

**FACTORS AFFECTING THE ADOPTION OF STAR FRENCHBEANS
VARIETIES BY HORTICULTURAL EXPORT GROWERS IN NAIVASHA.**



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A research Project submitted to the School of Human Resources Development in partial fulfilment of the requirements for the award of the degree of Executive Masters of Business Administration (EMBA) of Jomo Kenyatta University of Agriculture and Technology

JUNE 2011

DECLARATION.

This research project is my original work and has not been presented for a degree in other university. No part of this project may be reproduced without prior permission of the author.

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HD 334-033-0221/2010

DECLARATION BY THE SUPERVISORS

This research project has been submitted for defense with our approval as appointed university supervisors

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DEDICATION

To my lovely wife, Prisca and Son Edgar for understanding and appreciation during the entire period of my study

ACKNOWLEDGEMENTS

Special thanks to the Almighty God for giving me the strength and health to study during the course of the research project.

I hereby acknowledge the encouragement and support of my two supervisors Dr. Nelson Wawire and Dr. Charles Ombuki for guiding me through the development of this project document.

Similarly, I would like to sincerely acknowledge my Cohort 7 Weekend classmates whom I shared lectures with throughout the year of study.

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May the Almighty God bless you all.

ABSTRACT

A major limitation to fruit and vegetable production in many developing countries is the availability of good quality seeds. The public sector in developing countries frequently does not have sufficient capacity to supply adequate quantities of good quality seed and there are few private seed companies adapting varieties to local environments, especially in poorer countries. Without proper seed production, processing technology, quality assurance, or management supervision, seeds are often contaminated by seed-transmitted pests and diseases, and are genetically diverse.

The purpose of this study was to highlight the main factor that has affected the adoption of Starkeyres star frenchbeans varieties in the export horticulture sector in Kenya since its launch in 2008. I specifically focussed on how the star varieties filled in the gap of having a dependable seed product from the African conditions in a sector dominated by products from multinational seed companies of America and Europe.

The population was two major Export Companies and two minor companies and two individual growers in the key fine bean growing areas in Naivasha, and two export processing packhouse at the Jomo Kenyatta International Airport in Nairobi. The sampling techniques was be observation and independent study of records, data analysis and reporting to capture the state of affairs as they exist, Using questionnaire as an instrument of data collection. Data was analyzed using percentages, cross tabulations, frequencies, mean scores, and presented in pie charts, bar graphs and tables.

The study revealed that adoption of frenchbeans seed is a delicate balancing act of having the right seed price, quality of seed, yield potential, being above the competition and having a variety with the desirable post harvest attributes as per the customer specification.

The recommendations advocated for, more investment by both public and private sector in improving the germplasm of frenchbeans crop for growing and focusing also on seed quality controls.

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ABBREVIATIONS AND ACRONYMS

- APC**-African Caribbean Pacific Countries
- CIRAD**-French Agricultural Research Centre for International Development.
- DME**-Developed Market Economies
- EU**-European Union
- FAO**-Food and Agriculture Organization of the United Nation
- GDP**-Gross Domestic Product
- GLOBAL GAP**-Global Good Agricultural Practices
- HCDA**-Horticultural Crops Development Authority
- KRA**-Kenya Revenue Authority
- KENYAGAP**-Kenya Good Agricultural Practices
- KFA**-Kenya Farmers Association
- KEPHIS**-Kenya Plant Health Inspectorate Service
- KSC**-Kenya Seed Company
- IMF**-International Monetary Fund
- NAFTA**-North American Free Trade Agreement
- NDA**-Department of Agriculture & Forestry of South Africa
- SRC**-Seed Regulatory Committee
- UK**-United Kingdom
- WTO**-World Trade Organization
- WB**-World Bank

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

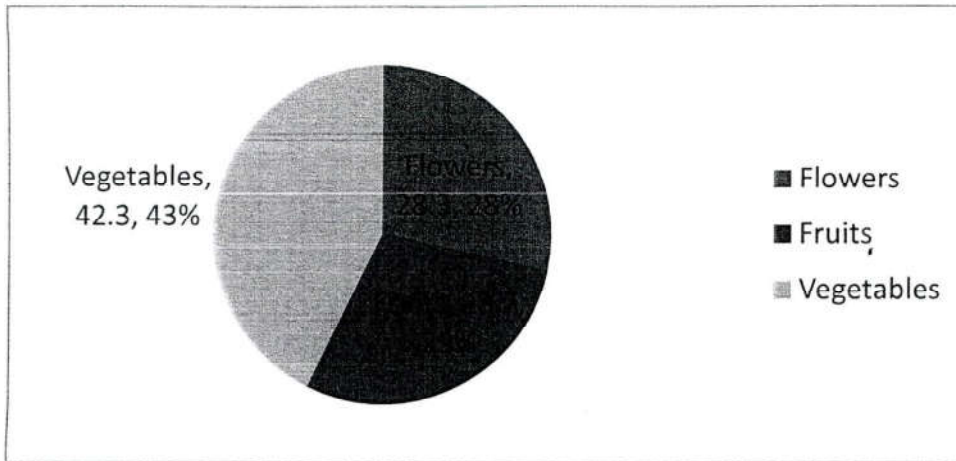
Seed is a means of providing genetic potential to customers. Since seed is grown in an environment that is changing with respect to climate, biotic stresses and consumer preference, the genotype may become challenged or unacceptable, particularly as improved varieties enter the market. This is the typical scenario of being a seed supplier in the competitive fruits and vegetables crops business. Thus a variety will likely have a product life-cycle which implies four things. Firstly, Products have a limited life span on the market, which in the case of seed is related to changes in biotic and a biotic factors and shifting market demands. Secondly, products sales pass distinct stages, from development to maturity, each posing different challenges, opportunities and problems to the company. Thirdly, profits rise and fall at different stages of the product life cycle and fourthly, products require different marketing, financial, manufacturing, selling, and human resources strategies in each stage of the life-cycle.

A target is the specific set of customers to whom the seed business aims to sell, its seed and services (Scarborough and Zimmerer 1988). Here the target market is the horticultural growers and individuals who plant fine beans for produce destined for the export market. The potential for this market is about 100 hectares planting weekly amount to 260,000 kgs of seed annually at the rate of 50kgs per hectare. A market a macro level, this may be perceived as the target but this is only about 75% of the market as still some small scale farmers farm-saved seed. Moreover, there is massive potential for export market going forward. Thus this market is large enough to warrant investment in product development, production and sales; it's accessible for easy distribution and has long term prospects given the long product development and scale-up cycles.

Globally, fruit and vegetable production is usually lucrative compared to staple crops. Horticultural produce has high value-added and income generation potential, and due to a relative lack of economies of scale (compared to grain production and livestock) their

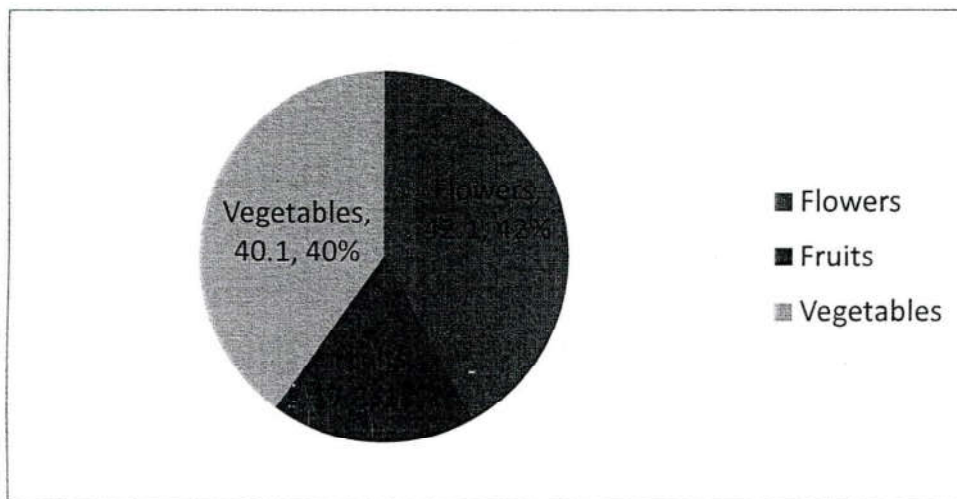
production is attractive especially for small-scale farmers. The production of fruits and vegetables has a comparative advantage particularly under conditions where arable land is scarce, labor is abundant and markets are accessible. This is the prevailing situation in many countries of South. The relative profitability of horticultural crops compared to cereals has been shown to be a determining factor for crop diversification into horticultural production in India (Joshi *et al.*, 2003).

Kenya's horticultural sector has received a great deal of attention from local and international researchers, government, and donors over the past decade, due to the rapid and sustained growth of its export sector (Jaffee 1994, Jaffee 1995, Swernberg 1995, Kimenye 1995, Stevens and Kennan 1999, Dolan *et al.* 1999, Kamau 2000, Thiru 2000, Harris *et al.* 2001, Minot and Ngigi 2002). From a very low base, Kenya's horticultural exports (defined here to include fruit and vegetables but not flowers) grew 9% per year in the first decade after independence, then 17% per year from 1974-1983 (Minot and Ngigi 2002). Growth slowed over the 1980s and 1990s, but still averaged about 4% per annum over the past decade. By the year 2000, fruit and vegetable exports amounted to US\$270m, or 15% of Kenya's total export economy. This impressive growth has undoubtedly contributed to increased rural incomes and reduced rural poverty, through both direct production effects and linkage effects, as horticultural incomes from export are re-spent in rural areas. Domestic exports grew marginally by 0.3% while re-exports declined by 4.1% 2010. (Kenya Economic Survey, 2010)



Source: Central Bank of Kenya, 2011

Figure: 1.1 Percentage Kenya Horticultural Export by Quantity



Source: central Bank of Kenya, 2011

Table: Percentage Kenya Horticultural Export by Value

Yet despite this growth, exports remain a small fraction of Kenya's overall horticultural sector. For the past decade, over 90 percent of all fruit and vegetable production was consumed domestically, and the domestic market accounted for over 90 percent of the total growth in quantity of fruit and vegetable production. However, export of agricultural products particularly both the traditional and non-traditional cash crops, have been contributing significantly to foreign earnings. Despite the global economic downturn, the value of Kenya's horticultural exports was an impressive 71.60 billion shillings in 2009,

equivalent to \$895 million in foreign exchange. Of this Fresh vegetables accounted for 24 percent of 2009 exports (HCDA, 2009). Kenya exported 73.8 metric tons of vegetables worthy 17.12 billons, equivalent to \$214.7 million (KRA, 2009). Of this, 13, 169.175 metric was for Fine beans and 7,892.72 metric was for Extra Fine beans. (HCDA, 2009).

