you been a member? [_____]

A2.5 Reasons why did you became a member? **Rank** with the most important first

To gain access to larger markets		To avail of large scale transportation	
To learn better agricultural practices		To avail of collective purchase of inputs	
To pool resources/product bulking		For better price negotiations	
Requirement by exporter/donor		To gain access to credit	
Other(specify)			

A2.6 What services does the group offer to the members? **Rank**

Training		Record keeping and grading of produce	
Buyer/supplier forums		Calenderised production programs	
Collective savings plan		Certification	
Collective collateral/credit		Farm demo plots/ Intergroup exchange visits	
Input supply		Other(specify)	

A2.7 What is your level of satisfaction with the services being provided by the group?

Very satisfied [__] Satisfied [___] Neutral [__] Less satisfied [___] Not satisfied [___]

A2.8 If not satisfied, what are the reasons?

Inefficient service provision [__] Members not active [__]

Corruption by officials [__] High group fees [__]

No consultative approach [__] Other (specify) [_____]

A 2.9 Categorize the compliance status of the farmer(Tick appropriately)

[__] Individually fully compliant farmer who is an out grower of exporters

[__] Group contract farmer(own facilities, production process and keep their records)

[__] Group scheme farmer(exporter owns facilities, keeps record and controls production)

[__]Non compliant who abandoned standards after adopting

[__]Non compliant who has never adopted standards

[__]Does not grow French beans

NB:ALL THE REMAINING QUESTIONS WILL ONLY APPLY TO GLOBALGAP COMPLIANT FARMERS UNDER EITHER GROUP OR INDIVIDUAL COMPLIANCE

B 1.1. Are you aware of the GlobalGAP requirements? [___]**Yes** [___] **No**

B 1.2 a. Are you GlobalGAP compliant ? [___]**Yes** [___] **No**

B 1.2 b. If **Yes,** when did you start complying? **Year**_____

B1.2 c. What kind of compliance do you practice? [___] **(based on ownership of shed)**

1=individual compliance 2=group compliance

B1.2.d. If under group compliance, who owns the grading shed and certificate? [___]

1=group owns both 2=group shed but exporter withheld certificate

3=group shed but exporter certificate (contract) 4=exporter owns both(scheme)

B 1.3. What were the major constraints encountered during compliance process?

[___] high costs of inputs [___] adulterated inputs

[___] high certification fees [___] long wait for auditors

Other(specify)_____

B 1.4. What are the main challenges/ constraints of maintenance of GlobalGAP compliance?
[___] low product prices [___] constant changes in required inputs
[___] high certification fee [___] high volumes of beans rejected despite compliance
[___] other (specify)

B1.5. From whom did you first learn about GlobalGAP standards? [___] codes (most important source)

1. Exporter	*4. NGO (specify)*	*7. Farmer's field days*
2. Government extension agent	*5. Farmer Groups*	*8. Others (specify)*
3. Local trader	*6.HCDA*	

B1.6. How did you obtain the information i.e. barazas,trainings,meetings with friends/relatives, visits to exporter

Meeting or activity	Number of times in a year	Time spent traveling to the meeting (hrs)	Cost of transport for the journey (Ksh)	Time spent in the meeting (hrs)	Incidental expenses e.g food and drinks taken(Ksh)
1.					
2.					

B2. What additional cost(KSh) did you incur as an individual in complying with these standards? (Use the Table below to guide you)

Cost category	*Cost component*	*Value/ cost of formerly used item/ input/ activity*	*Value/ cost of newly used item / input / activity*	*After how long do you replace, repeat or renovate the item or incur the cost after the first time(weekly, monthly, annually, etc*	*Cost of each replacement, renovation, repeat, etc*
1.Building and facilities	Storage room for pesticides				
	Storage room for fertilizers				
	Packing houses				
	Toilet facilities				
	Irrigation station				
	Grading shed				
2.Equipments	For pesticide delivery				
	For irrigation				
	For water and soil analysis				
	Other Equipments				
3.Needs assessment					
4.Technical assistance / services	Soil and water analysis				

5. Input use And protective clothes	Masks				
	Gloves				
	Other protective clothes				
	Insecticides				
	Fungicides				
	Fertilizers				
	Other inputs				
6.other cost of certification	Initial auditing				
	Certification audit				
	Record keeping				
	Consultation fee				
	Other costs				

B 3.1. What do you do when you want to improve the information on production and management of French beans and any new GlobalGap requirement?

Meeting or activity	Number of times in 1 yr	Time spent traveling to the meeting (hrs)	Cost of transport for journey(Ksh)	Time spent in the meeting (hrs)	Incidental expenses (Ksh)
1.					
2.					

