COMPETITIVENESS OF SMALLHOLDER SNAP BEAN PRODUCTION IN KIRINYAGA COUNTY, KENYA

ODERO DANIEL ODHIAMBO

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DECLARATION

This thesis is my original work and has not been presented for the award of a degree in any other University

Signed   Date

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Odero Daniel Odhiambo

University of Nairobi

Thesis submitted to the Board of Post Graduate Studies with our approval as University supervisors

Signed   Date

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Dr. John Mburu

Signed   Date

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Prof. Chris Ackello-Ogutu

Signed   Date

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Prof. John H. Nderitu

DEDICATION

To my parents, the late Mr Julius Odero Maziga and Mrs Philigona Akoth Odero for their

relentless efforts to make me achieve my dreams

ACKNOWLEDGEMENTS

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ABSTRACT

Past studies have indicated that trade in snap beans is highly profitable. However, there is limited information on costs and how value added benefits are shared by value chain participants. The objective of this study is to assess the competitiveness of small farmers of snap beans and to assess how the value-added benefits are shared by various participants of the snap bean value chain in Kirinyaga County. A random sample of 139 farmers consumers were interviewed using a semi-structured questionnaire. Focus group discussions and key informant interviews were also conducted with 10 brokers, 5 transporters, 5 exporters, 5 supermarket stores, 2 processors, 10 local vendors and 100 consumers. The value chain analysis software developed by FAO was used for financial analysis to capture the share of value added by each chain participant. One-way ANOVA tests were conducted to compare the mean value added between the actors in each channel and to determine if any of those means are significantly different. Levene's Test of Homogeneity of Variances was used to test for the suitability of using ANOVA analysis in this study. Four main marketing channels were identified that comprised domestic (formal and informal markets) and export channels. Results indicate that no major value addition involving change of form was done by the players at any level. The existence of formal domestic channels shows that production and marketing of snap beans that targets the domestic market can be increased. Farmers had the lowest share of value added among the chain participants. In the formal domestic channel farmers had a value added share of 15.6% compared with 16.3% for brokers, 30.5% for retailers and 37.6% for processor, respectively. The mean value added for the chain actors were statistically significantly different in all the four channels. Multiple comparisons using Tukey post-hoc test further showed that all means, except between farmers and brokers, were different. Shorter chains where brokers were excluded provided farmers higher benefits than longer chains. In spite of this lower share of value added by farmers, the study finds that the small farmers were still competitive and that the entire chain was profitable in all the four channels that were analyzed. The study recommends that while the Government should have policy interventions that seek to reduce the number of market intermediaries in the chains, farmers should also consider venturing into value addition practices such as trimming and packaging their beans for the local supermarkets. It further recommends that farmers should sell through exporters as this channel offers them more benefits. The results would provide exporters, researchers and government officials with additional information in formulating policies which will enhance export competitiveness of Kenya's smallholder snap beans production.

ACRONYMS

ASARECA	Association for Strengthening Research in Eastern and Central Africa
CIDA	Canadian International Development Agency
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
FIAS	The Foreign Investment Advisory Service
FOB	Free On Board
GI	Gross Income
GOK	Government of Kenya
GTZ	Deutsche Gesellschaft Techische Zusammenarbeit
HCDA	Horticultural Crops Development Authority
IFAD	International Fund for Agricultural Development
IFPRI	International Food Policy Research Institute
KARI	Kenya Agricultural research Institute
KACE	Kenya Agricultural Commodity Exchange
NGO	Non-Governmental Organization
NI	Net Income
NIB	National Irrigation Board
NTB	Non-Tariff Barriers
NVA	Net Value Added
SME	Small-Medium Enterprise
UK	United Kingdom
UNECA	United Nations Economic Commission for Africa

UNIDO	United Nations Industrial Development Organization
USAID	United States Agency for International Development
VA	Value Added
VAT	Value-Added Tax
VC	Value Chain
VCA	Value Chain Analysis

CHAPTER ONE: INTRODUCTION

1.1 Overview of the horticultural sub-sector in Kenya

Over the last two decades between 1980 and 2000, Kenyaøs horticultural sub-sector grew tremendously, attracting a lot of interest from a wide range of stakeholders including the Government of Kenya, private sector entrepreneurs, donors and non-governmental organizations (NGOs) among others (MOA, 2008). Since 2003 the horticultural sub-sector has been ranking third only after tea and coffee, as the most important foreign income earner in the country. Despite the global economic downturn which was witnessed in 2007/2008, the value of Kenyaøs horticultural exports in 2009 was Kshs 71.60 billion, equivalent to US$895 million in foreign exchange (HCDA, 2010). The total volume of horticultural exports showed a steady increase from 139,729 metric tons (MT) in 2003 to 193,107 MT in 2008 (Table 1.1), representing an increase of 38.3% over the six years. Between 2007 and 2008, however, the report says the sub-sector recorded a 10.8% decline in the value of exports, decreasing from US$ 811.25 million to US$ 723.75 million, arising possibly from the effects of the 2007/2008 post election violence, before rising again to US$ 751.25 million in 2009. Fresh vegetables accounted for 24% of 2009 exports but suffered from both drought and reduced market demand, resulting in a fall of 5.5% in exported quantities and value, equivalent to a 14% fall in dollar returns (HCDA, 2010).

The sub-sector has become an important source of income for rural farm households, traders and investors. The sub-sector provides close to two million jobs to Kenyans, both direct and indirect (FAO, 2003). It is also an important source of government revenue, foreign exchange earnings and employment, all of which contribute to the national goal of poverty reduction

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and food security. Key horticultural products in order of export earning include cut flowers, vegetables, and fruits. The main cut flowers are roses, hypericum and carnations. Vegetables include Asian vegetables and other fresh vegetables such as snap beans, sugar snaps and snow peas, while the major fruits are bananas, mangoes, pineapples and citrus.

Table 1.1: Trends in fresh horticultural exports from Kenya, 2004-2009

Year	2004	2005	2006	2007	2008	2009
Fruits and Nuts						
Volume of exports (Metric ton)	20.089.70	18,522	15,405	15,671	17,123	62,676
Value (Kshs million)	1,803	2,049	1,737	1,797	2,071	3,658
Vegetables						
Volume of exports (Metric ton)	52,805	61,220	61,348	84,313	82,345	92,483
Value (Kshs million)	11,820.50	13,574.60	17,823	20,799	16,129	19,391
Cut flowers						
Volume of exports (Metric ton)	66,805	82,056	86,480	91,192	93,639	120,394
Value (Kshs million)	18,092	22,238	23,561	42,374	39,766	37,086
Totals						
Volume of exports (Metric ton)	**139,729**	**162,196**	**164,021**	**191,176**	**193,107**	**275,553**
Value (Kshs million)	**31,721**	**37,998**	**43,319**	**64,970**	**57,966**	**60,135**

Source: HCDA and MOA (2010)

1.2 Snap beans production in Kenya

Snap beans, also known as French beans, are of growing importance in the socio-economic systems and livelihoods in Kenya. Snap beans in Kenya are mainly grown by small scale farmers, purely for export as a source of family income (Monda *et al.*, 2003; Mannon, 2005; Okello *et al.,* 2007). These are farmers who own between 0.5-5 acres (Ndegwa et al., 2010). It accounts for 60% of all vegetable exports and 21% of horticultural exports by value (Nderitu *et al.,* 2007).

Snap beans are grown in Kenya mainly for export, although there is growing popularity in domestic consumption particularly in the urban centers (voor den Dag, 2003; MOA, 2008). The crop is grown almost throughout the year using irrigation. The major snap bean growing areas are Central, Eastern and Rift Valley Provinces (Table 1.2). The main varieties grown in Kenya include Paulista, Monel, Amy, Impala, Samantha, Teresa, Alexandra and Julia for either fresh market or processing (Ndegwa et al., 2010). The seeds are mainly imported from Europe (ASARECA, 2010).

Snap bean production in Kenya has been facing production constraints that have led to general decline in total area and volume. The major constraints have been identified as fluctuating prices (Monda et al., 2003; Ndegwa et al., 2010) and transport problems due to bad roads. This has led to high losses due to bean rejection as a result of shriveling. Table 1.2 shows that there was a general decline in the total area planted to snap beans between 2005 and 2008. Similarly, production registered a general decline except in 2008 when the country recorded 44.3% increase compared to 2007. The Ministry of Agriculture and Horticultural Crops Development Authority (HCDA) attributes this decline to bad weather (MOA, 2009).

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Table 1.2: Area and production of snap beans in Kenya by province, 2005-2008

Province	Area (Ha)				Production (MT)				Value (KES '000)			
	2005	2006	2007	2008	2005	2006	2007	2008	2005	2006	2007	2008
Central	4,903	4,282	4,518	3260	49,030	42,820	45,180	65,200	1,470,900	1,284,600	1,355,400	2,086,400
R/Valley	674	603	851	700	6,740	6,030	8,510	14,000	202,200	180,900	255,300	420,000
Nairobi	7	7	2	3	70	70	20	60	2,100	2,100	600	2400
Western	-	-	-	45	-	-	-	675	-	-	-	27,000
Eastern	1,420	1,262	2,362	608	14,200	12,620	13,620	12,160	426,000	378,600	408,600	389,120
Total	7,004	6,154	7,733	4616	70,040	61,540	67,330	92,095	2,101,200	1,846,200	2,019,900	2,924,920

Source: MOA (2008)

Despite a steady rise in production between 2000 and 2005 there was a decline of 9.5% and 27% in 2008 and 2009 respectively (Figure 1.1). During the same period, value of exports declined by 28% and 23% respectively. The declining trend in total area under production and volumes of snap beans is worrying and reasons for this also require addressing if Kenya has to maintain her global competitiveness in fresh vegetable exports. This decline coincides with the 2007/08 post election violence (the political crisis in the early 2008 following the disputed presidential elections of December 2007). The crisis affected many parts of the country's economy and could therefore be attributed to this decline. Currently, the main fresh vegetable exporting companies in Kenya are Homegrown (James Finlay), Kenya Horticultural Exporters (KHE), Sunripe, Frig-O-ken and Exotic, among others.

Figure 1.1: Trends in export volume and value of Kenya's snap beans, 2000-2009
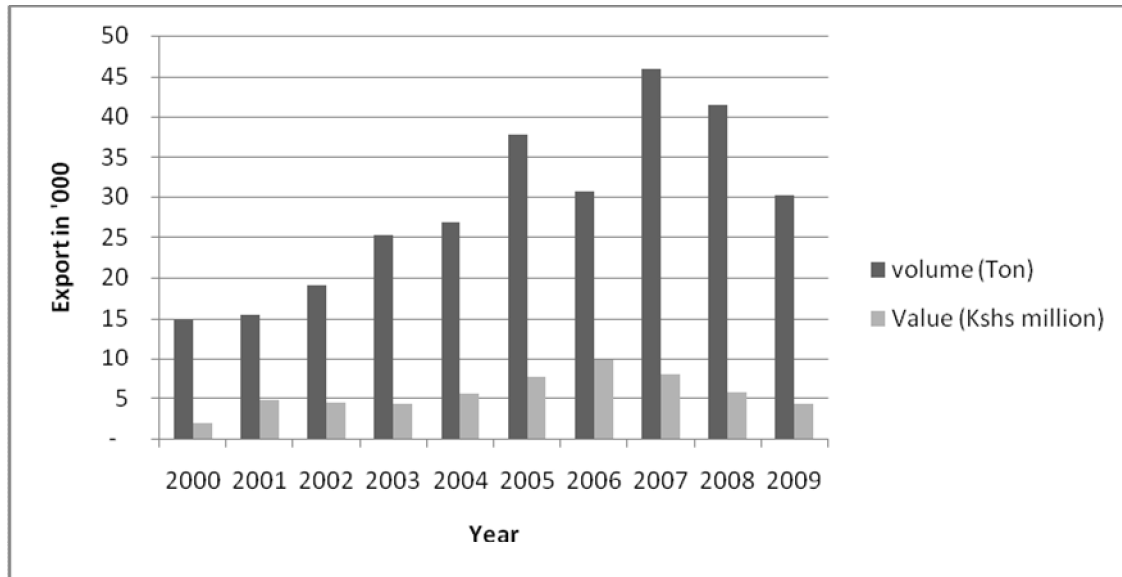
Source: HCDA (2010)

The European Union (EU) is the largest importer of Kenya's snap bean, accounting for 49.6% of the world market. The leading countries for Kenya's fresh beans include Holland, United Kingdom, France, Belgium, and South Africa (MOA, 2008). Kenya faces stiff competition from Morocco and Egypt in the supply of beans to the EU market (MOA, 2008). Other suppliers to the EU market include Senegal, Ethiopia, Zimbabwe, Zambia, Turkey and Burkina Faso. Apart from the EU, India is currently emerging as a major destination of Kenya's fresh vegetables.

According to Keyser (2006), Kenya's snap bean sector has continued to have a steady growth mainly due to increasing demand in the EU and the quality of Kenya's snap beans which meets international standards. The author reports that during the early 1980s the government, through policy intervention set the foreign exchange price for horticultural exports below the market price to encourage horticultural investors in the country. Jones et al. (2006) note that Kenya has been providing fresh vegetables to the European markets for nearly 50 years and this success has been due to market segmentation, servicing niche markets, and investing in marketing. Niche markets involve a narrow segment of customers who perceive high benefits of food products that compensate their high prices and do not require large volumes of supply (Humphrey, 2005), as is the case in France.

Targeting niche markets calls for investment in value addition of the raw agricultural products to meet specific market requirements. Reddy et al. (2010) identified three forms of value additions that small holders can use and these include differentiating the products on the basis of quality or size, and selling the same at different prices to appropriate consumers, minimally processing produce to a form and shape which is closer to the final consumer

product, like in fresh-cut vegetables, or processing the whole item or its functional components, or lower grades, waste or by-products by converting the short shelf-life to a storable form (e.g. frozen or dehydrated fresh fruits and vegetables). Such products earn premium price above their unprocessed forms.

The international market for snap beans is characterized by stringent quality requirements regarding pesticide use. This needs to be addressed as a key value chain challenge for competitiveness of the commodity in Kenya. Value chain is the full range of activities that are required to make a product or service (Kaplinsky and Morris, 2001). The value chain therefore incorporates all the activities including input sourcing, production, transformation, marketing all the way up to final consumption and disposal after use. Competitiveness can be defined in terms of costs, quality, dependability and flexibility of production and supply. Farm level competitiveness emphasizes cost reduction and, hence higher profitability for a given output level. A farm is competitive if, at prevailing prices for its products and inputs, it can generate sufficient profits to maintain its existence. Products of high quality attract higher price in the market. Competitiveness also increases with dependability and flexibility of production and supply. In this study, competitiveness implies cost reduction and hence increased profitability.