The upsurge in increased export of horticultural products is attributed to recent the falling prices of traditional cash crops such as coffee, cotton, sisal, tea and cashew nuts and emergence of world markets for nontraditional cash crops which have forced farmers to look for alternatives, hence the emergence of export of fresh fruits and vegetables. This started in the last decade, since then production has been increasing. This increase could be attributed to increased demand and high prices of fresh foods in the global market which led creation of attractive export opportunities. Dolan and Humphrey (2001) argue 'that, because of an increasing trend for the demand of fresh fruits and vegetables, a lot of effort has been devoted in promoting the production and export of fresh horticultural products by developing countries'. This has influenced the organization of marketing system of horticultural produce which was mainly dominated by the collection fresh fruits and vegetables from small and scattered producers in the developing countries into a more integrated marketing system. The former proved to be cumbersome, particularly in the accumulation of amounts to satisfy the world market demand and quality

For more understanding of this crop, Snap bean (or 'French bean'), is a strain of common bean, *Phaseolus vulgaris* L. which is grown as a cash crop by large scale and smallholder. The pods are also usually called string beans.

Green bean varieties have been bred especially for the fleshiness, flavour, or sweetness of their pods. The first "stringless" bean was bred in 1894 by Calvin Keeney, called the "father of the stringless bean".

From a consumer point of view, fine beans are of nearly universal distribution. They are marketed canned, frozen, and fresh. Green beans are often steamed, boiled, stir-fried, or baked in casseroles. A dish with green beans popular throughout United States and Europe though they are getting acceptance in Kenyan diets especially for the urbanites.

Green beans are found in two major groups, bush beans and pole beans. Bush beans are short plants, growing to approximately two feet in height, without requiring supports. They generally reach maturity and produce all of their fruit in a relatively short period of time (3 months), then cease to produce. Farmers may grow more than one crop of bush beans in a season.

Over 130 varieties of snap bean are known. Varieties specialized for use as green beans, selected for the succulence and flavour of their pods, are the ones usually grown in the home vegetable garden, and many varieties exist. Pod colour can be green, golden, purple, red, or streaked. Shapes range from thin "fillet" types to wide "romano" types and more common types in between. French Haricots verts (green beans) are bred for flavourful pods.

There are different types of fine beans namely, Bobby, fine filet and very fine filet. Varieties like 'Amy', 'Teresa' and 'Samantha' and Star 2053 and Star 2054 are grown for fine stringless filet ("needle") beans while 'Paulista' and 'Nerina' are used more for Bobby type fine beans. 'Nerina' seems to be approaching the end of its life and is being gradually replaced by 'Paulista'. The 'Julia' and 'Sagana' very fine filet varieties are grown for export to France and for canning (in Cameroon and South Africa). The geographical distribution of the varieties is fairly even according to producer country although certain varieties will be grown more or less according to the market segment patterns ought.

The French bean varieties used for export to the European Union market have changed little since the mid-1990s. About half a dozen are used for all the crops in African and Mediterranean producer countries. Seminis Company, a member of the Monsanto group of companies of America, supplies most of the seed for this particularly delicate counter-season crop. Several other seed companies are breeding new varieties that may soon afford a broader choice for producers. Among these is Starkeyres of South Africa that recently launched its Star varieties (Star 2053, Star 2054) in the region. These products are merchandised in Kenya by Pannar Seed Kenya limited. Starkeyres has been developing French bean varieties in the last 10 years and introduced their varieties embodied with unique characteristics to meet the customer specification in Kenya in

2007 to give the growers flexibility of choice of high quality seeds affordably. It's The flag ship varieties is Star 2053 ideal for fine and Star 2054 for extra Fine beans.

The market demand of fine beans is increasing. More than 90 percent of the crop produced in eastern Africa is exported to regional and international markets. Snap bean is an important export vegetable crop in Kenya, Tanzania, Uganda, Zambia, Zimbabwe and North Africa. It is gaining importance in other countries such as Cameroon, Ethiopia, Rwanda and Sudan. In east, central and north Africa, production is dominated by bush types. Climbing types are generally more productive and have a longer harvest period compared with the bush types, and could be intensify returns to the use of family labour. However, suitable varieties for eastern Africa are yet to be developed. Market preferences for snap bean pods differ with regions. Most of the snap bean produced in eastern Africa are round and thin mainly to suit European markets. In contrast, flat podded types are popular in some North American markets. Snap bean eastern Africa focuses on the development and production of bush and climbing snap bean varieties with a high proportion of the harvestable yield of each plant being extra fine and fine beans that command premium prices.

World French bean production was estimated to exceed 8 million tonnes in 2006. It increased by more than 22 percent from 2000 to 2006. While production is increasing, world trade in this produce has remained stable at only 5 percent of the total. The European Union is the world's leading importer, taking more than 70% of the volumes traded internationally. It is followed by the United States and Canada, each accounting for 7 percent of the trade. Morocco, Kenya, Egypt and Senegal ship more than 94 percent of European French bean imports with Morocco accounting for more than 57 percent. Morocco is by far the leading supplier of the European market. It exports more than 100 000 tonnes of French beans of all types, well ahead of Kenya (35 000 tonnes) and Egypt (26 000 tonnes). The remaining supplies are shipped by producer countries in West Africa (Senegal, Burkina Faso and Zambia), East Africa (Ethiopia) and southern Africa (Zimbabwe and Tanzania). Once the leading supplier of the European market, Kenya has given way to Morocco but is still interesting in more than one way. In spite of serious

logistic concerns (availability of air freight capacity, priority awarded to cut flower exports) and high transport costs, it still plays a leading role on the filet bean market thanks to quality that has long served as reference. Indeed, Kenya is one of the rare suppliers that still supplies very fine French beans in large quantities. Thus fine bean is a major international trade commodity that merits attention if Kenya has to remain active in global trade. Horticultural exports have relied heavily on a few key markets. There is a need for proactive efforts to maintain existing markets while creating new ones and increasing Kenya's bargaining power in global agricultural markets (Kenya Government. Vision 2030, 2007)

1.2 The Statement of the Problem

Yield improvements in fruits and vegetables have been lower than in cereals (FAO, 2004). Productivity growth has been particularly low in Sub Sahara Africa, where yields in vegetables have grown at an average annual rate of 0.6 percent against 0.7 percent for cereals and against the world average of 1.4 percent between 1961 and (FAO, 2004). Concerted action is required to lift up average yields of horticultural produce on this poor continent. Yields will increase by focusing both on productivity and stability of yields. More emphasis will have to be placed on the development of hybrid varieties, using the natural vigor of hybrids to fight stresses of disease, heat and drought. Molecular tools may be useful in increasing yields.

A major limitation to fruit and vegetable production in many developing countries is the availability of good quality seeds. The public sector in developing countries frequently does not have sufficient capacity to supply adequate quantities of good quality seed and there are few private seed companies' adapting varieties to local environments, especially in poorer countries. Farmers themselves often produce seeds locally preferred or indigenous varieties, as the individual markets are too small to attract the interest of the private sector. Without proper seed production, processing technology, quality assurance, or management supervision, seeds are often contaminated by seed-transmitted pests and diseases, and are genetically diverse. The lack of proper storage facilities often lead to low or uncertain seed viability and vigor. Moreover, low capital resources and poor

market information discourage development of seed-related agribusiness. Knowledge on constraints in the horticultural seed distribution chain remains limited in many countries, making it difficult to enter into target-oriented promotion of the vegetable and fruit seed and seedling sector. It is therefore necessary to gain a solid understanding of the issues within the fruit and vegetable seed sector, both private and public, in order to identify constraints that this sector faces and to formulate a strategy for its sustainable development.

The French bean varieties used for export to the European Union market have changed little since the mid-1990s. About half a dozen are used for all the crops in African and Mediterranean producer countries. The Seminis Company, a member of the Monsanto group, supplies most of the seed for this particularly delicate counter-season crop for the European Union. Thus the need for more varieties especially bred under African conditions.

1.3 Objective of the study

The main objective of the study was to establish the factors affecting the adoption of Star frenchbeans varieties by horticulture export growers in Naivasha, Kenya.

The specific objectives were:

- i. To establish how the pricing of star frenchbeans affects its adoption by growers
- ii. To determine how the seed quality of Star frenchbeans seed affects its adoption by growers
- iii. To determine how the yield potential of the Star frenchbeans varieties affects its adoption by growers
- iv. To establish how the availability of other frenchbeans varieties in the market affects the adoption of Star frenchbeans by growers
- v. To identify how post harvest quality traits affect the adoption of Star frenchbeans variety by export processors

1.4 Research Questions

The study sort information to address the following questions:

- i. How does the pricing of Star frenchbeans affect its adoption by growers?
- ii. How does the seed quality of Star frenchbeans contributed to its adoption?
- iii. How does the inherent yield potential of Star frenchbeans influence its adoption?
- iv. How does the availability of competing frenchbeans varieties affect Star frenchbeans varieties adoption?
- v. How do post harvest utilities affect adoption of Star frenchbeans?

1.5 Justification of the study

Most horticultural products in developing Sub-Saharan countries are produced on small farms and often in labour - intensive ways. With appropriate policies and technologies, horticultural production can significantly contribute towards increasing the incomes of small-scale farmers, expanding employment opportunities, enhancing rural development and an important source of foreign exchange. In Kenya, the industry employs about 2 million people directly and another estimated 0.5 million indirectly (Harris *et al.*, 2001). It also enhances rural development and an important source of foreign exchange earnings for the country. (Bruinsma, 2008).

French beans are a highly specific vegetable. In Kenya they are mainly grown for export. There is a large demand for French beans in both fresh and processed form, especially from Europe. Kenya is particularly posed for this business due to its different ecological zones owing to its varying altitude, and conducive Equatorial climate, which allows year-round production; fertile soils; a competitive labour force with good education and technical background. Similarly, Nairobi's location as a centre of air transport between Europe and the East and Southern Africa region, and Kenya's role as a major tourist destination, ensure that there is sufficient northbound air cargo to transport exports. Finally, the presence of ample local and international investors ready to invest in export horticulture ensures flourishing of the industry.