B3.2 What do you do to obtain information on marketing of your produce and prevailing prices of French beans in the market?

Meeting or activity	No of times in 1 yr	Time spent traveling to the meeting (hrs)	Cost of transport for the journey (Ksh)	Time spent in the meeting (hrs)	Incidental expenses eg food,drinks taken(Ksh)
1.					
2.					

B4. In your opinion what is the effect of adopting GlobalGap standards to you?

_____

B5. Have you ever looked for alternative markets with fewer requirements for your French beans? [___] **Yes,** [___] **No**

B6.1.Are you growing French beans under contract with an export company?

[___] YES [___] NO

B6.2 What kind of contract is it [___] formal [___] informal

B6.3. Who is the major exporter you produce for? (*Tick*)

[___]Homegrown [___] Woni [___] Sacco Fresh

[___]Vegpro [___] KHE [___] East Africa Growers

[___]Sunripe [___] Greenlands Other (specify)_____

B6.4. When did you start producing under contract? Year_____

B6.5. Why did you choose to produce under contract? **Rank.**

[___]Assured market for my French beans [___] Easier access to cash credit

[___]Easier access to current information [___] Easier access to quality seed

[___]Higher prices [___] STable prices [___] Easier access to new pesticides

Other (specify) _____

B6.6. What activities did you participate in during the contract making process.

Activity	*Transport time (min*	*Transport cost (to and from)*	*Time taken in The activity*	*Money Paid(legal fee)*	*Incidental cost (e.g. food and Drink taken*

B6.7. Does the contractor offer any support in facilitating compliance with GlobalGap requirements? [___]**Yes** [___] **No**

B6.8. If **Yes,** what are the support services provided?

[___]input provision [___] extension services [___] credit provision [___]auditing fee other(specify)_____

C:CREDIT

C1. Information on access to credit (**Credit is both formal and informal)**

Did you obtain credit for use in French beans production in the last year? 1=Yes 2=No	Major Source of credit (**Codes**) **1** = Government fund/agency e.g AFC **2** = exporters/buyers **3** = Commercial bank **4** = Informal lenders **5** = Donor / NGO/MFI's **6** = groups (farmer groups, ROSCAS) **7**= Relatives/friends 8= Co-operative/SACCO **9** = Other Specify	Major form of credit 1=Money 2=Material (s) 3=Other (specify)	Interest charged(kshs)

D:EXTENSION

D 1.Information on extension access and suitability

Did you receive extension contact on French bean production last year? 1=Yes 2=No	**If yes, who was the provider?** *(Codes 1)* **1** = Government **2** = NGO/donor 3=exporter **4**= Local traders **5**= Input dealers **6**= Farmer group **7**=Co-operative society **8** = Other specify	**What type of services were provided?** 1=Product handling 2=Pest management 3=Soil and water use 4=chemical handling 5=Record keeping 6=Field hygiene 7= others (specify

E: MARKET ACCESS

E 1.1. What is the distance to the nearest main market center from the farm? (Kms)_____

E1.2 What is the type of road from the farm to that main market? [___] codes

Road type codes: 1=All seasons tarmac, 2=All seasons murrum road, 3=Seasonal murrum road, 4=other (specify) _____

E1.3. What is the distance to the bean collection center or shed from the farm? (Kms)_____

E1.4. How far is your farm from the nearest input store in walking hrs? ____

E1.5. How far is your farm from the most important town/urban center? _____

E1.6. What is the cost of transport to the main market (Ksh)?_____

F:FARMSIZE

F 1.1. What is the total size of your farm in acres?_____

F 1.2. What is the area under French beans out of the total size of the farm? _____

G1:TRANSACTION COSTS FOR GROUP COMPLIANT FARMERS:

G1.1 What activities did you do to obtain information on compliance?**(this includes barazas,workshops,meetings with exporters/friends/relatives,trips to Nairobi e.t.c**

Meeting or activity	Number of times in a year	Time spent traveling to the meeting (hrs)	Cost of transport to and from the meeting (Ksh)	Time spent in the meeting (hrs)	Incidental expenses e.g food and drinks taken (Ksh)
1.					
2.					
3.					
4					

G1.2 Expenses of ordinary meetings/activities **of ordinary members only without any external person(normal meetings, AGM's e.t.c)**

Meeting or activity	Number of times in a year	Time spent traveling to the meeting (hrs)	Cost of transport to and from the meeting (Ksh)	Time spent in the meeting (hrs)	Incidental expenses e.g food and drinks taken (Ksh)
1.					
2.					
3.					