The value chain thus provides a framework to analyze the nature and determinants of competitiveness in value chains in which small farmers can participate (GTZ, 2007). It also provides the basic understanding required for designing and implementing appropriate development programs and policies to support their market participation. Thus value chain

approach has been used as an important entry point for engaging farmers, individually or collectively, in high value export markets (GTZ, 2007).

1.3 Statement of the problem

Snap beans are largely produced by small and medium level famers yet its trade is dominated by lead exporters in the developed countries who network with domestic exporters thus relegating smallholder farmers and small and medium enterprises (SMEs) to the position of mere standard takers excluded from value-creating process. These farmers face a lot of production problems that include high cost of inputs, low and fluctuating prices, poor infrastructure leading to high post-harvest losses due to high perishability, high incidences of pests and diseases, poor marketing, and cash-constraints. Furthermore, the farmers face high transaction costs and high tariff and non-tariff barriers (NTBs) which limit inter-regional trade in horticulture (ASARECA, 2010). However, the country lacks incentive mechanisms for the horticultural export market as a whole.

Despite results indicating that trade in snap beans is highly profitable (Kamau, 2000), little is known about the farm level competitiveness of snap bean production, and the distribution of the costs and value-added benefits between the chain participants who include input suppliers, farmers, brokers, exporters and processors. Information on the most costly items within each respective chain level is also scarce. Although past studies in Kenya (voor den Dag, 2003; Jones et al., 2006; Okello et al., 2007) have looked at value chain analysis of snap beans, literature on quantitative value chain analysis that captures the cost build-ups along the chain is scarce. Further, despite the fact that value chains are spreading rapidly in both developed and developing countries, the share of smallholder farmers in developing

countries affected by them is still small (Van der Meer, 2006). Moreover, past studies focused on the whole array of growers including medium- to large-scale farmers and exporters, often masking the smallholder farmers who are major producers of snap beans in the country. Thus, this study aimed to fill this gap especially at the farm level.

1.4 Objectives of the study

The overall objective of the study is to map out the snap bean value chain and assess the competitiveness of smallholder production, taking the case of Kirinyaga County.

The specific objectives are to;

i)   characterize the socio-economic characteristics of the respondents

ii) map the key actors and the roles they play in snap beans value chain

iii) determine the farm level competitiveness of smallholder snap bean production

iv) assess how the costs and value-added benefits accruing from the value chain are shared between the different chain participants

1.5 Hypotheses

i)   Smallholder snap bean production is not competitive

ii) There is no significant difference in the costs and value-added benefits between farmers, brokers, processors, exporters, and retailers along the snap bean value chain

1.6 Justification of the study

Identification of agriculture as the driver to economic growth and development particularly in Sub-Saharan Africa has dominated debate in recent years. In Kenya, the Agriculture Sector Development Strategy (ASDS, 2009) points out the need to increasing agriculture productivity, commercialization and competitiveness of agricultural commodities and enterprise by improving market access for small farmers through better supply chain management. Van der Meer (2006) portends that value chains are of growing importance particularly for perishable products that target top-end retailers such as snap beans. Thus this study conducts a value chain analysis (VCA) to give an input to the Government's export competitiveness strategy in snap beans.

This study is expected to map the participants in snap beans value chain and identify their roles and inter-relationships. Knowledge of mapping will enable the smallholders to understand how they interlink with other participants in the chain. Being in the first level of the chain, the quality of the final product will highly be dependent on how smallholders produce and the technologies they use in production. This knowledge will enhance direct communication between end buyers and producers which can be a powerful tool in helping smallholder snap bean farmers to understand the implications of adopting poor production processes in order to strengthen their role in the value chain. An assessment of how the costs and value-added benefits accruing from the value chain are shared among the participants will assist the farmers in making well informed production decisions that aim at cost-saving while maximizing on output. It is expected that the results of this study will be used by snap

bean exporters, researchers and government officials in formulating policies which will enhance competitiveness of Kenya's smallholder snap beans production.

1.7 Scope, Limitations and Organization of the thesis

Due to financial and time constraints, this study does not intend to present a full-scale industry analysis of snap beans. Nevertheless, it aims to present important data on production and marketing of the commodity that is relevant in evaluating the competitiveness of small farmers in the study area. The data used in the analysis only covered one production season. It is also important to note that farmers differ widely in their managerial capabilities and also output prices vary with seasons. These results should therefore be interpreted with these limitations in mind.

The rest of the thesis is outlined as follows. Chapter two reviews literature (on value chain and value chain analysis) of the study. Chapter three describes the research methodology which was used for the study, while chapter four discusses the results. Chapter five concludes and gives recommendations for policy responses and future research.

CHAPTER TWO: LITERATURE REVIEW

2.1 Review of literature on value chains

Literature on value chains has highlighted the importance of addressing several policy and production issues. It has been observed by van Melle et al. (2007) that in Kenya, chains which were initially started by smallholder producers have been replaced by large farms, mostly under direct control of the export companies. It should be noted, however, that the small farmers need to be linked to the value chains for them to realize the value chain benefits. These benefits include high quality that attract better price, reduced production costs through higher efficiency, reduced transaction costs, improved supply of fresh products, and improved access to production and market information (Van der Meer, 2006).

Pricing and cost structure largely determines a firmøs competitive advantage as well as interrelationships among related activities involved in the production and delivery of the commodity (UNECA, 2009). This has considerable merit in highlighting the constraints and opportunities at and between stages of the chain and can thus be used to develop integrative policy recommendations that target chain inefficiencies and address distributional issues (Rich et al., 2009). Considering the costs at each level of the value chain and comparing with benchmarks helps identify key stages where costs can most effectively be reduced (Keyser, 2006). Besides looking at the build-up of total cost at each stage of the value chain, quantitative VCA also finds out the types of costs incurred as a product accumulates its value. This is important for identifying areas where new policy interventions or process innovations could have the greatest impact on competitiveness (Keyser, 2006).

While analyzing the value chain of fruits and vegetables in India, Reddy et al. (2010) noted that as a whole farmers linked to the value chains receive a higher share of gross value than other stakeholders and that they also received higher prices for each of the vegetables considered during the study. The study concluded that vendors play an important role in the value chain by reducing information gap between farmers and retailers when accorded proper training. Their finding underscores the need to enhance capacity building for brokers in relaying market and production information to the farmers whom they link with exporters. A study carried out in 2003 by FAO in Kenya went further to emphasize that improvement in the key areas in each stage of mango value chain such as capacity building, credit acquisition, infrastructure development and setting up of collective bargaining bodies for farmers are necessary if competitiveness has to be restored and gains realized across value chain participants.

In another study, Kumar and Kapur (2010) also used value chain analysis to examine the market chain for coconut in Orissa, India. The aim of the study was to assess the flow of the product from the farmers through different intermediaries till it reaches to the consumers. They did this by computing prices and marketing margins at the different stages of the chain in order to reflect the value addition through various participants of the chain. Though value addition was not evident, the authors found well functioning marketing channels for coconuts that would stimulate management of increased supply and demand for nuts in the market hence avoiding gluts and scarcities. In spite of a high ratio of vendors to farmers and aggregators to vendors, the study found that both vendors and aggregators were still able to earn profit and hence continue the business.

Support to farmers in terms of credit and training still remain key challenges in enabling farmers to grow and produce quality crops. A study on rice value chain in Kenya by Emongor et al. (2009) found that intensive use of production inputs is required at the farm level but that most rice farmers were not using them optimally because of high costs. The study concluded that credit support was a felt need in order for the farmers to carry out timely operations in their fields. They went further to recommend that institutions involved in service provision should be strengthened to improve availability and distribution of production inputs and timely information to farmers.

While past studies by voor den Dag (2003) and Okello (2007) attempted to look at the French beans chain from Kenya, both studies were largely export oriented and qualitative in approach. In his study, voor den Dag (2003) found that farmers were better off dealing directly with exporters rather than through middlemen as this channel offered them more benefits in the value chain such as higher prices, credit acquisition, a contract, ability to negotiate prices and also assurance on the place of sale. Okello (2007) on the other hand showed that smallholders have been filtered out of the supply chain by food safety standards that have made them uncompetitive, although through collective action they have been able to mitigate some of the constraints arising from imposition of these standards. The study finds no direct purchase of green beans by domestic supermarket retailers from farmers.

2.2 Value added along the value chain

Value added is defined as the value of output at market price (farm-gate price or free on board [FOB] price) less the value of all intermediate inputs purchased from other firms

(FIAS, 2007). It is the additional value of a commodity over the cost of commodities used to produce it from the previous stage of production.

The flow of inputs to farmers and produce to the market occurs along a chain. As the product moves from one actor to another it gains value (Hellin and Meijer, 2006). Kotelnikov (2000) points out that for a specific commodity, the share of each value chain participant in total value-added could be assessed in terms of its contribution to aggregate inputs and outputs in the chain. Value chain analysis allows a sequential build-up of prices from stage to stage. All inputs and outputs carry forward their inherited value from the previous stage, hence allowing for calculation of costs at the different levels of the value chain which in turn enables for assessment of competitiveness.

Value added thus represents the contribution of payments to the primary factors of production. The more value a firm can add to a product for a given primary and intermediate cost configuration, the greater its profitability. The potential for a firm to add value to a product lies in its ability to keep raw and intermediate input costs as low as possible and to increase the price of its finished product in the market thus making it competitive.

Given that most farmers in developing countries are price takers, value added, therefore, is dependent on the following two factors; productivity and costs of production (FIAS, 2007). Greater productivity enables higher levels of final output given a particular configuration of inputs and, productivity is one of the critical factors in determining competitiveness.

2.3 Role of market power in price formation

Broadly defined, quantitative value chain analysis is focused on the price a customer is willing to pay for a firmøs output. In an open economy, this price is determined competitively and flows upstream from the customer to each producer and marketing company involved in the growing, collection, transformation, and delivery of that commodity to its terminal market (Keyser, 2006). Assessment of price is achieved by a consideration of vertical margins. Vertical margins are defined as the difference between prices at different stages of the supply chain and represent the portion of the final price absorbed by producers, traders, transporters, processors, exporters and other chain participants (Kirimi et al., 2011).

Price is basically determined by reconciling the opposed interests of sellers in having it as high as possible and of buyers in having it as low as possible (complicated by the competition between buyers among themselves and between sellers among themselves). Market power plays a critical role in price formation (Lines, 2006). Buyers and sellers need to have some form of power to influence prices their way. Price formation involves a constant struggle in which the respective amounts of power on the two sides determine an always provisional outcome. Where buyers and sellers reach an agreement over the quantity, quality and price upon negotiation, this is simple.

A VCA study for mangoes in Kenya by FAO (2003) found out that export market for mangoes offers better prices than the local market. In case where the exporting companies buy directly from the farm, farmers sell at better price than when they go through middlemen and brokers. However, the study concluded that the prices depend on the mango season just like in all agricultural produce.

2.4 Institutional framework and collective action

The availability of service organizations and social networks surrounding the participants influence the competitiveness of the chain (Hamukwala et al., 2010). These include access to input and output markets, membership of farmer organizations/associations and participation in government/NGO support programmes (Hellin and Meijer, 2006; Hamukwala et al., 2010).

Farmers with small land holdings are common in fresh vegetable production in Kenya. Such farmers are linked to the market in one way or another. It has been increasingly argued that the opportunity for small holders to raise their incomes from agricultural production increasingly depends on their ability to sell their goods not just at local, but also national, regional and even international markets (Weldeslassie, 2007; Okello et al., 2007; Markelova and Meinzen-Dick, 2009). Smallholders face significant challenges that hinder their participation in markets that are often characterized by pervasive imperfections such as lack of information on prices and technologies, high transaction costs, and credit constraints. With the expansion in trading blocks, farmers are forced to compete not only with their local peers but also farmers from other countries as well as domestic and international commodity markets (Markelova and Meinzen-Dick, 2009).

One way for smallholders to overcome market failures and maintain their market competitiveness is through organizing into farmer groups or producer organizations (Markelova and Meinzen-Dick, 2009). Acting collectively is associated with reduced transportation and storage costs, acquiring technologies and certificates to comply with required quality standards, and reach the necessary scale to supply the desired quantity of

their products through economies of scale (Hellin et al., 2007). In Central America for example, it was found that collective action and farmer organizations facilitated farmersø acquisition of subsidized maize seed and fertilizer along with extension service (Hellin et al., 2007).

Farmer groups play an important role in reducing transaction costs between small farmers and exporters (Minot and Ngigi, 2004). Producer groups can simplify long marketing chains by connecting smallholders directly to markets, bypassing various marketing intermediaries. A study of fresh fruits and vegetables (FFV) marketing chain in India by Reddy et al. (2010) recognizes the need to reduce the intermediaries in the marketing of FFVs so that farmersø share in consumer price increases. In general longer marketing chains present greater disadvantage for smallholders (Reddy et al., 2010).

2.4.1 Institutional arrangements of the value chain

Value chain stresses the fact that goods are produced by interlinked participants and activities. The approach focuses on institutional arrangements that link the various players such as trust, contracts, degree of vertical and horizontal integration and coordination (Pratap et al., 2005). Simple and understandable rules increase compliance within an organization because they are easy to monitor and reduce governance and coordination costs, and hence increase market competitiveness. Simple rules that are crafted within a group are easy to adhere to by the members than those from outside the group, and are likely to increase participation and sustainability in collective marketing.

2.4.2 Transaction costs incurred by value chain actors

Transaction costs have been variously mentioned as important costs in fresh vegetable production and marketing (Okello, 2005; Okello and Swinton, 2005; Okello et al., 2007). They are the single most important barriers to smallholder market participation in Sub-Saharan Africa (North, 1990; Arega et. al, 2007). Transaction costs are the costs sustained by carrying out exchange in an imperfect market, or costs related to using the market. They are, therefore, the costs incurred by trading partners associated with the exchange of goods and services (Pratap et al., 2005). Coarse (1960) explained transaction costs as those incurred for reaching, modifying and implementing agreements restraining potential gains from trade. Transaction costs could also be explained to include costs of obtaining information, establishing one's bargaining position in arriving at a group decision, and enforcing the decision made (Chowdhury et al., 2005). It can be separated into search and information costs, bargaining and decision costs, and policing and enforcement costs.

In a VCA conducted in Mexico and Central America by IFPRI (2007), it was found that the benefits of farmer organization are more evident in a sector characterized by high transaction costs associated with market access such as vegetables than those with low transaction costs such as maize. The study further suggests that farmer organizations linked directly to supermarkets may be more economical than those supported by NGOs. The study observes that of most importance farmer groups need to understand better the costs and margins along the value chain to make sure that services provided are sustainable.