Thus this information on the alternative French bean star varieties is invaluable to all the players in the supply chain to ensure sustainability of the sector. These varieties are bred in Africa which makes them more adaptable to the local conditions instead of relying on varieties bred in Europe and America then brought here. These varieties utilize available nutrients better without heavy dependence on additional inorganic fertilizers is limiting to most smallholder growers. Moreover, they have high tolerance to tropical fungal and bacterial diseases which leads to reduced pesticides as a requirement of the stringent sanitary and Phytosanitary regulation of the European Union market. Their pod characteristics meet the export market specifications with little wastage. Similarly, Exporters require produce that has a particular size (not too large and not too small), is not infected by insects and has a particular shape. The beans are not only picked and shipped, but also chopped, washed, combined into multi-product pack, labeled and bar-coded and star varieties have such attributes to meet the above specification

1.7 Scope of the study

This study was targeted at the both large and small scale export French beans growers in Naivasha region and processing units at the Cargo village at the Jomo Kenyatta International Airport in Nairobi, Who aim at maximizing their productivity through inputs rationalization and other factors of production to satisfy the demand of the customers. The study was carried out in three months i.e. November 2010 to January 2011

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

The chapter is organized in sub topics that borrow ideas from various authors, business journals and the internet. It begins with explaining the concept of fresh produce trade globally and progresses on to expound on put Kenya in perspective and finally highlights the challenges facing this sector. At the end it gives a summary of the chapter.

The literature review is based on the various findings from research done on the growth and development of export Horticulture and the availability of frenchbeans seed products in Kenya and other regions. Frenchbeans production trends in other key producing countries and the trend in consumption in Europe will be reviewed.

Farmers' adoption of the star frenchbeans is the dependent variable and offers a strong research orientation. Specifically, this chapter intends to explore the knowledge in frenchbeans demand, pricing, varieties quality utility traits, availability of competing varieties and post harvest attributes .of star beans.

2.2 Horticulture growth in Kenya

The economy of Kenya is very dependent on agriculture, which employs more than 75 percent of the available workforce, both in the formal and informal sectors. Agriculture as a share of GDP contributes more than 30 percent to the economy and brings in more than 6 percent of total foreign exchange earnings (Republic of Kenya, 2010) .Horticulture products are now Kenya's third largest merchandise export accounting for 23 percent of the GDP. Land available for farming makes up about 15 percent of the total land area. Of this amount, a little more than 7 percent is considered arable. Kenya boasts a wide range of climatic conditions, from hot coastal plains to cool highlands, enabling the country's farmers to produce a variety of crops.

Kenya's horticultural sector is one of the economy's fastest growing industries. This has been reflected with yearly expansion and increased exports of fruit, vegetables and

flowers. Kenyan export horticulture has grown by 132 percent since 2001. In 2010, the value of exports increased to Ksh. 78 billions from 71.3 billions in 2009 (HCDA, 2010).

Horticultural exports for 2009 went down by 15 percent in quantity, 3 percent in Kenya shilling value and 13 percent in US dollar value compared to 2008. This was because of the drought that hit the entire country, drastically reducing production of rain-fed vegetables. However, the annual performance was better than 2007 by 25 percent in Kenya shillings and 6 percent in dollar value, but down in quantity by 6 percent. On average the Kenya shilling devalued by 12 percent against the dollar in 2009 compared to 2008 and by 18 percent compared to 2007 (USAID, 2010)

More than 90 percent of fresh fruit and vegetables produced by smallholders are consumed within Kenya with an estimated wholesale market value of \$1.2 billion, Ksh 85 billion. Incomes realized by smallholders in 2005 were approximately \$47 million from exports and \$230 million from the domestic market. This constitutes a 7 percent increase from 2004 levels.

French beans and avocados are Kenya's main horticultural exports. Exports of fresh beans made up 17 percent of the fresh vegetable exports and dropped by 17 percent, from 15,000 tons in 2008 to 13,000 tons in 2009. The major destinations were France (6,000 tons) and UK (5,000 tons) (USAID, 2010).

Despite the global economic downturn, the value of Kenya's horticultural exports was an impressive 71.60 billion shillings in 2009, equivalent to \$895 million in foreign exchange. Of this Fresh vegetables accounted for 24% of 2009 exports (HCDA, 2009). Kenya exported 73.8 metric tons of vegetables worthy 17.12 billions, equivalent to \$214.7 million (KRA, 2009). Of this, 13,169.175 metric was for Fine beans and 7,892.72 metric was for Extra Fine beans (HCDA, 2009).

There are about 230 export companies actively involved in production and exporting of horticulture produce from Kenya. The majority of production occurs on small farms, many of which do not possess adequate handling facilities. Other challenges facing the horticultural sector include inconsistent postharvest practices and expensive air freight and compliance certification. Kenya has been working at obtaining European traceability

certification under GLOBALGAP and has launched a similar standard requirement called KenyaGAP. At the end of 2005, almost 900 growers attained GLOBALGAP certification. There are 2569 and 300 farms in Kenya that are GLOBALGAP and KenyaGAP certified, respectively. There are 2569 GLOBALGAP certified farms in Kenya. This consist of 69 large scale farms, 207 medium scale farms, and 229 small scale farms for 56 grower groups. This is an important prerequisite to position Kenya as a preferred source of horticultural produce to the European Union.

2.2.1 Global perspective of Frenchbeans trade

Growth is continuing on the French bean market world market. European Union imports increased by 23 percent from 2005 to 2008, increasing from over 160 000 tonnes to more than 197 000 tonnes. However, in 2009 supplies of horticultural produce for export fell due to drought and market demand for some products also dropped due to recession in Europe, Kenya's main market. Relative to 2008, the combined effects of these two factors caused an overall fall of 15 percent in the quantity of exports and 3 percent in value expressed in Kenya shillings. The foreign exchange value in \$US dropped by 13 percent. Fresh vegetables accounted for 24 percent of 2009 exports but suffered from both drought and reduced market demand, resulting in a fall of 5.5 percent in exported quantities and value, equivalent to a 14 percent fall in dollar returns (HCDA, 2009).

During the 2008 and 2009 period, exports from Morocco and Kenya increased by 35 percent and 25 percent respectively. In contrast, Egyptian and Senegalese exports have dipped by 21 percent and 20 percent. The greatest growth has been in exports from Burkina Faso, with the volumes increasing from 514 tonnes to more than 1 100 tonnes. Only Morocco, Egypt and Kenya can export beans almost all the year round. The other sources are only present on the market during the European counter-season period (Winter period) this is illustrated in Table 2.1 below (CIRAD, 2009).

European production period vary according to the countries, running roughly from 15th June to 15th October of each year. The counter-season supply from African countries run from November to April. Morocco is currently the market leader and together with

Egypt has succeeded in extending the production period by using greenhouse. Thus kenyan must innovate to sustain its market share.

Supplier	2007	2008	2009
Morocco	110,764	122296	125879
Kenya	37548	38308	40678
Egypt	27638	21238	20456
Sénégal	6203	5448	51234
Ethiopia	3396	3396	3209
Burkina Faso	935	1149	1026

Source : CIRAD, 2009

Table 2.1 Supply trend of African countries during the counter-season in Europe.

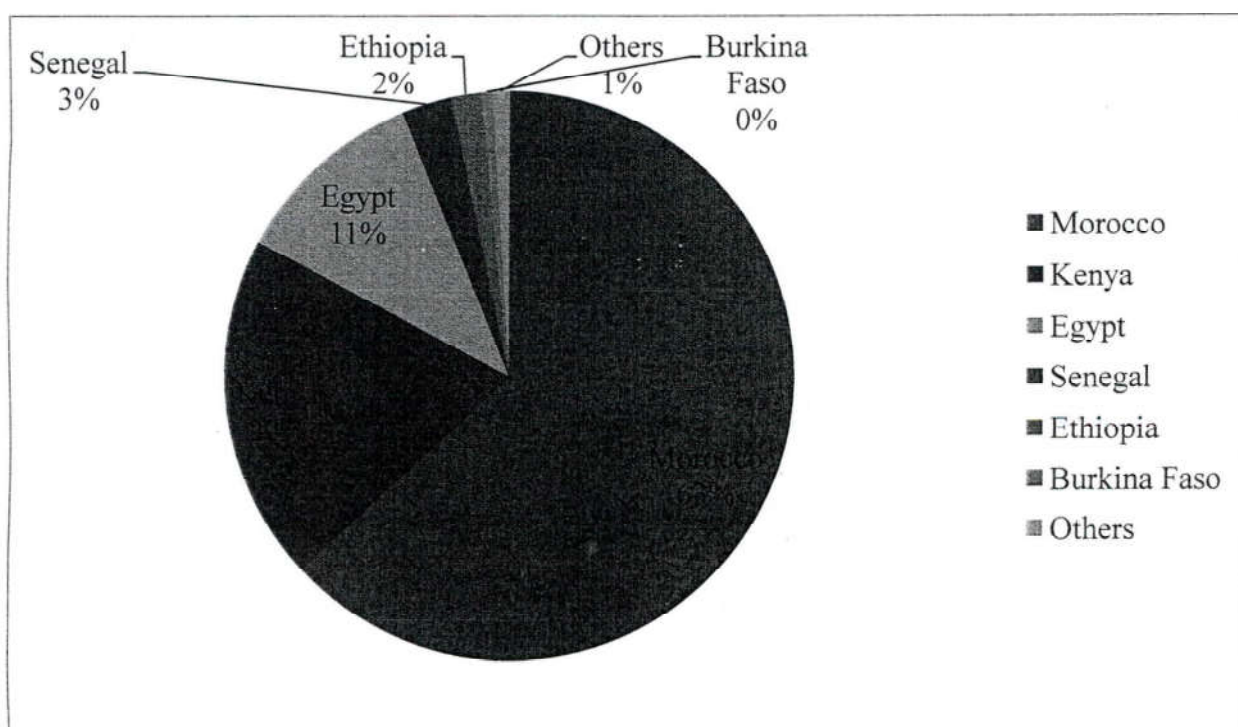


Figure 2.2 : Percentage proportion of European counter –season supplying countries

Source : Cirad, 2009

The increasing demand of frenchbeans globally is vertically integrated through contract rather than control and ownership of the means of production (Bruinsma, 2008). This trend has been encouraged by liberalizing international and national regulatory framework, associated with World Trade Organization (WTO), International Monetary Fund (IMF) and the World Bank policies, and has been further facilitated by improvements in communication and packaging technologies.

2.2.2 French beans export market in Kenya

French beans are a highly specific vegetable. In Kenya they are mainly grown for export. There is a large demand for French beans in both fresh and processed form, especially from Europe. Exporters require produce that has a particular size (not too large and not too small), is not infected by insects and has a particular shape. French beans are packed in boxes in extra-fine and fine grades and shipped by air to Europe. The beans are not only picked and shipped, but also chopped, washed, combined into multi-product pack, labelled and bar-coded. There are various players active in the marketing of French beans. The most important actors within the chain are farmers, middlemen, exporters, importers and supermarkets (Tineke voor den Dag, 2003).