G1.3 Expenses of (other) meetings with the development agency promoting French beans in the last one year i.e. **extension agents, exporters, auditors, credit providers**

Meeting or activity	Number of times in 1 yr	Time spent traveling to the meeting (hrs)	Cost of transport to and from the meeting (Ksh)	Time spent in the meeting (hrs)	Incidental expenses e.g food and drink(Ksh)
1.					
2.					
3..					
4.					
5.					

G1.4 Activities undertaken annually to maintain the contract after compliance e.g auditing.

Meeting or activity	Number of times in 1 yr	Time spent traveling to the meeting (hrs)	Cost of transport to and from the meeting (Ksh)	Time spent in the meeting (hrs)	Incidental expenses e.g food and drink(Ksh)
1.					
2.					
3.					

G2 TRANSACTION COSTS FOR INDIVIDUALLY COMPLIANT FARMERS :

G2.1 What activities did you do to obtain information on compliance?**(this includes barazas,workshops,meetings with exporters/friends/relatives e.t.c**

Meeting or activity	Number of times in 1 yr	Time spent traveling to the meeting (hrs)	Cost of transport to and from the meeting (Ksh)	Time spent in the meeting (hrs)	Incidental expenses e.g food and drink(Ksh)
1.					
2.					
3.					

G2.2What activities do you do to maintain compliance e.g auditing

Meeting or activity	Number of times in 1 yr	Time spent traveling to the meeting (hrs)	Cost of transport to and from the meeting (Ksh)	Time spent in the meeting (hrs)	Incidental expenses e.g food and drink(Ksh)
1.					
2.					
3.					

G2.3 Expenses of meetings with exporters, extension agents,credit providers in the last one year

Meeting or activity	Number of times in 1 yr	Time spent traveling to the meeting (hrs)	Cost of transport to and from the meeting (Ksh)	Time spent in the meeting (hrs)	Incidental expenses e.g food and drink(Ksh)
1.					
2.					
3.					
4.					
5.					

SECTION II: HOUSEHOLD DEMOGRAPHIC AND WEALTH INFORMATION

H 1.1. What is the main occupation of the household head(in terms of time)_____

1=Farming 2=Salaried worker 3=Self-employed 4=laborer 5=Retired 6= other(specify)

H 1.2. How long has he/she been performing this activity(years)_____

H1.3. Please provide the following demographic characteristics information concerning **the household members.(NB::people who cook and eat together from the same pot and they reside permanently in the household)**

	Name for the household member *(Full name of the household head. first name for the others)*	Relation- ship with household head (***codes below Table)***	In which **year** was this person born?	What is the **sex** of this person? ***1=male 2=female***	What is the **highest** level of education completed in years?
1					
2					
3					
4					
5					
6					
7					
8					
9					

Codes for relationship with household head: 1=head 2=spouse; 3=own child; 4=step child; 5=parent; 6=brother/sister; 7=nephew/niece; 8=son/daughter-in-law; 9=grandchild; 10=other relative (specify) ; 11=unrelated; 12=brother/sister-in-law; 13=parent in law; 14=worker

H.1.4. Is the household head the farm owner? [___]**Yes** [___] **No.**

J: Social capital

J1.1. Do you or any member of this household belong to a farming group or any other group?
[___]**Yes,** [___] **No)**

J1.2. How many groups are you involved in? Use the Table to give the types of groups (ALL GROUPS including the French Beans one) and number of meetings/joint activities

Name of local group, association e.g., bean group, dairy group, water group, church group ,ROSCA,coffee group e.t.c.	Year of joining	Meetings (no.) attended last year (Jan –Dec 2009)

K: Income

K1.1. In which of the **following categories** do you estimate your **total monthly household income (Ksh)**, from all farm activities, working members, business income, pensions and remittances from elsewhere (tick).
[___]<1,500 [___] 1,500 - 2,500 [___] 2,500 - 5,000[___] 5,000 - 10,000[___] 10,000 - 20,000 [___] 20,000 - 30,000 [___]> 30,000

K1.2 Would you agree if you are told that your DAILY NET INCOME (proceeds less costs) from both daily farm and off-farm activities (excluding non-farm occupations like teaching) that you are involved in is same as the daily wage rate (Ksh 300) in this area?
[___] 1= Yes, 2= No

K1.3 If no, what do you think is your DAILY NET INCOME (proceeds less costs) from your daily farm and off-farm activities? Ksh _____

K1.4 What is the proportion of months of the year that you are able to get employment in or outside your farm (enter %)_____

THANK YOU!