2.4.3 Flow of information along the value chain

Value chain participants may cooperate to improve the overall competitiveness of the final product, but may also be completely unaware of the linkages between their operations and other downstream and upstream participants, leading to information asymmetry. In many instances, farmers and buyers do not often have full information about each other especially with respect to price and volumes required. Information asymmetry is a major hindrance to effective market functioning and arises due to lack of trust among value chain participants. It often leads to overpriced inputs, underpriced outputs and also discourages increased production (Rota and Sperandini, 2010). Improving flow of information between farmers and potential buyers is crucial in reducing transaction costs within the value chain because it lowers the cost of searching for information. Monitoring costs will be reduced if information regarding buyers, sellers, and other market conditions such as price transmission and product quality is effectively relayed between various chain participants.

In the traditional selling system farmers produce commodities that are õpushedö into the market place. Farmers are isolated from the end-consumer and have little control over input costs or of the funds received for their goods. In value chain marketing system, however, farmers are linked to consumersø needs, working closely with suppliers and processors to produce the specific goods consumers demand (Miller, 2008). Similarly, through flows of information and products, consumers are linked to the needs of farmers. Under this approach, and through continuous innovation, the returns to farmers can be increased and livelihoods enhanced (Miller, 2008). This process ensures that players at all levels of the value chain benefit. The value chain linkage enables consumers and processors to be aware of factors

limiting production, and similarly farmers and other producers are made aware of what consumers require. Products can be traced up to their places of origin if there is information sharing within the integrated value chain (Jones et al., 2006). The revolution brought about by mobile telephony should be able to ease and quicken access to market information, especially with regard to searching for prices and potential buyers.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Study area

This study was conducted in Kirinyaga County in Central Kenya, which has been leading in the production of snap beans for export market in Kenya since the late 1970s (Kariuki *et al*., 2006). It is about 170km to the north-east of Nairobi around the Mt Kenya highlands. Kirinyaga County is located between latitude $0^o1\o$ and $0^o40\o$ south, and longitudes 37° and 38° east. The study was conducted in Kirinyaga West, South and East Districts (see map of the study area in Appendix 13).

Kirinyaga County covers a total area of 1478km^2, of which 1170.7km^2 is arable land and 350.7km^2 occupied by forest. The total population is 493,422 persons in 114,439 farm holds. The region has high population density of 334 persons per square kilometer leading to an average farm size of 2.5 acres for smallholders. Agriculture employs 87% of the population. The area receives a bimodal pattern of rainfall, with the long rains falling between March-May and the short rains between October-November. The annual rainfall ranges between a mean of 640-710 mm per annum, with horticultural farming mainly done under irrigation. Temperatures range between 8.1^{o}C -30.3^{o}C and lies at an altitude of 1158-6800 meters above sea level from the lowland areas to the highland areas of Mt Kenya. Soil types range from red soils, black cotton soils, sandy soils and loam soils.

The main cash crops are rice, coffee and tea. The main food crops grown by smallholder farmers in the region include maize and beans. Horticulture farming is the main economic activity in the region with the main horticultural crops being snap beans, tomatoes and

bananas. The area was purposefully selected because it leads in snap bean production for export in Kenya. Snap bean is grown by most of the farm households, as a source of income for the smallholder farmers, and covers an area of 2300 ha with an annual production of 3,680 tons. The crop is grown throughout the year using irrigation either as pure crop or mixed crop. It has two main seasons, the low season commencing in April-June and the high season in September-October.

3.2 Conceptual framework

Figure 3.1 shows the conceptual framework for a simple snap bean value chain. The value chain map shows product flows and the key participants and relationships involved in the value chain (UNIDO, 2009). Value creating activities indicated by the direction of the arrows focus around the key value chain participants ranging from input suppliers, who provide production inputs to producers, assembly stage, processing all the way to consumers. Value is added at each stage of the chain from input supply through to the point of sale to the consumer. The value chain map is made up of three interlinked components namely, the value chain participants, the enabling environment (infrastructure, policies, institutions and the processes that shape the market environment) and the facilitating services (credit, transport, extension services) that support the value chain's operations. The incentive for all the value chain participants is the value-added by each of them.

Therefore, in this study, chain mapping involved delineating the flow of snap beans from smallholder farmers, through traders to consumers. Data was collected from the participants using surveys and key informant interviews. The chain participants, who transact the produce as it moves along the chain, their respective roles, and the inter-relationships among them,

were identified. A basic map was then drawn showing the linkages with arrows indicating the direction of product flow. The map was presented in focused group discussions for further inputs and adoption before the final mapping was done.

Figure 3.1: Conceptual framework showing the snap bean value chain

Enabling environment: macro-economic policies and regulations

Facilitating institutions: policy, commercial law, market information, standards, food safety, technology, etc

Input supply → Farm production → Assembly → Processing → Logistics

Facilitating services: Transport, storage, processing, packaging, communications, credit, extension, etc

Incentive: Value added by every function for each participant

Adopted from Keyser (2006) and UNIDO (2009)

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3.3 Analytical framework

Competitiveness was analyzed using value chain analysis (VCA) framework (Kaplinsky and Morris, 2001). Value chain is the full range of activities that are required to make a product or service. The value chain therefore incorporates all the activities including input sourcing, production, transformation, marketing all the way up to final consumption and disposal after use. Value adding practices and returns realized in every stage by respective chain participants were explored. Following Kirimi et al. (2011), farm level competitiveness was measured by comparing value added and the costs involved at each stage of the value chain. Competitiveness was demonstrated in profitability of individual chain participants (FIAS, 2007).

3.3.1 Calculation of value-added

To compute the value-added all costs and sales for the various stages were measured as well as the underlying product and input prices. Actual market prices were used for financial analysis.

Thus according to guides from UNIDO (2009), the following were calculated;

1. **Value Added (VA)**

   Value Added (VA) is the difference between the value of output of a product i (Y_i) and the value of intermediate inputs (II_i) used in the productive activities and represents the value-added by an individual actor j during the accounting period. The intermediate inputs are those factors of production that are totally transformed or

consumed during the accounting period and are not available for use during the next period.

$$VA_{ij} = Y_{ij} - II_{ij} \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \text{(1)}$$

2. Net Value Added (NVA)

Net Value Added (NVA) is the difference between Value Added (VA) and Depreciation (DP) for product i from individual agent j. However, in this study depreciation was assumed to be zero because data was collected for only one production season covering 8 weeks, and so spreading out depreciation cost over the useful life of equipment and machinery would be negligible.

$$NVA_{ij} = VA_{ij} - DP_{ij} \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \text{(2)}$$

3. Gross Profit (GP)

Gross Profit (GP) measures the difference between VA and expenditure on labour, taxes, and interest charges. The GP measures the returns to cultivation after labour costs, taxes and interest charges have been deducted.

$$GP_{ij} = VA_{ij} - (wages_{ij} + interests_{ij} + rents_{ij} + taxes_{ij}) \ldots \ldots \ldots \ldots \text{(3)}$$

4. Overall value-added

The overall value-added was computed as

$$TVA_{chain} = Y_{chain} \text{ ó } II_{chain} = \hat{U}VA_{agents} \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \text{(4)}$$

From these it was possible to identify the share of value-added contributed by each stage of the value chain.

The VCA was chosen for this study because VA provides insights to areas where costs can most effectively be reduced. Considerations of stage to stage build-up of costs indicate insights to the competitiveness of individual chain participants. For example if in farm production the cost of inputs such as fertilizer and chemicals account for disproportionately large share of total cost structure then policy interventions or other investments that help reduce these expenditures on this stage of the value chain may be desired. However, value chain analysis procedure is tedious and time consuming.

3.4 Methods and procedures

3.4.1 Research design

The research was conducted through household survey. Primary data was collected from the selected respondents using semi-structured questionnaire. In addition key informants from the Ministry of Agriculture, Horticultural Crops Development Authority (HCDA), snap bean farmers, transporters, brokers, retailers and exporters were interviewed to obtain more data. An interview of consumers was also conducted to assess the level of domestic consumption. This data was used for comparison with field data and to enrich the findings in the questionnaires. Other relevant literature on snap bean production and trade were obtained from libraries and the internet.

3.4.2 Sampling procedure

The study used baseline data which had been collected earlier in 2010 through the DrivLIC project. Multistage sampling procedure was used to identify the sample group for primary data collection. The first stage involved purposeful selection of the main export vegetable growing administrative locations in the study area. Lists of all smallholder households in locations producing and exporting vegetables were developed with the help of village elders and frontline extension staff of the Ministry of Agriculture. The sampling frame comprised of 700 horticultural farmers from whom 270 households were randomly selected. This study further selected and interviewed 139 smallholder farmers who were growing snap beans, which was the focus of study.

Sampling of brokers was challenging as most of them were not residents in the immediate study areas. Because of repeated dealing with the farmers, some farmers had their contacts which assisted in contacting them. Likewise the brokers assisted in identifying transporters. All the five major supermarkets in Nairobi were selected for interview, and they in turn helped in identifying the processors who supply them with processed beans. Consumers were sampled as they did their shopping at the supermarkets or from local vendors and green grocers. So in addition to the farmers, 10 brokers, 5 transporters, 5 supermarket stores, 10 local vendors, 2 processors, 100 consumers and 5 exporters were interviewed. Separate questionnaires were developed for each category that was interviewed. Four enumerators to administer the questionnaire were trained first. The questionnaire was pre-tested in the study area to gauge its suitability in capturing key issues of the research.

3.4.3 Data needs

Quantitative information collected included financial costs and outputs that affect the value chain participants. Information collected through questionnaire included production and marketing related information from snap bean farmers, brokers, wholesalers/processors, domestic retailers and exporters.

3.4.4. Data sources

Data source	Type	Method of data collection
Smallholder farmers	-Farm characteristics (total farm size, area under snap beans,) -Input costs (seed, fertilizer, labour, farm implements, chemical pesticides, transport) -Socio-demographic variables (age, education, household size, gender, experience) -Yields, sales and farm gate produce price -Group status, extension service, input sourcing	Household questionnaire and focus group discussion
Traders (Brokers, local traders and vendors, domestic supermarkets and exporters) and transporters	-Personal/firmøs information -Buying and selling prices, commissions -Transaction costs and contractual arrangements -Transport costs, constraints	Key informant interviews
Consumers	Income levels, bean consumption preferences, buying prices	Consumer questionnaire

3.4.5 Data analysis techniques

SPSS was used for data entry and descriptive analyses such as means, standard deviations, and percentages to meet objective one. These descriptive statistics were used to summarize the socio-demographic characteristics of the respondents. The third objective was accomplished using the VCA software from FAO was used for financial analysis to assess the competitiveness of snap beans in the study area. The software helps build step by step quantitative database of each of the value chain stages, thus allowing individual analysis of each chain participant. The following assumptions were made in order to facilitate the use of the software. Yield per acre was approximated at an average of 3000kg per season; all other farm activities, farm inputs and snap bean output were converted into per acre units.

Step 1. To use the FAO software, the input/output commodities are calculated per acre as per the farmerøs current practice.

Step 2. To input all the actual inputs used by the farmer per acre. Once the data is entered the software automatically calculates the gross profits and value added per acre.

Test for equality of means

To accomplish the fourth objective, analysis of variance (ANOVA) was independently conducted for every channel to determine if there were differences in means of the value added between the actors in respective channels and if those differences are significant. ANOVA was chosen for the analysis since it allows for comparisons between three or more groups (Green, 2000). Multiple comparisons were done using the Tukey post-hoc test to show which groups differ from each other. Since the ANOVA test assumes equal variances

between groups, Levene's Test of Homogeneity of Variance was used to test the hypothesis of equal variances between the value-added for the different actors in each channel.

The null (H_o) and the alternative (H_1) hypotheses for the ANOVA analysis were stated as;

H_o: The mean value added for the actors are equal, and

H_1: At least one of the means of the actors is not equal to the others

CHAPTER FOUR: RESULTS AND DISCUSSIONS

4.1 Descriptive statistics

The descriptive analyses described here were conducted at household level to show the overall structure of the sample for understanding. Household structure is important as it defines the household decision making process and labour provision for farm work. Table 4.1 shows the summary of the socio-economic characteristics of the households.

Table 4.1: Summary statistics for household socio-economic characteristics

Farmers	Variable measure	Statistics				
		N	Min	Max	Mean	Std deviation
Age of household head	Average years	139	24.0	90.0	46.5	12.6
Experience in snap bean farming	Average years	139	1.0	38.0	12.7	7.9
Average snap bean area	Acres	139	0.1	5.0	0.5	0.6
Household size	Average number	139	1.0	11.0	4.2	1.6
Education	Years	139	0.0	16.0	8.7	3.6
Distance to buying shed	Km	139	0.0	15.0	1.4	1.9
Distance to input shop	Walking hrs	139	0.1	30.0	1.3	2.6

Source: Survey results, 2011

The average age of the household head was 47 years. This shows that people in productive age are involved in snap bean production, which is in line with Brij et al. (2011) who pointed out that the age bracket of 15-60 years constitutes the most active agricultural work force. The average household size was 4 persons, meaning much of the labour for farm operations

would be hired. Since snap beans production is labour-intensive, the age as well as family members available for work determines the competitiveness of farm operations.

The number of years one has been continuously involved in farming was taken to be a proxy for the level of experience of snap bean farmers. The average snap beans growing experience was 13 years, implying that famers have enough knowledge and competence in snap bean farming and making informed management choices. The level of education influences household decision making. Household heads received formal education for an average of 9 years, meaning most of them were educated beyond primary level. This is important because it implies that most of the farmers were literate and could interpret recommended production practices (Emongor et al., 2010). Land under snap beans in the study area averaged 0.5acres per household; with the minimum size being 0.125acres and a maximum of 5 acres. Such small sizes allow smallholders to do closer farm supervision and do better management as opposed to large farms. The mean distance to the buying sheds was 1.4km and input shop was merely an average of 1.3 walking hours. These imply that buying sheds and input shops were within reach of most farm households. Snap beans are highly perishable, hence the shorter the time lapse between harvesting and produce collection, the more competitive the farmer¢s produce is in terms of quality. Again, during rains, most roads become impassable so, women, who mostly carry beans on their heads to the buying sheds, do not strain a lot. Shorter distances also imply farmers incur lower transport costs in acquiring production inputs, and hence higher profits, ceteris paribus.