On average, Frenchbeans has contributed 43 percent of the total vegetable exports in the past decade as shown in table 2.2 below. This underpins the importance of this crop in the horticultural sector in Kenya.

Table 2. 2. Contribution of Frenchbeans to total Vegetable Exports in Kenya 2000-2010

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	average
Value Ksh-B	3.5	4.5	4.8	4.2	5.5	7.7	9.8	7.9	5.7	4.3	3	5.4
Value Ksh- B	5.5	10.5	8.0	12	12	13	18	21	23	19	11	13
% Beans	64	43	60	40	46	55	55	38	24	23	27	43

Source: HCDA, 2010

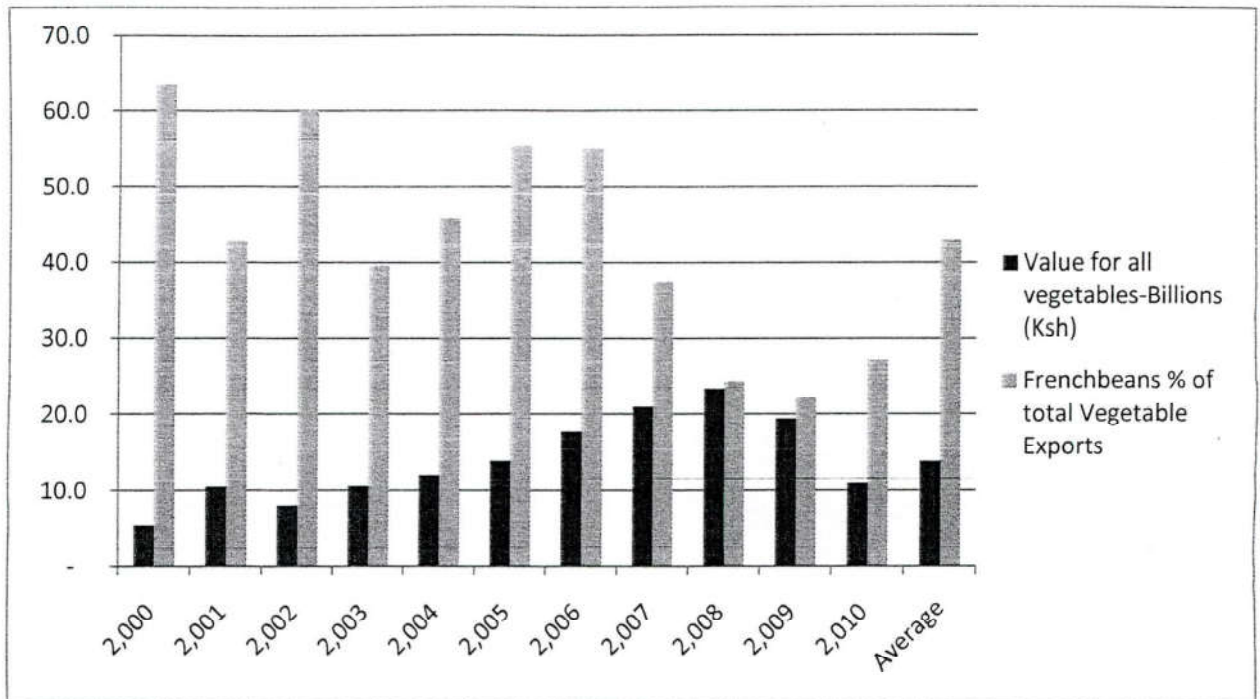


Figure 2.3: Proportion of Frenchbeans of total vegetable exports in Kenya from 2000-2010

Kenya's strategy of promoting smallholder commercial farming began with the Swynnerton Plan of 1954, which gave priority to helping smallholders to increase the production of traditional export crops, such as coffee and tea, which were previously grown by large-scale farmers. As a result, the smallholder share of total marketed output reached 50 percent by the late 1970s (Kimenyi, 1995). Fruit and vegetable growers can be categorized by size into four groups:

1. Small-scale producers are farmers with less than 10 acres;
2. Medium-scale producers are farmers with between 10 to 20 acres;
3. Large-scale producers are farmers with between 20 and 200 acres;
4. Plantations are farmers with more than 200 acres of production (Harris et al., 2001).

2.2.3 Production and marketing channel of fine beans in Kenya

In a study by Tineke voor den Dag of Wageningen(2003) it was noted that It is important to link smallholder farmers in developing countries to the emerging fruit and vegetable markets, because the production and commercialization of these high-value crops can be beneficial to small farmers in several respects. In the past decade more and more attention has been given to food safety. Various rules and regulations have been developed. The EUREPGAP protocol is one of them. It is especially meant for growers of fresh fruits and vegetables and has become effective in January 2003. These Good Agricultural Practices (GAP) includes regulations regarding food safety, labour standards and environmental management. It would be interesting to see what new requirements like the EUREPGAP protocol do with smallholders. Are they able to maintain their position within the chain? The country Kenya has been chosen, because small-scale farmers are important actors in the export chain of vegetables and fruits within this country. The thesis dealt with the crop French beans, because firstly, it is one of the most important horticultural export crops, secondly a large amount is shipped to the Netherlands and thirdly one of the EU retailers that set up the GLOBALGAP protocol, sells these in his supermarkets.

The increasing importance of frenchbeans can be demonstrated by the table 2.3 below showing the volume of frenchbeans produced and exported as a fraction of all vegetable exports from 2000 to 2010.

Table 2.3: volume of frenchbeans and total vegetable exports in Kenya from 2000-2010.

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Volume of F. Beans – Metric tons	24,265	25222	15407	40624	26845	56897	19611	32671	30344	41456	21959
Volume of vegetable- Metric tons	45039	99211	34771	48674	51942	63427	61348	85383	119304	82345	
% of F. Beans	54	25	44	83	52	90	32	28	25	50	

Source: HCDA.2010

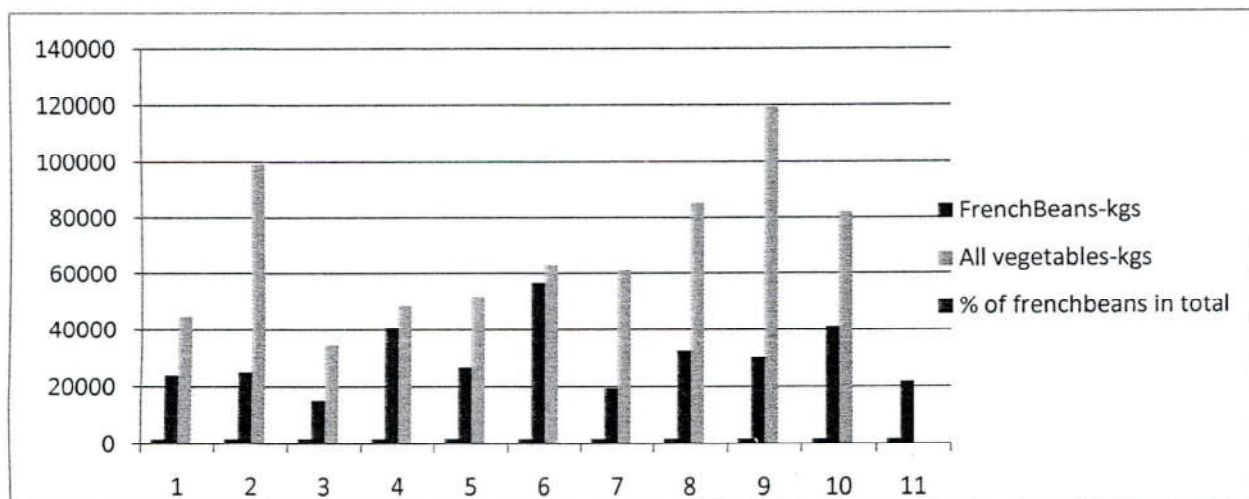


Figure 2.4 Proportion of volume of Frenchbeans to total vegetable exports in Kenya 2000-2010

Source: HCDA, 2010

2.3 Factors affecting the adoption of Star frenchbeans varieties

2.3.1 Seed price

Frenchbeans seed like most other inputs in growing horticultural products in this country is imported. Imported seed is expensive as its produced in developed countries where the cost of labour and the technology is high and has to be passed on to the end users to recoup the initial investment. On the other hand, locally produced seed are of poor quality as there is still no technical knowhow in plant breeding and production techniques to come up with good germplasm. However, some farmers still uses seed saved from a previous crop (second generation seed) which has led to deterioration in the quality of exportable frenchbeans (Kimenye,1995). On average the seed cost for a bag of 100,000 seed is \$ 110-120 at source. In addition import costs i.e. Freight, insurance, Phytosanitary certification and ISTA certification averages \$7-10 per bag. The end user prices ranges from \$180 -\$200 per bag of 100,000 seeds. The seed rate per hectare is 60kgs amounting to about \$ 800 (Ks 64,000). The best alternative for seed companies is to cushion the farmers is to bring in the seed in bulk by sea to mitigate the increasing freight costs. This can be deduced from Table 2.4 that shows the difference in air and sea freight costs per unit cost. It's about 41 percent cheaper to use sea instead of airfreight and this will inevitably reduce the end user price.

Table 2.4: Effect of sea / air freight as an added cost on seed.

Description	Cost
Seed cost	\$112-115 per bag of 100,000 seeds
ISTA certification	\$30 per seed lot
Phytosanitary cost	\$5 per product
Insurance	0.35% of invoice value
Sea Freight cost	\$0.545 per kg
Airfreight cost	\$0.923 per kg

Source: Pannar Seed Kenya Limited, 2011

2.3.2 Access to high quality seed

Production of quality seed is a boon to the vegetable seed industry. The main emphasis is to produce quality seeds that are true to type, uniform, and of high vitality as essential parameters. (Amarjits, 2006). Usually, reputable seed companies adhere to the Good practice of seed production and thus the imported seed meets the set quality standards. The present knowledge and technology of ensuring quality seed is expensive and is passed over to the end user. Thus the imported seeds are expensive for small-scale farmers to afford. Locally produced seeds instead are of poor quality. A number of contract growers are able to obtain credit from their buyer to purchase seed. Other buyers offer seed on credit to the farmers they deal with. The majority of the farmers still use seed saved from a previous crop (second-generation seed) (Kimenye, 1995). This has led to deterioration in the quality of exportable French beans. French beans require a seed rate of 50 kgs per hectare.

A study by Nyoro (1993) identified three main constraints faced by export horticultural producers, which reduce their competitiveness in the world market and therefore reduce land and labour productivity. These constraints are (i) access to high quality seed, (ii) lack of market information, and (iii) Research and extension. Small scale farmers have limited access to high quality, improved vegetable seeds and fruit tree seedlings. Since locally available seed are of poor quality, farmers resort to using own seed, which eventually results in low yields, poor quality produce and high susceptibility to diseases and pests. Such produce is faced with an uphill task of penetrating the EU market.

In a study by Tineke voor den Dag of Wageningen University (2003), it was noted that food quality of quality is not a single, recognizable characteristic. Although the quality of a food product (or service) is recognized as important for successful agribusiness, there is often a general lack of understanding or agreement on the meaning. Garvin (1984) proposed eight dimensions of quality attributable to seed, stressing that each dimension was self-contained and distinct; since a product could be ranked high in one dimension

while being low in another. The dimensions that can be influenced by growers and their buyers are as follows:

The primary product characteristics are of a particular importance, especially in the case of fresh fruits and vegetables, because these commodities are among most likely to be observed and evaluated by consumers in their primary and unprocessed form (Hueth *et al.*, 1999). The produce that growers offer to their buyers will be evaluated on these characteristics. Growers can influence these characteristics by using high quality seed, the right quantities and types of pesticides and a sophisticated irrigation system. A part of their produce will be rejected, partly because it doesn't meet the required standards. It appears that the rejection rate may depend on the level of market demand, the experience of the farmer in quality control, and how well the farmer understands the process – the smaller the farmer, the more likely he/she is to be unfairly treated (Harris *et al.*, 2001). Jaffee (1995) estimated that in the mid-1980s, as a result of poor co-ordination between growers and down-stream buyers as well as seasonal production gluts and transport bottlenecks, the average level of waste and post-harvest losses was approximately 25%.

Reliability of Suppliers is more and more valued at the fact whether they are able to supply the right amount at the right time. Castano (2001) argued that farmers participating in vertically integrated marketing systems are better able to implement sustainable resource management practices due to improved price stability and reduced input constraints.

Conformance from definition is meant that there is a minimum variability in product quality standards. This can be achieved by accurate grading. Furthermore long-term relationships might result in knowledge of the wishes of the customer. Contracts with regard to the quality an act or prefers might also result in homogeneity.

Durability is essence as highly perishable products need to be treated carefully along the way to the final consumer. Storage facilities are very important in this process to maintain the quality. According to Dijkstra *et al.* (2001), better keeping quality could be achieved by improving either transport or storage methods or both.

To maintain their position, all actors within the chain will try to build up some kind of reputation. Farmers can do this for example by improving their production system, investing in specific assets like storage facilities and through keeping records. Middlemen may decide to only buy their produce from suppliers who keep records and have storage facilities. Exporters could invest in cooling facilities to improve the quality.

Traceability refers to the collection, documentation, maintenance and application of information related to all processes in the supply chain in a manner that provides a guarantee to the consumer on the origin and life history of a product (Opara and Mazaud, 2001). For a food product, traceability represents the ability to identify the farm where it was grown and sources of input materials, as well as the ability to track the post harvest history and identify the specific location in the supply

The availability of quality seeds of a wide range of varieties and crops to farmers is one of the major keys for achieving food security in Africa. Some of the direct benefits accrued to farmers from the distribution and use of good quality seed of improved varieties include enhanced productivity, higher harvest index, reduced risks from pest and disease pressure, and higher profits. Seed is also critical to the optimum use of natural resources and, according to its provenance and the breeding goal; seed determines the requirements for inputs such as pesticides, fertilizer and agricultural technology. When production increases through use of improved varieties in a given area, self-employment potential through processing, marketing, and related activities can bring about a general improvement in the quality of life. There is a gap on research focusing on this area for fine beans seeds

The Kenyan government have not intervened to any significant degree in horticultural output markets to buy, sell, export, or set prices. The main regulatory body of the horticultural sub-sector in Kenya is the Horticultural Crop Development Authority (HCDA), which was established in 1967. HCDA was originally given authority to fix prices, regulate trade, and operate processing facilities and market horticultural goods. For example, HCDA maintained a monopoly on onion marketing and export briefly, then

competed with private onion traders and finally, by 1986, withdrew its buying and selling functions from the market. Based on unsuccessful experiences, these functions were transferred back to regulation, provision of market information and advisory services. Hence, horticultural commodities are bought and sold in a private, competitive market environment with very little government regulation and no direct government participation in commercial activities (Dijkstra, 1999). Horticultural input markets, on the other hand, have faced various types of interventions in each country. Vegetable seed production and distribution in Kenya is governed by the Seed and Plant Varieties Act of 1991. Under the Act, Kenya Plant & Health Inspectorate Services (KEPHIS) is the main regulatory body of the seed industry. KEPHIS is aparastatal in which Ministry of Agriculture, Kenya Agricultural Research Institute (KARI), Kenya Seed Company (KSC), Horticultural Crop Development Authority (HCDA), Kenya Forestry Research Institute (KEFRI), Kenya Farmers Association (KFA), Kenya Farmers Union (KFU) and a member who may be co-opted to represent interests of the industry sit in the Seed Regulation Committee (SRC). The SRC is mandated to formulate and recommend developmental policies for the growth of the industry. It is also supposed to make standards, recommend registration of seed merchants, recommend certification fees and act as moderator in cases of appeals by aggrieved industry players. KEPHIS has the responsibility of administering the Act and is empowered to inspect, test, certify, control imports and enforce the seed law. Figure 2.1 shows the structure of the seed industry in Kenya.

The seed law in Kenya is comprehensive and very stringent, and KEPHIS has concentrated most of its efforts on enforcing this law -- policing the activities of the private sector -- rather than acting in their interests to offer quality, timely and satisfactory services. The private sector has complained of the way KEPHIS has adopted an attitude of 'policing' the industry and exercising regulatory monopoly powers over the private sector rather than providing services, co-ordination and leadership in the seed industry. They suggest that this approach has been an impediment to private sector innovation and growth and has usurped the developmental role in the industry.

2.3.3 Yield potential and Genetic improvement.

Yield improvements in fruit and vegetables have been lower than in cereals (FAO, 2004). Productivity growth has been particularly low in sub-Saharan Africa, where yields in vegetables have grown at an average annual rate of 0.6% against 0.7% for cereals and against the world average of 1.4% during 1961–2004 (FAO, 2004). Concerted action is required to lift up average yields of horticultural produce on this poor continent. Yields will increase by focusing both on productivity and stability of yields. More emphasis will have to be placed on the development of hybrid varieties, using the natural vigor of hybrids to fight stresses of disease, heat, and drought. 0.6% against 0.7% for cereals and against the world average of 1.4% between 1961 and 2004. More emphasis will have to be placed on the development of hybrid varieties, using the natural vigor of hybrids to fight stresses of disease, heat and drought. Molecular tools will be useful in increasing yields, as recent experience has shown.

A major limitation to fruit and vegetable production in many developing countries is the availability of good quality seeds. The public sector in developing countries frequently does not have sufficient capacity to supply adequate quantities of good quality seed and at present, there are few private sector seed companies adapting varieties to local environments, especially in poorer countries (Rohrbach, Minde, and Howard, 2003). Farmers themselves often produce seeds of locally preferred or traditional varieties, as the individual markets are too small to attract the interest of the private sector and private companies have little interest in producing open pollinated varieties (Weinberger and Msuya, 2004). Without proper seed production, processing technology, quality assurance, or management supervision, seeds are often contaminated by seed transmitted pests and diseases, and are genetically diverse. Lack of proper storage facilities and an effective monitoring mechanism often leads to low or uncertain seed viability and vigor. Moreover, low capital resources and poor market information discourage development of seed-related agribusiness. Knowledge on constraints in the horticultural seed distribution chain remains limited in many countries, making it difficult to enter into target-oriented promotion of the vegetable and fruit seed and seedling sector.

It is therefore necessary to gain a solid understanding of the issues within the fruit and vegetable seed sector, both private and public, identify constraints and problems the sector faces, and formulate a strategy for sustainable development to empower growers.

2.4.4 Postharvest characteristics.

Horticultural production, particularly in hot wet tropical environments is severely constrained by postharvest losses of up to 25%, depending on the crop and season (Genova *et al.*, 2006a, 2006b, and 2006c). Horticultural crops are often highly perishable, restricting the ability of producers to store them to cope with price fluctuations. Reducing postharvest losses would make diversification into vegetable production less risky and more attractive. Postharvest related quality losses also reduce opportunities for export and export revenues. Postharvest technologies Participation in international markets requires relatively sophisticated marketing, information, and transportation networks. A successful competition requires quality control, product standardization, and to some future markets, traceabilities. The development of the postharvest sector includes improving pre- and postharvest processing technologies, as well as developing and improving market information systems that includes prices, information on seasonality, constraints in postharvest handling, and technological opportunities. International supermarket chains and large processors are becoming the main buyers of fresh horticultural products (Reardon *et al.*, 2003) and small farmers need to be trained and organized to meet the challenge of supplying these international players.

According to a study by Varieties by Muchui, Ndegwa, Wachiuri, Muthama and Kimamira there is need to test new varieties introduced from the temperate countries to local conditions as well as their postharvest characteristics to ascertain that they meet the export standards. Three introduced varieties(R-1516, R-1515 and Lexus) were evaluated for their performance at KARI Thika. The snap beans were grown and harvested in long rains season of 2001. The plants were grown in rows following agronomic recommendations. The pods were harvested when mature at a frequency of 3 times per week, graded and weighed in a general laboratory. Random samples of 2 kg per grade from each variety were taken on the same day and taken to the postharvest laboratory for evaluation. Parameters recorded included number of pods per plant, pod length, pod

diameter, seed size, colour of pods, pod appearance, shape and curvature, incidence of fibre, and yield (kg per ha). Variety R-1516 had the highest number of pods followed by R-1515 and Lexus in that order. There was no significant difference in yield, although all the varieties gave an acceptable higher yield compared to the local check (Amy). All the snap beans evaluated had acceptable green pod colour, pod length, pod diameter, pod appearance, seed size, and fibre content. All the introduced varieties were therefore recommended for production since the pods met the export standards.

Harvest frequency will be adjusted to the type of bean exported. Extra fine beans (Kenya) are picked every day. It is advised that fine beans are picked every two day and Bobby beans should be picked every three or four days.

These intervals should be maintained throughout production so as not to penalize commercial performance by large amounts of sorting rejects. The pods are picked by hand, with the stalks. Particular care is needed to conserve the quality of the harvest: harvest boxes should not be over-filled (to avoid any risk of crushing); freshness should be conserved by not leaving produce in the sun; the produce should be placed in a cold store as soon as possible—even before sorting if the latter is delayed. Picking is best carried out in the morning but not if the plants are too wet. The pickers must be made aware of the specific quality requirements of these beans.