4.2 Household attributes

Table 4.2 shows the summary of the major frequencies that characterizes the households. Majority of the snap bean household heads were men (87.1%) with women constituting only 12.9%. This discrepancy can be explained from the nature of the crop; being an export vegetable crop, it is mostly associated with men. Credit for snap beans production was obtained by 58.1% of the farmers. Credit is important for cushioning cash constrained farmers to be able to meet their farm activities requiring cash on time. Only 38% of the farmers belong to a marketing group. Being in a collective marketing group is beneficial to farmers as it helps spread investment costs in high-value vegetable crops (Okello, 2011) like snap beans. Additional benefits of being in a group include having a stronger bargaining power when dealing with market agents and brokers. More than 60% of the farmers received general extension service from either government or private extension service providers. Farmers who were growing snap beans under contract accounted for 50.8% of the respondents, with 69.4% of those contracts formally signed and 30.6% being informal. Negotiated contracts have the advantage of offering farmers higher price during periods of gluts but low price during periods of scarcity during which the contract price is lower than prevailing market price. Buyers use this to their advantage by ensuring that the burden of international variation in prices is transferred to farmers. A similar comparison can be drawn from Maertens (2006) who looked at the case with fresh fruit and vegetable marketing in Senegal.

Table 4.2: Frequencies of selected household characteristics

Farmers	Variable measure	No	%
Gender	Male	121	87.1
	Female	18	12.9
Distribution per district	Kirinyaga South	63	45.3
	Kirinyaga East	26	18.7
	Kirinyaga West	50	36.0
Access to credit	Yes	81	58.1
	No	58	41.9
Access to extension service	Yes	89	63.7
	No	50	36.3
Group membership	Yes	54	38.8
	No	85	61.2
Growing under contract	Yes	71	50.8
	No	68	49.2
Type of contract	Formal	96	69.4
	Informal	43	30.6

Source: survey results, 2011

4.3 Snap bean value chain actors and their roles

Figure 4.1 shows the snap bean value chain map from smallholder perspective, detailing the functional levels on the left column while the support services are on the far right column. Table 4.3 is a schematic summary of the roles played by the chain actors.

Figure 4.1: Smallholder Snap bean value chain map

	Domestic market channel	**Export market channel**	
Functions	Consumers	International consumers	**_Support services_**
Retailers	NCC retail market, green grocers, local	Hotels, restaurants, supermarkets	**_Cold chain transport_**
			Air-freight
			Certification services
Wholesaler/ **_Processing_**	Market intermediaries	Distributors/small processors	Briefcase exporters — Small and medium exporters
Broker	Brokers		**_Financial services_**
		Brokers — Exporter agents	
	0.7% 9.0%	74%	
		42.1% 48.2%	**_Transport_**
Producer	Small-scale farmers	Farmer/producer Associations	**_Technical services_**
Input supply	Local agro-vet stores, exporters, producer associations		

Author's compilation from survey, 2011

The main participants in snap beans value chain were input suppliers, primary producers (smallholder farmers), transporters, traders (brokers, processors and retailers who include

local vendors and supermarkets), other service providers, and consumers. The value chain begins with input suppliers located at the bottom of the map who supply production inputs to producers. As the commodity exchanges hand along the chain, key services such as financial support, technical assistance in terms of research and extension, transport, and produce certification are provided by service providers. Cold chain transport and certification are important services that ensure end consumers get products of high quality, a key factor in harnessing competitiveness in snap beans business.

Specific roles played by each chain actor are discussed hereunder.

4.3.1 Primary Producers

Apart from producing, smallholders also offered extension services to their neighbors. Their yield ranged from 1800kg/acre to as high as 4200kg/acre. Despite its high value, 38% of the farmers still planted second generation seed, locally known as õmuhoroö, since certified seed was either unavailable in the markets or was expensive. This probably contributed to the low yield realized by the farmers, hence lowering their competitiveness.

4.3.3 Service providers

4.3.3.1 Input Supply

Specific input suppliers consisted of local agro-vet merchants, producer associations and export companies. Most of the inputs such as fertilizer and pesticides were available in local agro-vet shops except seed, which was mainly supplied by exporters to the contracted famers. Input shops were on average 1.3 hours walk, meaning farmers spent less in transport to source for inputs.

4.3.3.2 Transporters

Means of transport included bicycles, motorcycles to small open pick-ups (2-3tons) and large trucks (7 tons). Farmers hired local private transporters who use motor cycles to transport the beans from the farms to sheds where produce are bought (at Kshs 20-30 per crate), while brokers hired small open pick-ups at a cost of Kshs 7000 to transport produce to Nairobi. Exporters used large trucks with coolers to keep the produce fresh for longer hours while on transit as freshness is a major factor determining competitiveness of the product. Even though road network was good, transporters complained about the poor condition of the roads, especially when it rains as most roads become so muddy, in the event delaying produce transmission to markets or total failure to deliver. Better infrastructure should be provided to guarantee freshness and quickness of delivery of produce to the intended destination.

4.3.3.3 Extension and Research

Research was conducted by Universities, in collaboration with partners such as ASARECA, USAID, and CIDA among others; and the Kenya Agricultural Research Institute (KARI). Research focused mainly on agronomic, breeding and economic aspects as well as on utilization of snap beans which was carried out by KARI. Extension service for snap beans was mainly provided by exporters who reached 62.3% of the farmers through their field agents, followed by input suppliers (13%), government (10.1%), NGOs (2.9%), producer associations (2.9%) and others including neighboring farmers reached 8.7% of the farmers. This shows that extension in snap beans production is largely private sector-driven, and clearly demonstrates the changing Government policy on extension as emphasized in the

National Agricultural Sector Extension Policy, towards developing private-sector operated extension services to complement the public extension service (NASEP, 2007).

Figure 4.2: Per cent of farmers getting snap bean extension services from various extension service providers
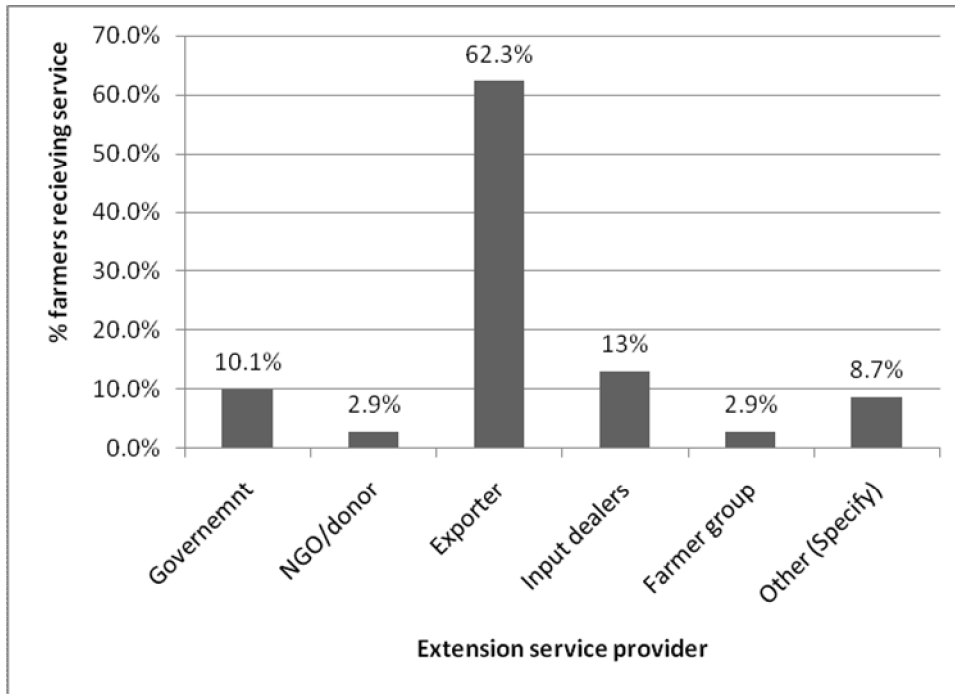
Source: Survey results, 2011

4.3.3.4 Credit Services

Credit for snap beans production was obtained by 58.1% of the farmers. Farmers who receive credit have higher yield, income, and improved access to farm inputs compared to non-beneficiaries (Badiru, 2010). Figure 4.3 shows exporters were the main providers of credit to the farmers (45%), followed by input dealers (16.3%) while commercial banks provided 11.3% of the farmers with credit. The main commercial bank was Equity, whose presence was evident in entirely every major market center. Credit is so crucial in enabling cash-constrained farmers to carry out their farm operations in time. To encourage more farmers to

take credit, commercial banks and other lending institutions need to lower their interest rates to levels that are affordable to the farmers.

Figure 4.3: Per cent of farmers acquiring credit from various sources
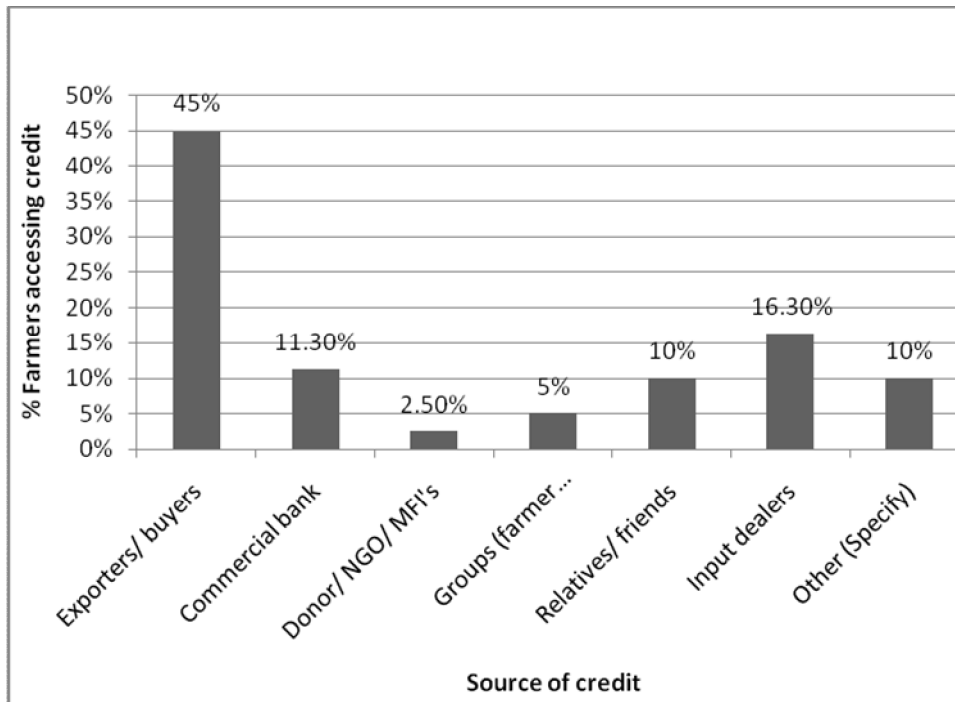
Source: Survey results, 2011

Credit was mainly in the form of inputs (67.5%) with cash credit accounting for only 25% (Figure 4.4). Seed was the main material support to farmers (74.5%), followed by extension services (12.7%) and chemicals (5.5%), among other support services provided by buyers (Figure 4.5). However, farmers still need cash credit to enable them carry out timely farm operations, such as those requiring labour (Badiru, 2010), that will ultimately improve the quality of the produce. Costs of credit were recovered from the sales after harvesting.

Figure 4.4: Forms of credit that farmers received
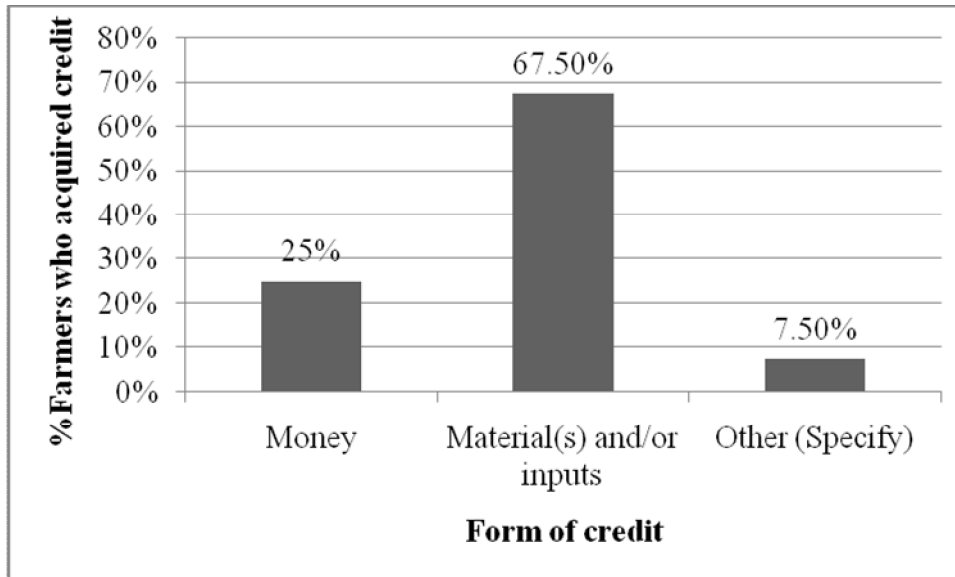
Source: survey results, 2011

Figure 4.5: Per cent of farmers exporters provide with various support services
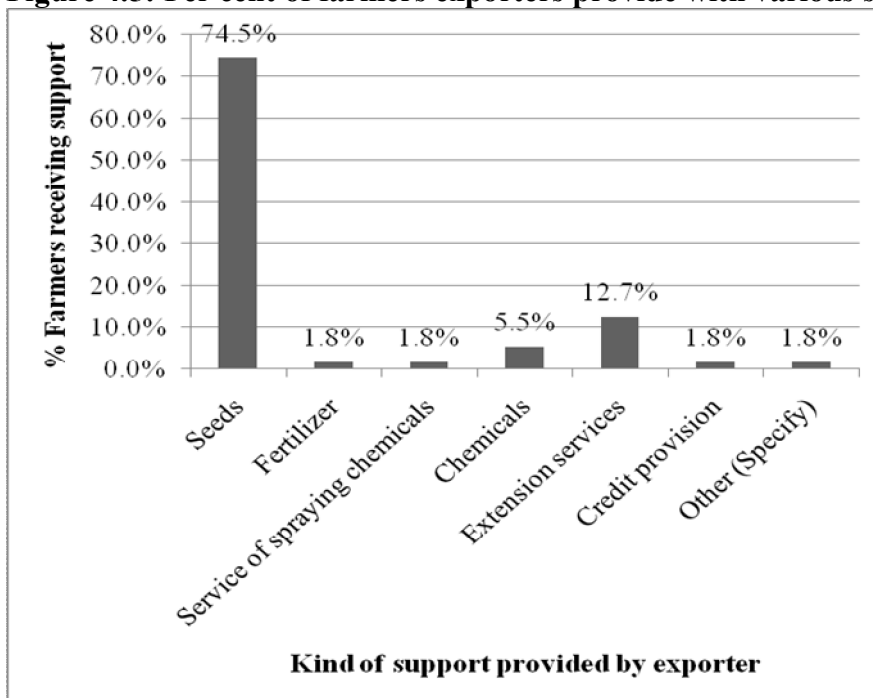
Source: Survey results, 2011

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4.3.4 Processors

Farmers carried out minimal primary processing which involved washing the harvested beans to remove foreign particles such as soil and snails. The main processing firms were Fresh n Juici and Ben Peter Fresh Ltd. They processed beans by trimming the ends into equal sizes, which they then neatly arranged in half-kilogram packs (pre-packs) or mixed vegetable packs or stir fry mixes for sale to supermarkets. A pack of mixed vegetable fries contained other vegetables such as baby corns, carrots, sugar snaps and snow peas. The processors, apart from ensuring some quality control also carry out wholesale functions of the processed beans to supermarket outlets. In order to be more competitive, smallholders can engage in processing functions such as trimming and packaging the produce before sale as this would fetch them more money. One kilogram of packed beans sells at between Kshs 80 to Kshs 150 (depending on whether it is pre-pack or mixed vegetable fries) compared with Kshs 40-50 per kilogram of fresh beans that farmers sell.