Packing operations result in boxes of produce that must be in conformity with the EU quality standard for French beans (standard EC 912/2001). For this, the produce must be sorted after picking in order to: Remove pods that are broken perforated, twisted, remove plant debris (leaves and stalks), grade the beans by size.

Each box packed for the export market must display the product characteristics, that is to say category, size and all the regulation information (origin, name of producer/exporter)

Whatever the transport method chosen (air or sea), it is essential that produce is placed in cold store as soon as it has been packed. Minimum storage temperature is about 4°C and

this makes it possible to store French beans for about a week. For shorter marketing channels (air freight) and for fine grade beans, storage temperature should be close to 10 to 12°C. In addition to the question of temperature, the storage atmosphere for packed products should have relative humidity of around 80% for storage at 4°C and some 90 to 95% for storage at about 10°C. Excessive humidity can cause changes in pods and the appearance of moulds. This is especially important for produce transported in refrigerated containers. Packed produce is stored in cold rooms with moderate ventilation to avoid the drying of the pods. It is important not to break the cold chain when the produce has reached its destination in order to conserve the quality of the beans.

2.4.5 French bean varieties competition

The French bean varieties used for export to the European Union market have changed little since the mid-1990s. About half a dozen are used for all the crops in African and Mediterranean producer countries. The Royal Sluis Company, a member of the Monsanto group (USA), supplies most of the seed for this particularly delicate counter-season crop. Several other seed companies are breeding new varieties that may soon afford a broader choice for producers. Broadly there are different varietal types: bobby beans, fine beans and extra fine beans

The varieties 'Teresa' star 2053, Serengeti and 'Samantha' are grown for fine stringless pods ("needle") beans while 'Paulista' and 'Nerina' are used more for Bobby type fine beans. 'Nerina' seems to be approaching the end of its life and is being gradually replaced by 'Paulista'. The 'Julia' and 'Sagana' and star 2054 are ideal for extra fine filet varieties grown for export to France mainly. Table 2.6 shows the common varieties in Kenya. The geographical distribution of the varieties is fairly even according to producer country although certain varieties will be grown more or less according to the market segment pattern sought. Thus, Kenya and Burkina Faso concentrate more on fine beans. Morocco, Egypt and Senegal opt for a more varied use of the varieties available according to destination markets on which Bobby bean is predominant. The different varieties have

more or less the same production characteristics and differ in pod shape and length or have a more or less marked green colour (under the same production conditions).

Table 2.6: Common Frenchbeans varieties in the Kenyan market

Variety	Supplier	Availability
Teresa	Monsanto	Available
Samantha	Monsanto	limited
Amy	Monsanto	Limited
Paulista	Monsanto	limited
Serengeti	Pop vriend	Available
Tana	Pop vriend	Available
Star 2053	Starkeyres	Available
Star 2054	Starkeyres	limited

Source: Author 2010.

2.5 Critical Analysis

The literature review clearly indicates that the Kenya's Frenchbeans export has been performing well and progressively showing improvement despite the challenges. However, availability of the right seed on a consistent basis is paramount and thus it remains the most daunting task for the stakeholders in this fast growing sector of the economy. Moreover, over reliance on imported seed for such a key sector poses business risks with the increasing competition for the lucrative European Union market.

2.6 Summary and gaps to be filled.

Many studies have been done on the success of the horticultural sub sector of the economy of Kenya. Indeed literature exists on the positive trend of the horticultural sector, particularly frenchbeans. However, there are no studies carried out on the effects of the availability of the right germplasm as the pivot on which profitable frenchbeans crops productivity rotates. Thus this study sought to fill in this gap and establish the factors that affect the adoption of star frenchbeans varieties.

2.7 Conceptual Framework.

According to Mugenda and Mugenda (2003), a conceptual framework helps the reader to quickly see the proposed relationships between the variables in the study and show the same graphically or diagrammatically.

In this study, the dependent variable was the adoption of Star frenchbeans export growers in Naivasha while the independent variables are: unit pricing, quality attributes, yield potential, availability of competing varieties and post harvest attributes. This is illustrated in figure 2.7

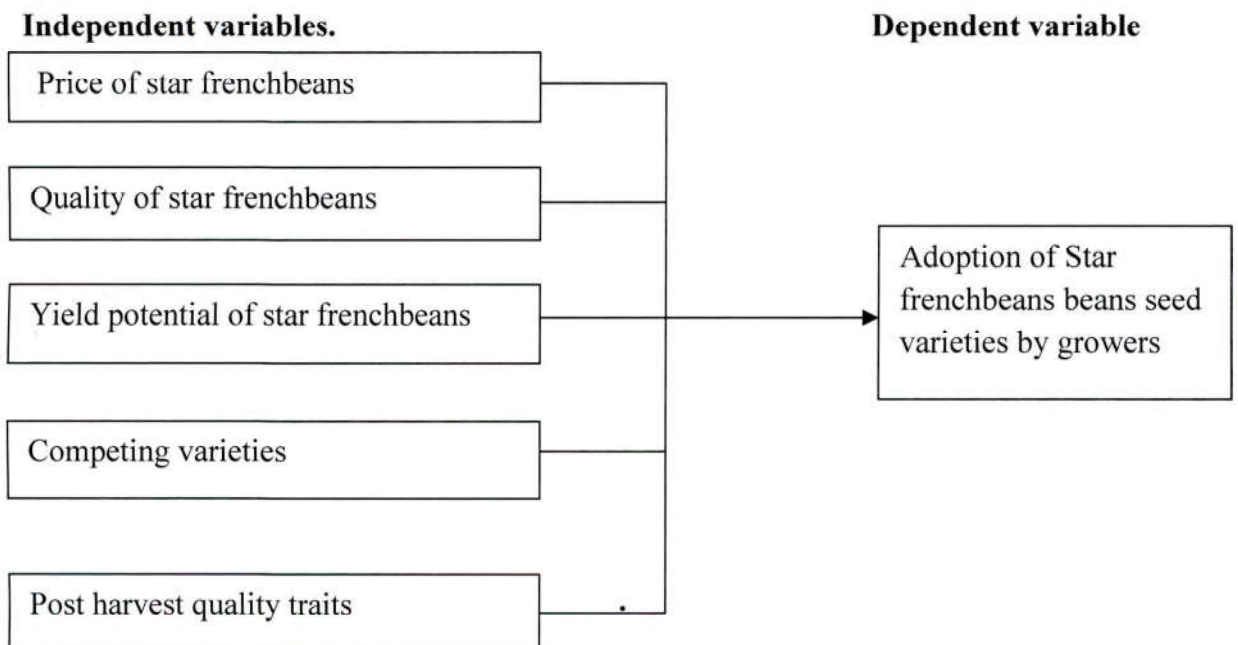


Figure 2.1: Conceptual Framework.

(Source: Author, 2010)

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter provides an insight into the area of research, the samples, the data sets and the different analytical tools used in this research to answer the research questions. The sample derivation and expected sample size are explained, as well as the methods of data collection. Subsequently, the questionnaire design is discussed. Lastly, the data analysis techniques used in this study are discussed.

3.2 Research design

The research was a quantitative research and intended to draw conclusions from quantitative summaries yielded by statistical analysis (Borg and Gall, 1989)

The purpose of the study was to determine the perception growers have towards star varieties and find out the factors that they consider in their choice of fine bean varieties for export market i.e. if there is a significant difference between the variety seed quality and its adoption.

The study was descriptive in nature as it was the most appropriate of seeking to determine factors that would influence the growers to purchase the products. Descriptive research is description of the state of affairs as it exists. Kerlinger (1969) points out that descriptive studies are not only restricted to fact findings, but may often result in the formulation of important principles of knowledge and solution to significant problems. According to Mugenda and Mugenda, this design is systematic inquiry into which the researcher does not have direct control of the independent variables because their manifestation has already occurred.

3.3 Study Area

Naivasha, which is the hub of the fine bean growing and processing by large horticultural exporters in Kenya. This areas lie between coordinates $0^{\circ}40'6,70^{\circ}$ South and $36^{\circ}21'2.32^{\circ}$ East. Altitude ranges from 1935 metres to 1950 metres above sea level. It's on the shores of Lake Naivasha, A fresh water lake in the Great Rift Valley in Eastern Africa. The optimum altitude for French beans is between sea level and 1800 metres above sea level. Frenchbeans are grown where temperatures are warm, ranging between 12° and 34° C degrees. The optimal temperature for French beans is 20° C. With temperatures below 12° C; French beans are likely to be destroyed by frost while in temperatures above 34° C, flowers drop at an alarming rate thus affecting the overall yield. French beans grow in a wide variety of soils ranging from light sand to heavy clays but does best in well-drained loam soils rich inorganic manure. They need a well- rainfall is either not enough or is unevenly distributed because they are very sensitive to the amount of water they receive, which invariably affect the yield. Naivasha has the above characteristics and thus its selection as the study area for the research project.

3.4 Target Population size

Horticultural crops growing for export is constantly attracting new entrants. Thus at the time of designing this study, the researcher was not able have an exact number of frenchbeans growers in Naivasha. Therefore, the research used a case study as a strategy of meeting the objectives as set. In as much as the target population was all frenchbeans growers, four Agronomists in two large scale growers (more than 20-200 acres), and two medium scale (more than (10-20 acres) and two small scale individual farmers (less than 10 acres) and two export companies who are growing and processing Star frenchbeans varieties and have extensive knowledge in Frenchbeans growing for export market was the specific target. Thus all these groups formed the target population of respondents. This group is representative of over half of the spectrum of export horticultural growers. Table 3.1 shows the population of the study.

Table 3.1: representative of the Target Population Size of study

Category	Population	Gender	Age	Education level	Position
Large scale growers	2	male	35-45	Degree holders	Company Agronomists
Medium scale growers	2	1 male 1 female	30-40	High school qualification	Farm managers
Small scale individual growers	2	2 male	45-55	High school qualification	Owner of farm
Large scale packhouse	1	male	30-40	Degree holder	Packhouse manager
Small scale packhouse	1	female	25-35	Degree holder	Operations manager
Total	8				

Source: Author 2010

3.5 Sampling Frame and technique

Purposive sampling was used as the subjects to participate in the study were hand-picked based on independent variables under consideration. The three groups of growers and three groups of packers have the required information and represent more than half of the exporters.

Warwick and Lininger (1975) argued that the main factor considered in determining the sample size is the need to keep it manageable enough. This enables the researcher to derive from it detailed data at an affordable cost in terms of time, finances and human resources (Mugenda *et al.* 1999), further suggest that for descriptive studies, 10 percent of the accessible population is enough. Mugenda and Mugenda (1999) further suggest that for discipline studies, 10 percent of the accessible population is sufficient.