4.3.5 Traders

Traders included brokers, local vendors and green grocers, supermarket retail outlets located in urban centers and exporters. Export companies handled 48.2% of fresh beans, brokers 51.1% (9% sold through the domestic market and 42.1% sold to exporters) and 0.7% bought by the rest of the buyers including local traders and hoteliers (Figure 4.1). In total 90.3% of the produce was exported and 9.7% consumed locally. Trust played a key role in building confidence between trading parties. Majority of the farmers had very little to moderate trust with the buyers (69.9%) and only 30.1% of the farmers showed much trust in the buyers. Four main supermarkets operating in Nairobi (Uchumi, Nakumatt, Naivas and Tuskys) were

all found trading in snap beans and its products except Ukwala. Nakumatt was supplied by Fresh n Juici Ltd and Naivas Supermarket by Ben Peter Fresh Ltd. Naivas Ltd was also selling beans in its own brand name. The average sales reported per week was about 200kg for the supermarket chains. Some exporters who were unable to meet contract quantities with their upstream buyers were reported to fill up the difference from brokers and non-contracted farmers.

Produce that was rejected and those that had missed flight to Europe were sold to local traders from Nairobi City Council's (NCC) Wakulima market and to green groceries spread across residential estates in the city. This is an informal market where rules and regulations regarding food safety standards are not defined. Hotels and restaurants also got their supplies mostly through this channel, which is rapidly growing. The main constraints faced by the traders were poor market infrastructure (poor hygiene due to lack of holding sheds and cold storage facilities to lower post-harvest spoilage) and unregulated local authority cess collection.

4.3.6 Consumers

Most of the consumers who were interviewed were middle income earners with an average monthly income of Kshs 5000- 10,000. They showed varied preferences for eating snap beans with only 22.5% saying they had high preference, 35% had moderate preference and 17.5% did not prefer to eat snap beans at all, whereas 25% were indifferent. The reason they attributed to this was that the relative quantity of beans per shilling was low to feed an average family of 5 persons compared with other common vegetables such as kales. Majority of the consumers preferred to buy beans from NCC market at Wakulima or from the estate

groceries who sold beans in small packages that were affordable, than from supermarkets. The upper income consumers preferred to buy from supermarket retail outlets. This finding concurs with Munguzwe and Tshirley (2006) who studied the domestic value chains for fresh fruits and vegetables in Zambia. The main reason for this pattern is because price at the open market and green groceries (Kshs 74/kg) is lower than in supermarkets (Kshs 201/kg). The economic recession which was experienced from the year 2007 emphasizes this behaviour in which majority of the low income consumers prefer to buy in smaller packages that are affordable to meet their daily food needs.

4.4 Institutional set up of the value chain

4.4.1 Collective Action

Table 4.2 indicates that 61% of the farmers belong to a marketing group. Farmers had various reasons for being members of the marketing groups with 52% joining in order to gain access to larger markets, 7% to learn better agricultural practices and 5% joining because it is a requirement by the exporter. Most of the respondents (67%) were satisfied with the services provided by the group, 24% were not satisfied while 9% were neutral. Okello (2011) concludes that collective action can help spread investment costs in high-value vegetable crops, thus increasing competitiveness of smallholders.

Figure 4.6: Main reasons why smallholder snap beans farmers in Kenya form a marketing group
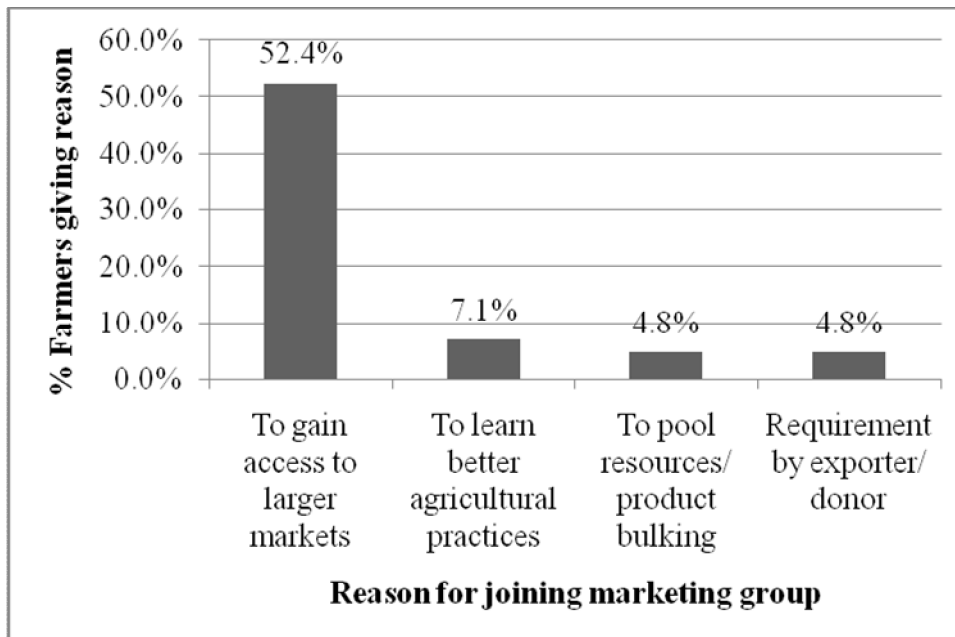
Source: Survey results, 2011

4.4.2 Transaction Costs

Okello et al., (2007) described snap bean as an asset-specific commodity whose production investments and use are restrictive. Farmers incur high transaction costs in searching for market for it. To enhance smallholder competitiveness, the sources and levels of transaction costs have to be understood if the farmers have to reduce them. Some of the main transaction costs include cost of signing and negotiating a contract, cost of calling the buyer to arrange when to buy the produce and other incidental costs incurred such as meals eaten when attending meetings with buyer (Table 4.3). For example, the total time spent in signing and maintaining contracts was about 60% of total labour hours required for producing an acre of snap beans.

Table 4.3: Transaction costs incurred by snap bean farmers in signing and maintaining contracts with exporter per person per season of eight weeks

Activity	Time spent in hrs	Total transport and incidental costs in Kshs
Initial activity with contractor (meetings, signing and negotiations)	10.2	399
Other activity (follow-up meetings, audit, soil analysis, farm assessment)	22.45	851
Contract maintenance (contract renegotiation, calling buyer)	19.5	1665.7
Other activity with service providers (barazas, seminars, meals, consultations)	58.3	1355
TOTAL TCs	**110.45**	**4270.7**

Source: Survey results, 2011

4.4.3 Information flow in the value chain

An index based on the household's rating on ease of access to market information from buyers was scaled on a 1 (very difficult)- 5 (very easy) point scale. The result in Figure 4.7 show there exists high asymmetry of information, with brokers and exporters having better information on prices and quantity requirements, as 58% of farmers agreed that access to market information is not easy. This explains the results in Figure 4.8 which show that on average majority do not have trust with their buyers, particularly after failing to honor price agreements in past dealings. A trust index based on a household's rating of their level of confidence in buyer was scaled on a 1 (very little)- 5(very much) point scale. Information was found to flow from exporters, through their agents and/or brokers, to the farmers. Brokers who are connected to buyers in Nairobi looked very aggressive in searching for market information. They receive market information mostly by calling the exporters or large traders on whose behalf they buy the produce.

Figure 4.7: Farmers who access information on marketing of snap beans from buyer (per cent of households)
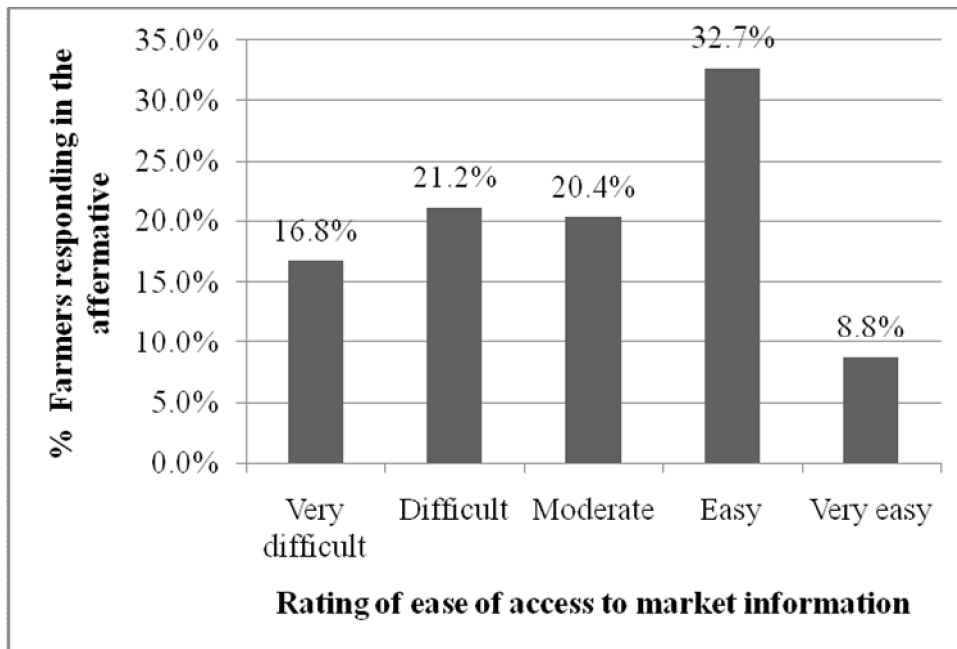
Source: Survey results, 2011

Figure 4.8: Household's level of trust with buyers
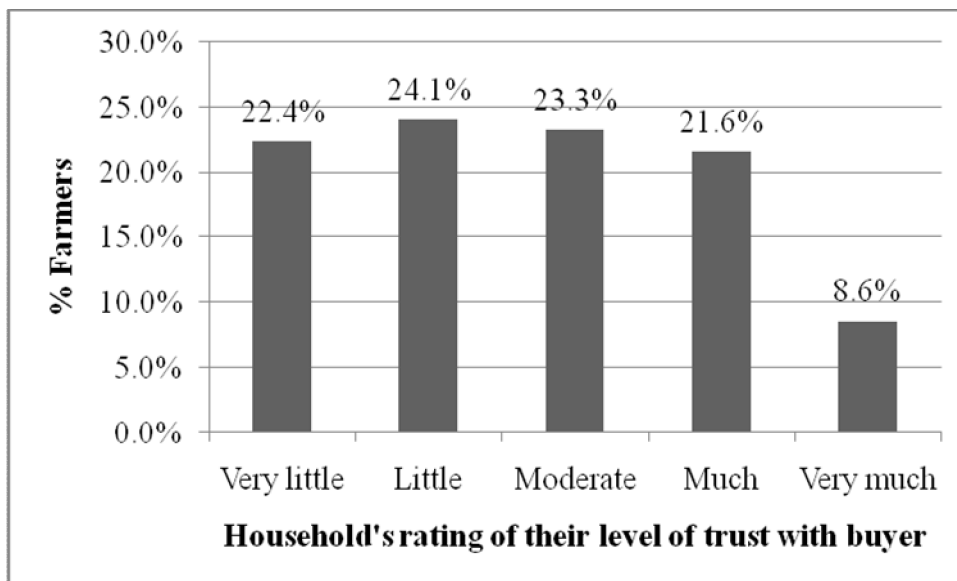
Source: Survey results, 2011

4.5 Price Formation

Snap beans pricing at farm-gate is set by exporters and brokers who interact with upstream buyers. Non-contracted farmers receive price information either by calling brokers or waiting for the brokers to visit them at the farm. While exporters pay farmers an average price of Kshs 46 per kilogram of fresh beans throughout the season, brokers manipulate buying prices and sometimes pay as low as Kshs 23 per kg of fresh beans during the low season, which is far below the average cost of producing one kilogram (Kshs 35.30) while during the high season, brokers would pay as high as Kshs 55-80 per kilogram, coming to an average of Kshs 43 per kilogram.

Figure 4.9 shows that 46.6% of farmers could not bargain for prices with the buyer with only 12% having nearly equal bargaining power. This shows that most farmers merely took what buyers offered them, hence rendering them less assertive. Middlemen had more bargaining power than farmers. This disparity in level of bargaining between farmers and middlemen is because of financial dependence of farmers on middlemen and poor access to existing marketing system (Shamsuddoha, 2007).

Figure 4.9: Bargaining power of smallholder farmers on price agreement with buyer (per cent of households)
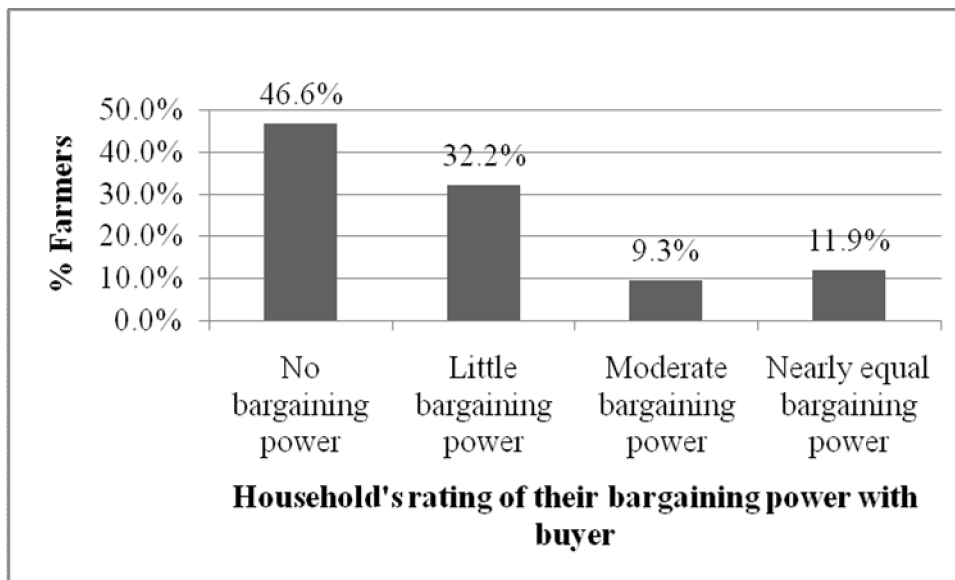
Source: Survey results, 2011

4.6 Calculation of value -added by chain actors

In order to examine the competitiveness of smallholder snap beans production value added shares of the chain participants was calculated and compared with the costs incurred by each. On average, the cost of producing a kilogram of snap beans was Kshs 35.30. Kamau (2000) who estimated the average cost to be between Kshs 18/kg and Kshs 30/kg. The difference could be associated with the increased pest and disease incidences which imply higher labour costs.

Value added was considered for the main domestic chain (both formal and informal) and the export chain. The formal domestic chain is the one comprising of supermarkets as retailers. Four main channels for snap beans marketing were identified as follows;

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| i) | Farmer | í | Broker | í í | Processor | . | Retailer 1 | í . | Consumer |

(Formal domestic market)

| ii) | Farmer | í | Broker | í í í | Retailer 2 | í . | Consumer |

(Informal domestic market)

| iii) | Farmer | í í í | Broker | í í | Exporter | í í | Consumer |

| iv) | Farmer | í í í í | Exporter | í . | Consumer |
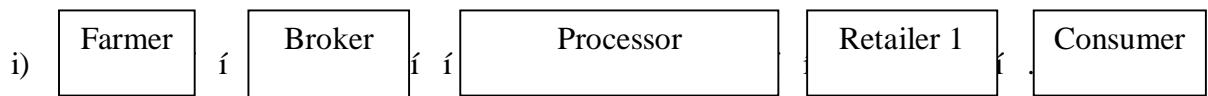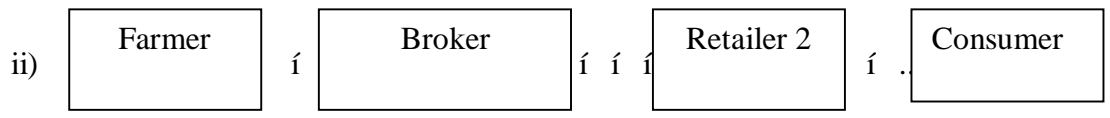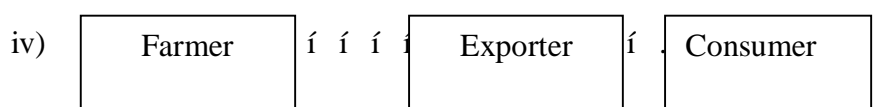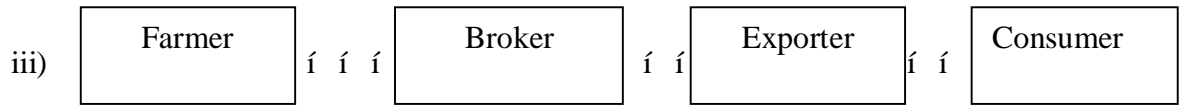
Channels (i) and (ii) are domestic channels whereas (iii) and (iv) are export channels. Ndegwa et al. (2010) identified 3 broad channels basically as being through brokers, directly to processors or to exporters. VCA software was used for this analysis. Since price varied widely among actors, the average buying and selling price were calculated for various value chain participants.

4.6.1 Calculation of intermediate costs and value added for channel 1

In this channel, farmers sell to local vendors and green grocers through brokers. The intermediate cost for farmers include conventional production inputs such as seed, fertilizer and pesticides. Combined labour for farm operations was the most expensive cost for farmers, accounting for 42% of the total cost, folowed by seed (18%) and fertilizer (14%) (Appendix 3). Brokers incurred the least cost, only incidental costs for calling buyer to make enquiries and transport for reaching the farms (0.5% of the ir total cost). Results in Table 4.4 indicate that farmers had the lowest share of total value added of 15.6%, followed by brokers (16.3%) , retailers (30.5%), and finally processors (37.6%). Processors reaped their high

value added by trimming the produce into equal sizes and packing it. Their intermediate costs include payment of rent, fuel, licencing fees, insurance and maintenance cost among others. Of these insurance accounts for the highest cost at over 5% of the total cost (Appendix 4). This may be due to the fact that snap beans is high-value and any errors during processing, contrary to next buyerøs specicications, would lead to rejection. Farmers added the least value since they merely trade in raw untransformed produce. Overall, the chain has positive value added of Kshs 164.10 indicating profitability of the entire chain. This concurs with the AsiaADHRA (2008) findings on the chicken value chain in Cambodia in which small farmers got less benefit than middlemen and wholesalers who trade in large volumes, even though sale margin for farmers was higher.

Table 4.4: Value added per kg of snap beans per actor for channel 1

Actor	Total output in Kshs per kg	Intermediate inputs	Total Value added	Net Value Added in Kshs	Gross Profit in Kshs	% share of Value Added
Smallholder farmer	43	17.4	25.6	25.6	9.3	15.6
Broker	70	43.2	26.8	26.8	24.5	16.3
Processor	151	89.3	61.7	61.7	55.8	37.6
Retailer 1 (Domestic supermarkets)	201	151	50	50	50	30.5
TOTAL			**164.1**			**100**

Source: Survey results, 2011

4.6.2 Calculation of intermediate costs and value added for channel 2

Channel 2 has only three actors. In this channel, the retailersø costs include local authority cess payable to the City Council at 60cents per kilo of fresh beans. Even though the produce

that go through the informal channel earns farmers greater share of value added of 45.9% (Table 4.5), compared with the formal channel in Table 4.4, it deals mainly with rejects and is dominated by brokers whose value added share is the largest at 48%. In this channel freshness of beans was the key measure of quality and this could be evidenced from total value added created of Kshs 55.8, which is the lowest among all the four channels considered. Retailers here comprised of grocers and estate vendors who sold to local consumers, hotelliers and restaurants as well as children homes, and served mostly low to medium income consumers. It is rapidly growing and therefore the local authority council should improve produce handling facilities at the market stalls to reduce spoilage. Out of an average of 320kg bought per day, vendors reported to lose nearly 60kg per day amounting to 19% loss.

Table 4.5: Value added per kg of snap beans per actor for channel 2

Actor	Total output in Kshs per kg	Intermediate inputs	Total Value added	Net Value Added in Kshs	Gross Profit in Kshs	% share of Value Added
Smallholder farmer	43	17.4	25.6	25.6	9.3	45.9
Broker	70	43.2	26.8	26.8	24.5	48.0
Retailer 2 (grocers/ vendors)	74	70.6	3.4	3.4	3.4	6.1
TOTAL			**55.8**			**100**

Source: Survey results, 2011

4.6.3 Calculation of intermediate costs and value-added for channel 3

Tables 4.6 shows the intermediate costs and value added for export market channel in which the broker acts as an intermediary for the farmer. Since the broker is based around the production areas, the only cost they incur are incidental costs for calling the exporter to arrange or negotiate price and cost of meals, which together accounts for 0.5% of their total cost. On the other hand, exporter costs include loading and reloading of produce at the buying centers and at depots, licence fees, produce inspection fees,clearance fees, packing, transport, storage, management, other overhead costs and insurance fees. Overhead costs account for 26.4%, labour for 11.7% and insurance 2.97% of the total exporter cost (Appendix 5). Like processors the risk of rejection is high if error is made during this crucial stage. In this channel, the value added share for exporters is the highest at 63% followed by brokers (18.9%) and lastly farmers (18.1%). This channel is more active during low season in the months of April-June when produce is scarce.

Table 4.6: Value added per kg of snap beans per actor for channel 3

Actor	Total output in Kshs per kg	Intermediate inputs	Total Value added	Net Value Added in Kshs	Gross Profit in Kshs	% share of Value Added
Smallholder farmer	43	17.4	25.6	25.6	9.3	18.1
Broker	70	43.2	26.8	26.8	24.5	18.9
Exporter	187	97.8	89.2	89.2	76.3	63.0
TOTAL			**141.6**			**100**

Source: Survey results, 2011

4.6.4 Calculation of intermediate costs and value-added for channel 4

This channel deals with contractual farming in which farmers are contracted by exporters. The farmer sells directly to exporter, thus avoiding having to go through many intermediaries. The value added share for farmers is higher at 20.2% in Table 4.7 compared to 18.1% in Table 4.6. Results indicate that the presence of brokers in a value chain reduces the share of value added for farmers. Reddy et al. (2010) also concurs that shorter marketing chains present more benefits to farmers than longer ones. The higher benefits can be attributed to lower transaction and marketing costs. The implication of this is to have smallholders form marketing organizations that would minimize the influence of brokers and in return get higher benefits.

Table 4.7: Value added per kg of snap beans per actor for channel 4

Actor	Total output in Kshs per kg	Intermediate inputs	Total Value added	Net Value Added in Kshs	Gross Profit in Kshs	% share of Value Added
Smallholder farmer	46	17.4	28.6	28.6	12.3	20.2
Exporter	187	73.8	113.2	113.2	100.3	79.8
TOTAL			**141.8**			**100**

Source: Survey results, 2011

Since value added represents the contribution of payments to the primary factors of production such as seed, fertilizer and other inputs, the more value a firm (snap bean farmers) can add to a product for a given primary and intermediate cost configuration, the greater its profitability (FIAS, 2007). The potential for farmers to add value to their produce lies in their ability to keep intermediate input costs as low as possible. There is need for enhanced

extension services by both government and other stakeholders to improve management capacity of smallholder farmers. Kotelnikov (2000) points out that for a specific commodity, the share of each value chain participant in total value-added could be assessed in terms of its contribution to aggregate inputs and outputs.

4.7 Difference of means tests

Table 4.8 shows the output of the ANOVA analysis and whether there are statistically significant differences between the means for the four market channels.

Table 4.8: ANOVA results for testing the difference of mean value-added between the snap bean value chain actors in four different market channels in Kirinyaga County

	Description	Sum of Squares	df	Mean Square	F	Sig.
Channel 1	Farmer-Broker-Processor-Retailer 1	5087.426^a 303.083^b 5390.509^c	3^a 77^b 80^c	1695.809^a 3.936^b	430.830	0.000***
Channel 2	Farmer-Broker-Retailer 2	4408.41^a 301.319^b 4709.732^c	2^a 81^b 83^c	2204.207^a 3.720^b	592.530	0.000***
Channel 3	Farmer-Broker-Exporter	18843.521^a 421.842^b 19265.364^c	2^a 76^b 78^c	9421.761^a 5.551^b	1697.445	0.000***
Channel 4	Farmer-Exporter	33524.869^a 381.099^b 33905.969^c	1^a 78^b 79^c	33524.869^a 4.886^b	6861.568	0.000***

***Significant at = 0.05; [a]Between Groups; [b]Within Groups; [c]Total

Source: Survey results, 2011

The significance level is 0.000 (p = 0.000), which is less than 0.05, in all the four channels. The F-values are also high. Therefore, there is a statistically significant difference in the

mean value-added between the value chain actors in all four channels and the null hypothesis that the mean value-added for the actors are equal is rejected. Results of the Tukey post-hoc tests indicated in Tables 4.10, 4.11 and 4.12 showed which of the specific means differed in each case. There is a significant difference in means between the value-added for all the value chain actors in channel 1 (p = 0.000). However, there were no differences between farmers and brokers (p=0.315) (Table 4.10).

Table 4.10: Multiple comparisons between value-added means of actors for Channel 1

Dependent Variable: VA
Tukey HSD

(I) channel	(J) channel	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Farmer	Broker	-1.168	0.6746	0.315	-2.939	0.604
	Supermarket	-24.428(*)	0.9213	0.000	-26.847	-22.009
	Processor	-36.158(*)	1.4246	0.000	-39.899	-32.417
Broker	Farmer	1.168	0.6746	0.315	-0.604	2.939
	Supermarket	-23.260(*)	1.0867	0.000	-26.114	-20.406
	Processor	-34.990(*)	1.5368	0.000	-39.026	-30.954
Supermarket	Farmer	24.428(*)0	0.9213	0.000	22.009	26.847
	Broker	23.260(*)	1.0867	0.000	20.406	26.114
	Processor	-11.730(*)	1.6599	0.000	-16.089	-7.371
Processor	Farmer	36.158(*)	1.4246	0.000	32.417	39.899
	Broker	34.990(*)	1.5368	0.000	30.954	39.026
	Supermarket	11.730(*)	1.6599	0.000	7.371	16.089

* The mean difference is significant at α = 0.05
Source: Survey results, 2011

Similarly, in channel 2 (Table 4.11), only the means between the farmers and brokers did not differ (p = 0.183). The same case applied to channel 3 where p = 0.317, which is larger than 0.05. The rest were all significantly different (p = 0.000) (Table 4.12). These findings are further corroborated by the t-test results in Table 4.13.

Table 4.11: Multiple comparisons between value-added means of actors for Channel 2

Dependent Variable: VA
Tukey HSD

(I) channel	(J) channel	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Farmer	Broker	-1.168	0.6558	0.183	-2.734	0.398
	Vendor	22.182(*)	0.6558	0.000	20.616	23.748
Broker	Farmer	1.168	0.6558	0.183	-0.398	2.734
	Vendor	23.350(*)	0.8626	0.000	21.291	25.409
Vendor	Farmer	-22.182(*)	0.6558	0.000	-23.748	-20.616
	Broker	-23.350(*)	0.8626	0.000	-25.409	-21.291

* The mean difference is significant at = 0.05
Source: Survey results, 2011

Table 4.12: Multiple comparisons between value-added means of actors for Channel 3

Dependent Variable: VA
Tukey HSD

(I) channel	(J) channel	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Farmer	Broker	-1.168	0.8011	0.317	-3.083	0.747
	Exporter	-63.568(*)	1.0940	0.000	-66.183	-60.953
Broker	Farmer	1.168	0.8011	0.317	-0.747	3.083
	Exporter	-62.400(*)	1.2904	0.000	-65.485	-59.315
Exporter	Farmer	63.568(*)	1.0940	0.000	60.953	66.183
	Broker	62.400(*)	1.2904	0.000	59.315	65.485

* The mean difference is significant at = 0.05
Source: Survey results, 2011

A t-test was run to compare whether the means for the value added by smallholders who sell directly to exporters were different from those who sell through brokers at 95% level of confidence. The results indicate that the means for the two groups of farmers differ significantly (p < 0.05) (Table 4.13). Therefore, the null hypothesis of no difference in mean value added for the two groups is rejected.