3.6 Research Instruments.

The study employed both primary and secondary sources such as magazines, books, newspapers, and internet and library journals.

In this study questionnaires and interview were used to collect primary data. A questionnaire is a research instrument that gathers data over a large sample. It required respondents to respond to questions posed. It is designed in such a way that, it meets the research objectives and obtains the most complete and accurate information possible, easy for respondents to give the necessary information, sound analysis and interpretations (Crawford, 1990).

The questionnaire will have both closed and open-ended questions, was distributed on 'drop and pick' later basis well before the interview date. Star beans variety quality is standard and is same for everyone growing or processing.

This source is not collected directly by the user or specifically for the user, and often under conditions unknown to the user for example KEPHIS reports, HCDA Data, KRA Data, FAO Data and Pannar Seed Kenya internal records.

3.7 Pilot testing.

The purpose of pre-testing the questionnaire is to determine whether the questions as worded will achieve the desired results, are placed orderly, understandable any additions or omissions (Crawford, 1990). It involved using the target study population before the study for purposes of eliminating ambiguity and establishing validity.



A pilot run was done in early November, 2010 to tests its strength measure the variables.

3.8 Data collection procedure.

Data collection was carried out in December, 2010 through to January 2011. This involved assessing the crop of star bean varieties on the farms and its produce in the packhouses against the variables understudy. An introduction letter from JKUAT was sort to facilitate the administration of the questionnaire to various respondents. The questionnaire was distributed manually by hardy copy and via e mail with assurance of confidentiality.

3.10 Data Processing and analysis.

The study was based on descriptive method and adapted statistical methods of data analysis. Data was analyzed using percentages, cross tabulations, frequencies, mean scores, standard deviation and be presented in pie charts, bar graphs, line graphs, tables and histograms.

CHAPTER FOUR

DATA ANALYSIS AND PRESENTATION

4.1 Introduction

In this chapter the results from the survey are presented, the data from the completed questionnaires were summarized and presented in form of tables, mean scores and percentages.

4.2 Response Rate.

From the respondents in Naivasha, 5 of the original 6 questionnaires were filled and returned (83.33%) response. From the processing side at the Jomo Kenyatta International Airport Nairobi, all the 4 processing packhouses responded (100%). Below is the response rate table.3.2

Table 3.2: Response rate

Category	Large scale	Medium scale	Small scale	Large packhouse	Small packhouse
Population	2	2	2	1	1
Response	2	2	1	1	1
Response rate	83.33%			100%	

Source: Author 2010

4.3.1 Price of Star frenchbeans and its adoption

From the reviewed literature, it was evident that the price of seed for frenchbeans growing has implication on its adoption as seed cost is an important part of the cost of inputs and its subsequent importance in the performance of the entire chain. The research sought to analyse the effects price of locally produced and imported seed cost on the adoption by growers and the collected data was analyzed. The analysis shows that the growers are quite sensitive to the seed price. Star frenchbeans seed which is 5 percent less than the most competing varieties as preferred as most growers struggle to limit the cost of seed to less than 5 percent of the total cost of inputs.

Frenchbeans seed like most other inputs in growing horticultural products in this country is imported. Imported seed is expensive as its produced in developed countries where the cost of labour and the technology is high and has to be passed on to the end users to recoup the initial investment. On the other hand, locally produced seed are of poor quality as there is still no technical knowhow in plant breeding and production techniques to come up with good germplasm. However, some farmers still uses seed saved from a previous crop (second generation seed) which has led to deterioration in the quality of exportable frenchbeans (Kimenye,1995). On average the seed cost for a bag of 100,000 seed is \$ 110-120 at source. In addition import costs i.e. Freight, insurance, Phytosanitary certification and ISTA certification averages \$7-10 per bag. The end user prices ranges from \$180(Ksh 14,580 -\$200(Ksh. 162,000) per bag of 100,000 seeds. The seed rate per hectare is 60kgs amounting to about \$ 800 (Ks 64,000).

To ascertain if the price of star frenchbeans imported from South Africa and marketed in Kenya by Pannar seed Kenya limited has an effect on its adoption rate, than other varieties in the market imported from Europe, the researcher sort to analyze the prices of the key varieties in the industry. Twelve leading frenchbeans varieties in Kenya per 100,000 seed count basis (industry standard) sold to the export growers were analysed as in table 4.1, 4.2, and 4.3 below.

Table 4.1: The price of Star frenchbeans varieties from Pannar seed Kenya limited.

Variety	Seed count	Price-Ksh
Star 2052	100,000	15,850
Star 2053	100,000	16,000
Star 2054	100,000	16,250

Source: (Author 2011)

Table 4.2: The prices of frenchbeans seed varieties from Monsanto Kenya limited as of April 2010.

Variety	Seed count	Price (Ksh)
Paulista	100,000	13,362
Amy	100,000	14,247
Teresa	100,000	16,422
Samantha	100,000	13,981
Alexandria	100,000	16,422

Source: (Author 2011)

Table 4.3: The price frenchbeans seed varieties from Kenya Highland Seeds.

Variety	Seed count	Price (Ksh)
Tana	100,000	16,500
Mara	100,000	15,950
Venda	100,000	15,950
Serengeti	100,00	16,280

Source: (Author 2011)

The three price lists gives a fair representation of the frenchbeans varieties marketed in Kenya as of end of December 2010. Monsanto is the leading frenchbeans seed producer in the world and always sets the pace for the industry. Kenya highland seeds are the local agent of Pop Vriend seeds of Netherlands and Pannar seed Kenya limited is the local agent of Starkeyres of South Africa. The study showed that the prices are within the industry range with an insignificant difference of 2-3%.

On average the price is set on cost plus margin pricing model, where the margin is calculated over the cost of sales. The price differential is limited because of the similar trading conditions. The analysis assumes the exchange rate of the Kenya shilling to the US Dollar is 80(As at January 2011)

As reviewed in the literature, in a study done in Thika Kenya by Muchui, Ndegwa, Wachiuri, Muthama and Kimamira, there is need to test new varieties introduced from the temperate countries. locally available seed are of poor quality and low yield potential as there is still local technological capacity in plant breeding and seed processing, growers have resorted to using own first generation seed from the imported seed which eventually result in low yields, poor quality produce and high susceptibility to pests and diseases. Such produce is faced with an uphill task to meet the set standards by the importers in the European Union. To meet the objective of assessing the impact of seed cost, the study analyses data from large scale growers (Vegpro Kenya ltd) who plant imported seed and small scale grower who plants second generation seed in Naivasha over a period of 14 weeks.

Table 4.4: Effect of seed price on returns per hectare.

	Price /kg (Ksh)	Seed cost / ha	Yield/Ha (kgs)	Quality (% grade out)	Returns /ha in kgs	Price / kg of produce	Total returns / ha
Own seed	200	10,000	3,000	70	$0.7*300=2100$	40	84,000
Imported seed	14,4000	43,200	10,000	90	$0.9*10,000=9000$	45	405,000

Source: (Author, 2011)

Exportable production is determined by the percentage grade out of the total yield. Price for small scale farmers is pegged at Ksh 40 because of the inherent risk covered by the exporting company, while the price by reputable growers who use imported seed is Ksh. 45 because of the assurance of quality as per the customer specifications. A total return

per hectare is calculated by multiplying the price per kg of graded beans by the total acceptable volume per hectare.

This analysis assumes the seed rate per hectare is 50 kgs and the seed price is pegged at an exchange rate of Ksh. 80 to the \$. It also assumes other production factors remain constant.

4.2.2 Star frenchbeans seed quality and its adoption

An important component of seed production is quality assurance (MacRobert, 2009). This is not a one-off item, tagged on at the end of production process, when the seed is put into the bags, but it has to be part of every aspect of the seed production process. Quality of seed refers to its fitness for purpose and its conformance to statutory requirements. Although this is defined by the seed regulations, at the end of the day, it is the farmer who evaluates the real value of the seed.

To meet the objective of assessing the impact of seed quality, the study analyses data of respondents on quality parameters set. This is shown in Table 4.4 below

Table 4.5 Effect of quality on adoption of Star frenchbeans by growers in Naivasha

	Large scale		Medium Scale		Individuals	
	Vegpro	E. A Growers	Rozzika	Boffar	Lawrence	Habel
foreign matter	4	5	4	4	5	4
Physical defects	5	4	5	5	4	5
coat colouring	5	5	5	5	5	5
Seed grade	5	5	4	5	5	5

1=strongly disagree 2=Disagree 3=Neutral 4=Agree 5=strongly agree.

The data shows that growers are keen on the physical seed quality parameters. Star frenchbeans quality parameters of free from foreign matter, lack of physical defects,

mode of seed coat colouring and seed grade are rated highly by the entire spectrum of the growers in Naivasha.

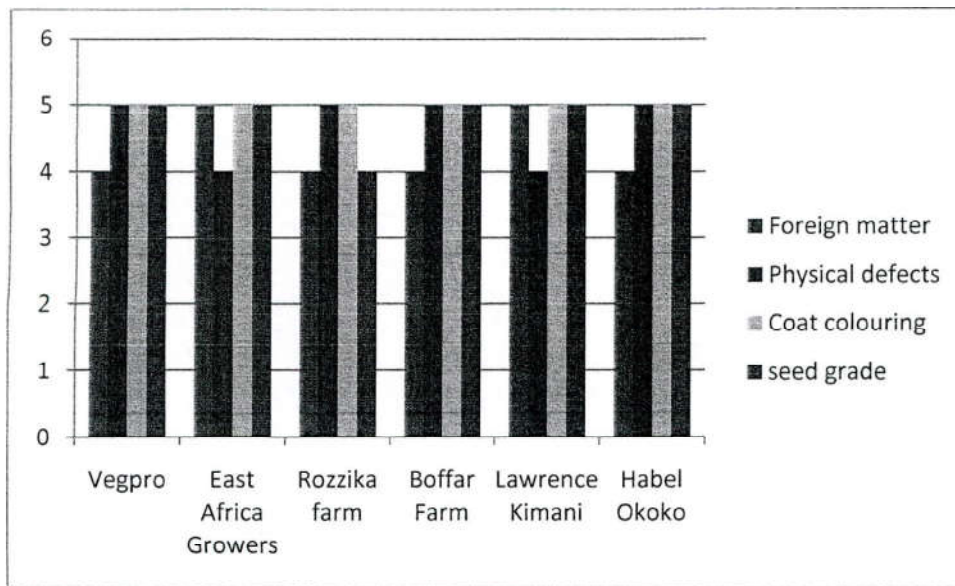


Figure 4.1: An analysis of the physical qualities by export growers in Naivasha

Source: Primary data, 2011

Summary of Government monitoring of imported star seed quality

In an effort to establishing quality parameters of star frenchbeans seed independent of the seed producer, seed merchant and growers, the researcher sort to analyse the Seed certification records for some of the seed imported for the period 2009 to 2010 from Kenya Plant Health Inspectorate Services (KEPHIS) which is the Government regulatory authority mandated to ensure adherence to set standards. This is summarised in Table 4.5 below

Table 4.6 Imported Star frenchbeans quality monitoring by KEPHIS

Date	Lot Number	Volume -kgs	KEPHIS Germination	KEPHIS Abnormality	KEPHIS Purity-%	NDA Germination	NDA Abnormality	ND A Purity
19.06.08	A12945	7500	97	2	100	96	3	100
29.01.09	10567	5508	96	3	100	95	3	100
4.04.09	16115	3576	99	1	99	98	2	99
11.09.09	16815	1962	96	3	100	96	2	100
21.01.10	11156	2780	98	1	100	97	2	99

Source: (Author 2011)

The data shows consistency in the quality parameters of the seed from the Exporting regulatory authority- Department of Agriculture of the Republic of South Africa (NDA) and those of importing regulatory authority KEPHIS. This consistency of the quality is paramount it's a requirement that any seed of the produce destined for export to Europe has to meet the set standards and established by and independent authority.