See Appendices 7,8, and 9 for descriptives of actors in each channel and Appendix 10 for results of Levene's Test of Homogeneity of Variances. Levene's test indicate that the variances between the snap beans value chain actors in each of the market channels do not differ, hence allowing for the use of ANOVA in this study.

Table 4.13: T-test for comparing difference in mean value added between farmers who sell through brokers and those who sell directly to exporters in Kirinyaga County

N	Mean	Std. Deviation	Std.Error Mean	t (two-tail)	p-Value
139	25.77	2.80	0.24	13.57	0.000***

*** Significant at = 0.05

Source: Survey results, 2011

These results indicate that there is no channel that offers the same benefit. The farmers should choose the channel which is more beneficial when they are selling their snap beans. The findings underscore the fact that brokers do not add much value in the value chain, and reap the value added share that would have otherwise been transferred to the smallholder farmers, thereby increasing their benefits. On the basis of these results, the most appropriate channel for farmers to engage in is the fourth channel, in which they sell to exporters directly, as it offers them more benefits. This concurs with what voor den Dag (2003) found out; that farmers who sold to exporters directly obtained more benefits as opposed to those who sold through other market intermediaries. Policy recommendations on how to reduce the number of chain intermediaries so that smallholder farmers can earn more benefit from their farm produce is imminent.

CHAPTER FIVE: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

This chapter presents the summary, conclusions and policy recommendations drawn from the results of this study.

5.1 Summary

Most studies on snap bean value chain have focused on the qualitative aspects of the chain and on export chain (voor den Dag, 2003; Okello *et al.,* 2007), often masking the smallholders. This study analyzes the snap bean value chain by assessing the production and market channels for the smallholders. It addresses three specific objectives: (1) to characterize the snap bean value chain actors (2) to map the actors and identify their roles and inter-relationships in the value chain (3) to assesses the costs and value added benefits for each actor along the chain and how these are shared among them, and (4) to test if there are any significant differences in the value added for actors in each channel using ANOVA and t-tests. This chapter concludes by stating the limitations of the research. In chapter two, important literature on snap beans and value chain analysis are explored.

Chapter three describes the research methodology which was used for the study. Household survey was carried out to collect primary data using semi-structured questionnaire. 139 smallholder snap bean farmers were interviewed in Kirinyaga County, which leads in production of snap beans in the country. Focus group discussions and key informant interviews were conducted on 10 brokers, 5 exporters, 10 local retailers, 5 supermarkets, 2 processors and 100 consumers. Value chain analysis software developed by FAO was used to

calculate the value added for each chain actor. Descriptive statistics was employed to characterize the socio-economic characteristics of the actors, more so smallholders.

In chapter four the results of this study are discussed. The findings indicate that even though the value added share for smallholder snap bean farmers is the lowest, the study finds them still competitive since they realize positive profit. Processors reap the highest share of value added. Shorter chains are more beneficial to farmers than longer ones. The ANOVA analysis indicates that the means of actors were statistically significantly different in all the four channels. Having found that there are significant differences between the channels as a whole, multiple comparisons using Tukey post-hoc test was used to show which actors differed from each other within the channels. A t-test indicated that there exist significant differences between means of farmers who sell through brokers and those who sell directly to exporters, with the ones who sell directly getting more benefits. Chapter five concludes and gives recommendations for policy responses and future research. Policy recommendations are that government should have interventions that seek to reduce the number of intermediaries in the chain by encouraging farmers to form produce marketing groups. Brokers can be regulated by ensuring they are licensed and are legally recognized for the role they play in market linkages.

5.2 Conclusion

Production of snap beans was found to be dominated by male farmers. The value chain actors were found to play roles which complement each other. Trade was dominated by lead exporters who work through field agents. Support services to farmers such as credit, extension and transport are important in improving farmersø field operations. In general, the

chain was vertically integrated, but information flow was asymmetric especially between farmers and brokers, thus increasing transaction costs.

The smallholder farmers were competitive. However, smallholder snap bean production and marketing can be enhanced if the challenges facing them along the chain are addressed. The main constraints being the high cost of inputs (labour alone constituting 42.1% of the total cost), lack of cohesion, high information asymmetry, poor infrastructure and access to credit.

Although farmersø share of value added is the lowest in the value chain, they can get more benefit through initiating value addition processes like cleaning, trimming and packing harvested beans for the domestic market. This will ensure that the local supermarkets engage with them directly in business. Smallholder snap beans production was found to be competitive as farmers realized positive profits in the value chain. There were significant differences in the value added by the chain actors across all the channels, except between smallholder farmers and brokers. The proportion of value-added share by farmers was low, followed by brokers, then retailers while processors realized the greatest percentage of the value-added. Although shorter chains were found to be more profitable to farmers than longer ones, brokers still play a critical role of linking farmers to other buyers.

5.3 Recommendations

In view of the above the study recommends interventions that are necessary to support on-going research to develop sustainable varieties of snap beans seed that are locally adapted and acceptable in order to cut down on the high cost of (imported) seed and thus increase competitiveness of smallholder producers. Despite extension services being largely provided by exporters, government efforts still remain important to empower farmers to best practices

through training and information. Improved market information should be made available to all participants in the chain. Price information can be availed through telephone or group offices which are spread across the growing regions. This will greatly lower transaction costs as monitoring costs will be low.

Access to credit is seen as a great enabler for smallholder farmers to improve their production methods and ultimately increase outputs on farms. To enhance borrowing and use of credit, government together with credit schemes and credit institutions should formulate education programmes to educate farmers on credit acquisition and use. In addition, development of infrastructure should be improved; especially feeder roads and cold storage facilities should be established around the production centers. This will lower the rate of post-harvest losses thus enabling farmers to present more produce of better quality for sale. Markets should be regulated to reduce exploitation of farmers by potential buyers. A pricing mechanism that takes cognizance of the production cost by smallholders should be adopted to avoid using prices that only favor upstream traders.

Overall, farmers should be encouraged to form marketing groups so that they can minimize the infiltration by brokers. Since shorter chains are more beneficial than longer ones, the government should have policy interventions that seek to reduce the number of intermediaries in the marketing chain, such as licensing them into legal entities. The farmers should engage in value addition practices such as cleaning, trimming and packaging their produce for the local supermarkets.

Further research is required to assess the competitiveness of snap beans production in other regions of the country and to review the factors determining the distribution of benefits and costs among the various chain actors. Since the sector has had no controls over the years, a study using private and social prices would identify any market imperfections along the value chain and highlight the country's competitiveness in snap bean trade in the region.

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APPENDICES

Appendix 1: Distribution of value chain participants

		Gender	
Actor	No	Male	Female
Farmers	139	121	18
Brokers	10	10	0
Transporters	5		
Exporters	5		
Processors/wholesalers	2		
Supermarket retailers	5		
Local vendors/retailers	10	6	4
Consumers	100	78	22
Total	**276**		

Source: Survey results, 2011

Appendix 2: Distribution of consumers

Place of residence of household	Frequency	Percent
Innercore	3	3
Kayole	8	8
Komarock	12	12
Langata	11	11
Nairobi West	10	10
Ngara	12	12
Nyayo Highrise	9	9
Parklands	9	9
South B	8	8
South C	1	1
Tena	6	6
Umoja I	6	6
Umoja II	5	5
Total	100	100

Source: Survey results, 2011

Appendix 3: Smallholder farmer financial accounts per acre

Activity: Smallholder farmers			Per cent of total cost
Values: Using market prices		Value in Kshs	
R	Total Output Value	138,000	
	FarmerSP	46	
I = Ic + Io	Intermediate Inputs	56,130	
Ic	Inputs from inside the chain	-	
Io	Inputs from outside the chain	56,130	
	Seed	19,200	18.8
	DAPFert	6,600	6.2
	NPKFert	2,900	2.7
	CANFert	3,080	2.9
	Manure	1,750	1.7
	Fungicide	3,500	3.3
	Insecticide	4,100	3.9
	LandRate	15,000	14.2
VA = R ó I	Value Added	81,870	
Dep	Depreciation	-	
NVA = VA ó Dep	Net Value Added	81,870	
F	Value Added Components	49,800	
	LabPrep	2,200	2.1
	LabPlant	1,800	1.7
	LabWeed	3,200	3.0
	LabSpray	11,800	11.1
	LabIrrig	6,800	6.4
	LabHarvest	18,000	17.0
	LabFertApplic	1,000	0.9
	ProdTransport	5,000	4.7
NVA ó F	Profits	32,070	

Source: Survey results, 2011

Appendix 4: Processor Financial accounts per ton

Activity: Proc		Value in Kshs	Per cent of total cost
Values: Using market prices			
R	Total Output Value	151,000	
	ProcSP	151	
I = Ic + Io	Intermediate Inputs	89,300	
Ic	Inputs from inside the chain	-	
Io	Inputs from outside the chain	89,300	
	ProcBP	70	
	ProcBuy	70,000	73.5
	ProcRent	1,200	1.3
	ProcInsur	5,000	5.3
	ProcMaint	2,400	2.5
	ProcMgt	5,000	5.3
	ProcFuel	2,100	2.2
	ProcLic	2,800	1.9
	ProcMisc	800	0.8
VA = R ó I	Value Added	61,700	
Dep	Depreciation	-	
NVA = VA ó Dep	Net Value Added	61,700	
F	Value Added Components	5900	
	ProcLab	2400	2.5
	ProcTransp	1000	1.1
	ProcPack	2500	2.6
NVA ó F	Profits	55,800	

Source: Survey results, 2011

Appendix 5: Exporters financial accounts per ton

Activity: Broker_Transporter			Per cent of total cost
Values: Using market prices		Value in Kshs	
R	Total Output Value	187,000	
	ExporterSP	187	
$I = Ic + Io$	Intermediate Inputs	73,731.30	
Ic	Inputs from inside the chain	-	
Io	Inputs from outside the chain	73,731.30	
	ExporterBuying	46,000	53.1
	ExporterLicence	400	0.5
	ExporterLoad/Reload	1,657.45	1.9
	ExporterInspect	200	0.2
	ExporterInsur	2,575.55	2.97
	ExporterClearance	25	0.03
	Misc	22,873.3	26.4
VA = R ó I	Value Added	113,268.70	
Dep	Depreciation	-	
NVA = VA ó Dep	Net Value Added	113,268.70	
F	Value Added Components	12,908.65	
	ExporterStorage	686.80	0.8
	ExporterPackag	343.40	0.4
	ExporterLab	10,106.45	11.7
	ExporterTransport	1,772	2.0
NVA ó F	Profits	100,360.05	

Source: Survey results, 2011

Appendix 6: Descriptive results for snap beans value chain actors for Channel 1

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Farmer	64	25.592	2.1618	0.2702	25.052	26.132	18.8	31.2
Broker	10	26.760	0.7486	0.2367	26.224	27.296	25.8	28.3
Supermarket	5	50.020	0.7887	0.3527	49.041	50.999	49.2	51.2
Processor	2	61.750	1.0607	0.7500	52.220	71.280	61.0	62.5
Total	81	28.137	8.2086	0.9121	26.322	29.952	18.8	62.5

Source: Survey results, 2011

Appendix 7: Descriptive results for snap beans value chain actors for Channel 2

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Farmer	64	25.592	2.1618	0.2702	25.052	26.132	18.8	31.2
Broker	10	26.760	0.7486	0.2367	26.224	27.296	25.8	28.3
Vendor	10	3.410	0.4533	0.1433	3.086	3.734	2.5	4.0
Total	84	23.090	7.5328	0.8219	21.456	24.725	2.5	31.2

Source: Survey results, 2011

Appendix 8: Descriptive results for snap beans value chain actors for Channel 3

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Farmer	64	25.592	2.1618	0.2702	25.052	26.132	18.8	31.2
Broker	10	26.760	0.7486	0.2367	26.224	27.296	25.8	28.3
Exporter	5	89.160	5.5311	2.4736	82.292	96.028	84.0	97.9
Total	79	29.763	15.7160	1.7682	26.243	33.283	18.8	97.9

Source: Survey results, 2011

Appendix 9: Descriptive results for snap beans value chain actors for Channel 4

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Farmer	75	28.631	1.7451	0.2015	28.229	29.032	21.9	32.9
Exporter	5	113.200	6.2398	2.7905	105.452	120.948	103.9	121.2
Total	80	33.916	20.7169	2.3162	29.306	38.527	21.9	121.2

Source: Survey results, 2011

Appendix 10: Test of Homogeneity of Variances in mean value-added between snap beans value chain actors in the four channels in Kirinyaga County

		Levene Statistic	df1	df2	Sig.
Channel 1	Farmer-Broker-Processor-Retailer 1	2.909	3	77	0.400
Channel 2	Farmer-Broker-Retailer 2	6.945	2	81	0.202
Channel 3	Farmer-Broker-Exporter	7.529	2	76	0.901
Channel 4	Farmer-Exporter	15.655	1	78	0.310

Source: Survey results, 2011

Appendix 11: Research Survey Questionnaire: Farmers

 SECTION 1: HOUSEHOLD INFORMATION

1.1. District í

1.2. Division í

1.3. Location í

1.4. Sub-Location í

1.5. Respondentøs name í

1.6. Phone Number í

1.7. Indicate the distance (km) to the nearest:

Main Road	Market center	Agricultural extension Office	Produce collection point	Exporterøs TA office

1.8. Type of road to market centre for selling produce and buying most of your agricultural inputs [1] Tarmac [2] Murram/graded [3] Earth road [4] Other (specify)

1.9. Quality of road [1] Very good [2] Good [3] Poor [4] Very poor (muddy)

1.10. Transport cost to the nearest market centre on public service vehicle (Kshs/person)í í í ..í í

1.11. Name of the market centreí .

1.12. Please fill the table for household members living on the farm

HH identification	Gender (A)	Age (yrs)	Marital status (B)	Education (C)	Relation to hh head (D)	Main occupation (E)	Farming experience (yrs)	Experience in other main entrepreneural activity
1.								
2.								
3.								
4.								

5.								
6.								
7.								
8.								

Codes A: Gender- Male [1] Female [0]

Code B: Marital status- [1] married and living with spouse [2] married but not living with spouse [3] widow/widower [4] unmarried [5] other (specify)

Code C: Education- [1] no formal education [2] primary level [3] secondary level [4] post-secondary education

Code D: Relation to hh head- [1] spouse [2] son [3] daughter [4] brother [5] sister [6] grandchild [7] farm worker [8] other (specify)

Code E: Main occupation- [1] farmer [2] other employment

SECTION 2: HOUSEHOLD LAND HOLDING

2.1. Total land area owned by farmerí í ..hectares

Ownership	Cultivated (Ha)		Fallow (Ha)	Rent paid (Kshs)	Rent received (Kshs)	Total land area (Ha)
	Irrigated	**Rainfed**				
Own						
Rented in						
Rented out						
Borrowed in						
Borrowed out						

SECTION 3: HOUSEHOLD INCOME

3.1 Income from sale of crops during the year 2010

Crop	Area (Ha)	Yield (kg/ha or bags)	Consumed (kgs or bags)	Sold (kgs or bags)	Price (Kshs/unit)	Cash received (Kshs)
Snap beans						
Tomatoes						
Kales						
Cabbage						
Rice						

SECTION 4: SNAP BEAN PRODUCTIOIN PRACTICES

4.1 For how long have you been in commercial production of snap beansí í ..years?

4.2 Do you keep any production records of your activities? [1] Yes   [0] No............................

4.2 Are you growing snap beans under contract? [1] Yes   [0] Noí í í í ..

4.3 If yes, what is the name of your contractor?...

4.6 Access to agricultural information

4.6.1 Have you been receiving production information concerning snap beans? [1] Yes   [0] No

4.6.2 If yes, what is the source of information? [1] Agricultural officer   [2] Buyerøs field staff [3] Agrochemical Co.   [4] Stockist   [5] Other farmers   [6] Family member   [7] Media (TV, radio, newspaper) [8] HCDA

4.6.3 How often do you get the information? [1] Daily [2] Twice a week [3] Weekly [4] Monthly [5] Other (specify)

4.6.4 From whom do you get the information about prices and required quality?

[1] Exporter [2] Middleman [3] Calculation from cost of production [4] Collective action group [5] other farmers [6] Someone else, namelyí .

4.6.5 Describe how easy it is for you to get information related to market, policy and new technologies in snap beans production and marketing.

[1] Very difficult [2] difficult [3] moderate [4] easy [5] very easy

4.7 Input costs

Input type	Quantity used per year	Unit cost (Kshs)	Total cost/hectare (Kshs)
Seed (kgs)			
Insecticide (lts)			
Fungicide (lts)			
Fertilizer (planting) (kgs)			
Fertilizer (topdressing) (kgs)			
Irrigation water (lts)			
Other inputs			
Sub-total			

4.7.1 Which variety of seed did you plant? [1] Amy [2] Monel [3] Samantha [4] Paulista [5] Impala [6] Samantha [7] Teresa [8] Alexandra [9] Julia

4.7.2 What informed the decision above? [1] Market demand [2] Exporter [3] Resistance to pests and diseases [4] Readily available in the market [5] Other (specify)

4.7.3 Is the seed certified? [1] Yes [0] No

4.7.4 Where did you source the seed? [1] Stockist [2] Supplied by exporter [3] own saved [4] local market [5] other farmers [6] other (specify)

4.8 Labour requirements for snap bean production activities

Activity	Labour reqt (man-days)				Total labour requirement per activity (man-days)	Cost per man-day	Total labour cost
	Men		Women				
	F	C	F	C			
Land Preparation							
Planting							
1st Weeding							
2nd weeding							
Fertilizer application							
Pesticide application/spraying							
Irrigation							
Harvesting							
Grading/Sorting/handling							
Sub-total							

F= Family labour C= Casual/hired labour

4.8.1 Permanent labour for snap bean production

4.8.1.1 Do you have any permanent employee on the farm?............... [1] Yes [0] No

4.8.1.2 If yes, complete the table below;

Employee designation	Number	Total pay per month	Total during snap bean production	Total amortised cost for snap bean
e.g plant driver				
Farm manager				

4.9 Cost of farm tools and equipment used in snap bean production

Equipment	Number	Cost of new item (Kshs)	Estimated life span	Cost for production
Hand hoe				
Panga				
Wheel barrow				
Slashers				
Knapsack sprayer				
Bucket				
Watering can				
Others				
Sub-total				

4.10 Storage costs per yearí í í í í í í í .Kshs

4.11 Total transport cost for snap beans to collection point during the year 2010..í í í í Kshs

SECTION 5: CREDIT SOURCES/USAGE

5.1. Did you receive credit/loan from financial institutions to support your snap bean production activities in the last 12 months?.......................... [1] Yes [0] No

5.2. If yes, fill source of credit.

Credit Body	Type of credit? [1] cash [2] inputs	Distance from farm (km)
Exporter		
Association/Group		
AFC		
Micro-finance		
Merry-go-Round		
Other		

5.3 If no, what could be the reason why you did not get the credit?..

[1] No collateral [2] Had outstanding loan [3] Do not know [4] Other (specify)

SECTION 6: FARMERS ASSOCIATION

6.1 Do you belong to a farmers association producing snap beans? [1] Yes [0] No

6.2 If yes, which year did you join this association?...

6.3 Name of the associationí í

6.4 What are the associationøs activities?...

6.5 Are members of your group cooperative?

[1] Very uncooperative [2] Uncooperative [3] moderate [4] cooperative [5] very cooperative

6.6 How often do you attend group meetings in a month?............ days

SECTION 7: MARKETING

7.1 How did you market your produce?

[1] Traders came at home. [2] Transported to the exporting company

[3] Transported to the pack house where traders purchased produce from [4] Others (specify)

7.2 If trader came at home, how much did he offer? Kshs/kg...

7.3 If supplied to the exporting company premises, how much did you sell produce? Kshs/kgí

7.4 And if transported to pack house or collecting point, how much was paid? Kshs/kg...............

7.5 Are you satisfied with the price process above? [1] Yes [0] No

7.6 What influence do you have on price agreement?

[1] No bargaining power [2] Little bargaining power [3] moderate bargaining power [4] nearly equal bargaining power [5] equal negotiating power

7.7 What is the level of trust with your buyer? [1] Very little [2] Little [3] Moderate [4] Much [5] Very much

7.8 Are there times when you fail to market your produce at all? [1] Yes [0] No.

7.9 If yes, what could be the reasons?..

í í

7.10 About what proportion of your total produce did you fail to sell in the last 5 years?

2006:í í í í í .2007:í í í í í í .2008:í í í í í ..2009:í í í í .2010:í í í í ...

7.11 Buyer information by category:

Buyer	Amount of produce bought (Kg)	Unit price offered (Kshs/kg)	Total sales (Kshs)	Proportion of total (%)
Exporter				
Wholesaler				
Middlemen				
Supermarkets (namely)				
Local traders/vendors				
Farmer group				
Total				

7.12 Rank from the most [1] to the least [3] preferred channel for selling your produce: Sell directly to buyer [ ] middleman [ ] Farmer group [ ]

7.13 How do you receive information about the market?

[1] By phone [2] By fax [3] By mail [4] The buyer visits us regularly [5] We visit the buyer [6] Other (specify)

7.14 Do you have made agreements with your buyer regarding the quantity that should be delivered? [1] Yes [2] No

7.15 If yes, are these agreements written down? [1] Yes [2] No

7.16 Do you have made agreements regarding the price? [1] Yes [2] No

7.17 If yes, are they written down? [1] Yes [2] No

7.18 Do you have made agreements regarding the delivery date? [1] Yes [2] No

7.19 If yes, are these agreements written down? [1] Yes [2] No

7.20 Do you have made agreements regarding the quality? [1] Yes [2] No

7.21 If yes, are these agreements written down? [1] Yes [2] No

7.22 When do you receive your money?

[1] 1 day after delivering the beans [2] Later

7.23 If later, when exactly?

[1] After 1 day [2] after 1 week [3] after 2 weeks [4] after 3 weeks [5] after 1 month [6] after a season [7] differs with buyer [8] Other (specify)

7.24 Do you always receive your money the day the buyer promised? [1] Yes [0] No, he has limits during low season

7.25 If buyer rejects your produce, where do you take it? [1] Sell to local traders/vendors [2] Sell to livestock owners [3] Sell to local consumers at the farm [4] Discard it

7.26 Challenges in production and/or marketing of snap beans;

í í
í í

í í

SECTION 8: CONCLUSION

Is there anything else you want us to know about your snap bean production?......................

í í
í í
í í

Thank you for your time

Appendix 12: Guiding Questions for Mapping the Value Chain

1. **Focus group discussion**

    1.1 Who are the key chain participants and what are their roles?

    1.2 How do they interlink in the sector with respect to value added?

    1.3 What competitive advantages do major value chain actors have?

    1.4 What is the market structure of the industry? [1] monopoly [2] oligopoly [3] perfect competition [4] monopolistic competition

    1.5 Is there a dominant firm in the industry or are there several? [1] 1 dominant firm [2] several

    1.6 What is the level of vertical integration of the industry? [1] low integration [2] moderate [3] moderate to high [4] highly integrated

    1.7 What is the market share of the following along the value chain: (i) producers; (ii) middlemen/brokers; (iii) exporters (iv) local traders/vendors (v) local supermarkets? [1] <5% [2] 5-10% [3] 11-30% [4] 31-50% [5] >50%

    1.8 Which services are provided, and who provide them for the value chain participants?

2. **Input supply**

    2.1 How long have you been an input supplier in this center?...............yrs

    2.2 Where is the source of the inputs you sell? [1] domestic [2] imported *(identify which inputs for each source)*

    2.3 Are there times when demand exceeds your capacity to supply? [1] yes [0] No

    2.4 What has been the general trend in input prices for the past five years? [1] increasing [2] decreasing [3] constant

    2.5 Give an example with: [1] fertilizer [2] insecticide spray [3] snap bean seed

    2.6 Are you aware of the global food safety requirements and use of banned chemicals? [1] Yes [0] No

    2.7 Do you offer explanations to farmers on safe use of chemicals? [1] Yes [0] No

    2.8 Are you trained in the field of agriculture? [1] Yes [0] No *(if no go to 2.8)*

    2.9 If yes, when did you last attend training on safe use of chemicals?

2.10   If 2.6 above is no, have you attended any training on agricultural input use? [1] Yes [0] No

3. Production

3.1 Who are your key service providers?

3.2 Which services does each in 3.1 above offer? [1] extension [2] research [3] extension and research [4] financial [5] training [6] transport [7] assembly

3.3 Who are the major input suppliers in your local market? Do you get the inputs required on time? [1] Yes [0] No

3.4 Are there some inputs which are not available with the local agro-vet stores? [1] Yes [0] No

3.5 If yes, which ones?

3.6 To whom do the farmers here sell their produce? *(mention all the pathways)* [1] Exporters [2] middlemen or brokers [3] wholesalers [4] local traders and vendors [5] supermarkets [6] other (specify)

3.7 What are the prices offered by each per kg?

4. Assembly/ Transport

4.1 Nature of transport [1] truck with cooler [2] truck without cooler [3] open pick-up [4] bicycle [5] baskets on head

4.2 Are you hired? Yes/No

4.3 If yes, how much do you charge í í í í í í Kshs

4.4 Purchase price from grower per kg in kshs [1] Fine beansí í í [2] extra fine beansí í í

4.5 Constraints.

4.6 Costing:

Activity	Cost in kshs
Storage and depot costs	
Packing	
Vehicle O&M	
License fees/council cess	
Hired labour	
Overhead costs and management	
Interest	
Total cost	

5. **Exporters**

5.1 Are there entry barriers to new firms? [1] Yes [0] No

5.2 Are there licensing restrictions for new entrants? [1] Yes [0] No

5.3 Do transparent criteria exist for allocating licenses and permits? [1] Yes [0] No

5.4 What policy issues affect export of snap beans?

5.5 How long does it take to clear exports?

5.6 What are the procedures for clearing shipments?

5.7 How much paper work is needed?

5.8 How many agencies are involved?

5.9 Are there delays in shipment? [1] Yes [0] No

5.10   What was the percentage of rejects in 2010? Reasons for rejection

5.11   Where do you take the beans when your buyer rejects them? [1] return to origin [2] dispose [3] abandon at the port of exit

5.12   What is the cost of disposing them?

5.13   What is the value of the rejects?

5.14   Does the sector serve a niche market? [1] Yes [0] No

5.15   How does the state of physical infrastructure affect competitiveness of the country's exports of snap beans?

5.16   In your opinion how would you rate the status of Kenya's competitiveness in the export of snap beans compared to major competing countries? [1] Competitive [2] moderately competitive [3] uncompetitive

5.17   What competitive advantage do major producing nations have?

5.18   How does the factor costs of labour, technology, capital and key input costs compare with global/regional best practices?

5.19   What is the purchase price to the following category of sellers per kg of each type of beans? [1] Contracted Farmers [2] Non-contracted farmers [3] Farmer groups [4] Middlemen/brokers

5.20   What was your total volume of exports in 2010 in tons?

5.21   What was the international price per kg of [1] Fine beans [2] extra fine beans?

5.22   Has the price grown over the past five years? [1] Yes [0] No

5.23   Do you have contracts with your buyers? [1] Yes [2] No [3] with some

5.24   Are the contracts formal or informal? [1] Formal [2] Informal

5.25   How do you ensure you always have enough quantities for your buyer? [1] own farm [2] contract farmers [3] own farm and contract farmers [4] buy from other farmers not in contract [5] buy from middlemen/brokers

5.27 Costing:

Activity	Cost in kshs
Storage and depot costs	
Packing	
Loading and re-loading	
License fees and permits	
Hired labour	
Taxes	
Cost of inspection prior to export	
Insurance charges	
Clearing fees	
Interest	
Transport cost to delivery points	
Other overhead costs	
Total cost	

6. **Local traders/vendors**

   6.1 Where do you get your snap beans from? [1] farmers [2] brokers [3] wholesalers [4] my own

   6.2 How many days do you sell at the local market in a week?

   6.3 How much is the council cess per day?

   6.4 How do you rate the preference for the beans by consumers in your local market? [1] Not preferred [2] moderate preference [3] highly preferred

   6.5 How do you maintain the beans fresh the whole day? [1] cover [2] water [3] cover and water [4] other (specify)

6.6 Financial calculations:

Source of beans	Quality (1, 2)	Quantity bought/day	Buying price/kg	Quantity sold/day	Selling price/kg or unit of measure
Farmers					
Broker					
Wholesaler					
Own					

*Quality: [1] direct from farm [2] left-overs

7. Government/HCDA

7.1 Who are the new entrants in the sector? Who has left the market? Why?

7.2 Do any regional partners share special trading rights in snap beans? [1] Yes [0] No

7.3 Does the country have preferred access to key global markets? [1] Yes [0] No

7.4 Which policies govern the value chain?

7.5 What is your role in the snap bean production and marketing in this area/region?

Thank you for your time

Appendix 13: Map of study area