The records are as guided by ISTA which is an association of members, who work together to achieve their vision of 'Uniformity in seed quality evaluation worldwide

From the above analysis of quality parameters of Star frenchbeans varieties, the study showed that its high quality attributes has influenced its adoption by growers in Naivasha.

4.2.3 Yield potential of star frenchbeans and its adoption

The different frenchbeans varieties have more or less the same production characteristics and differ in length of harvesting, pod shape and pod length and diameter and the extent of green pod colour. Star frenchbeans exhibit high yield potential and the research objective was to ascertain this by collecting data on its (1) yield potential and stability-adaptability and appropriateness for the farmer's environment, (11) Defensive traits-pertinent disease resistance, lodging resistance, tip coverage, pest tolerance, maturity and a biotic stress tolerance, (111) utility traits-pod colour, length, shape, diameter, shelf life (1v) Aesthetic traits-plant height, phenotype. This is illustrated in table 4.6 below

With a rating of 1=strongly disagree 2=Disagree 3=Neutral 4=Agree 5=strongly agree respondents were asked about the yield characteristics of star frenchbeans as above.

Table 4.7: attributes of yield potential of star frenchbeans

Yield Potential	Mean score
High production	5
Stability of production	4.5
Suitability to farmer's environment	3.5
Pertinent disease resistance	3.5
Lodging resistance	4
Tip coverage	4
Pest tolerance	2.5
Maturity and a biotic stress tolerance	4

Source: primary data.

The most significant attributes of Star frenchbeans yield potential is its high production per unit (5), followed by stability of production (4.5). Lodging resistance (4), tip coverage (4), maturity and a biotic stress tolerance (4) are intermediate attributes. Its poor attributes are suitability to farmer's environment (3.5), pertinent disease resistance (3.5), and worse of all is its inability to pests attack (2.5) as expressed by most growers.

As reviewed in the literature, a major limitation to fruit and vegetable production in many developing countries is the availability of good quality seeds. In line with this,

Starkeyres has endeavored to produce varieties that are of high yielding and stable production of up to 4 to 5 weeks as opposed to the 2 to 3 weeks as the competing varieties. The plants are vigorous with excellent leaf canopy. This offers good pod and flower protection under hot growing conditions. The plants are sturdy, with no lodging. The pods are carried well clear of the ground. Flowering and bearing are moderately concentrated. The pods are uniform, straight and dark green. Seed development is very slow with excellent gel retention-this allows for a flexible harvest window and extended *shelf life*. For star 2053, the pod length is 12-14 cm length and a with distribution of: 37% less than 6mm, 60% 6.1-7mm, 3% 7.1-8mm.(Starkeyres product fact sheet). The results show that most farmers still regard first generation seeds because of its high quality as opposed to the study by (Kimenye, 1995) which asserted that most farmers prefer own saved seed

4.2.4 Availability of other frenchbeans varieties and adoption of star frenchbeans.

The French bean varieties used for export to the European Union market have changed little since the mid-1990s (Cirad, 2009). About half a dozen are used for all the crops in African and Mediterranean producer countries. Seminis Company, a member of the Monsanto group of companies of America, supplies most of the seed for this particularly delicate counter-season crop. But in the past 5 years, several other seed companies such as S&G, Pop vriend of Netherlands, Starkeyres of South Africa are breeding new varieties that may soon afford a broader choice for producers. Starkeyres of South Africa recently launched its Star varieties (Star 2052, Star 2053 and Star 2054) in the region in 2008. These products are merchandised in Kenya by Pannar Seed Kenya limited. Starkeyres has been developing French bean varieties in the last 10 years and introduced their varieties embodied with unique characteristics to meet the customer specification in Kenya in 2007 to give the growers flexibility of choice of high quality seeds affordably. Its flag ship variety is Star 2053 ideal for fine bean and Star 2054 for extra fine bean.

However, there are other formidable varieties in the market competing for market share with the Star frenchbeans varieties. The original main varieties since the 1990s was

Teresa, Alexander, Samantha and Amy from Monsanto but seed supply has been affected since 2009 when the American multinational seed company Monsanto bought Seminis of Holland. There is a strategic change in focus which affected the production of these varieties given the small contribution of bean seed division in Monsanto. Moreover, it was discovered that the beans grown in America are infected by bacteria which is a quarantine disease in Kenya. Thus KEPHIS restricted the entry of any bean seed from the Americas. With this development, and the industry being very loyal to Monsanto products there was a significant shift in seeking alternative good varieties so as not to affect the fresh produce export market in Kenya. It is at this point in time that Starkeayres was launching its brand varieties and quickly proved as the best alternatives. However, other companies like Kenya Highland seeds launched the S & G varieties of Serengeti and Konza for extra fine beans market, Tana for fine bean market. Hygrotech has Soria for extra fine bean and Escalade for fine bean in the market too. Thus, competition is stiff for this lucrative market that is estimated at 150 tons of seed per year (KEPHIS Data). Of this market, Star frenchbeans varieties are controlling about 50-55 percent of the market share within two years of its launch in the Kenyan market.

To ascertain the objective of estimating the market share of Star frenchbeans in Kenya, the research sort to analyse the total seed of Star frenchbeans varieties 2053 sold by the Pannar seed Kenya limited from January 2009 to January 2011 and the ratio of star 2053 exported by two of the exporters during the peak season in December 2010.

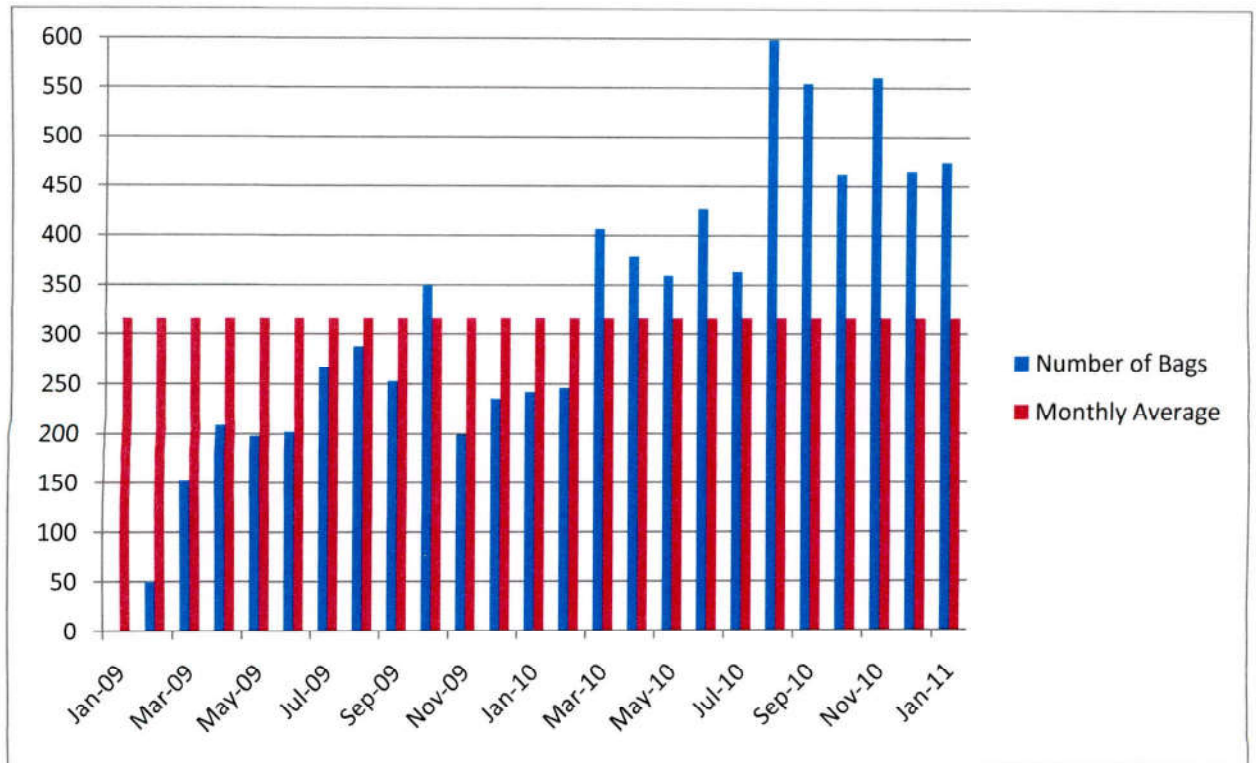


Figure 4.2 Trend of Star 2053 as sold by Pannar seed Kenya limited in 2009-2011

Source: (Author 2011)

The sales trend for the period under review clearly shows an upward trend implying increasing adoption of Star frenchbeans by the growers. From a paltry 50 bags sold in February 2009, the sales have increasing to average 317 monthly. The adoption rate increased steadily as most growers became aware of the product in the market. The sales shot above the monthly average from March 2010 to January 2011. In September 2010, the sales shot to a record 599 bags in a month and there since average above 450 bags per month. This was found to be so because of the increased planting in September to cater for the peak export season during the European winter from the beginning of December, where they rely mainly on imports. Thus this confirms the positive attributes of Star 2053 as growers did not want to take chances with other varieties during this important season. The trend is steady towards the end of the period under study meaning sustainability of the market share.

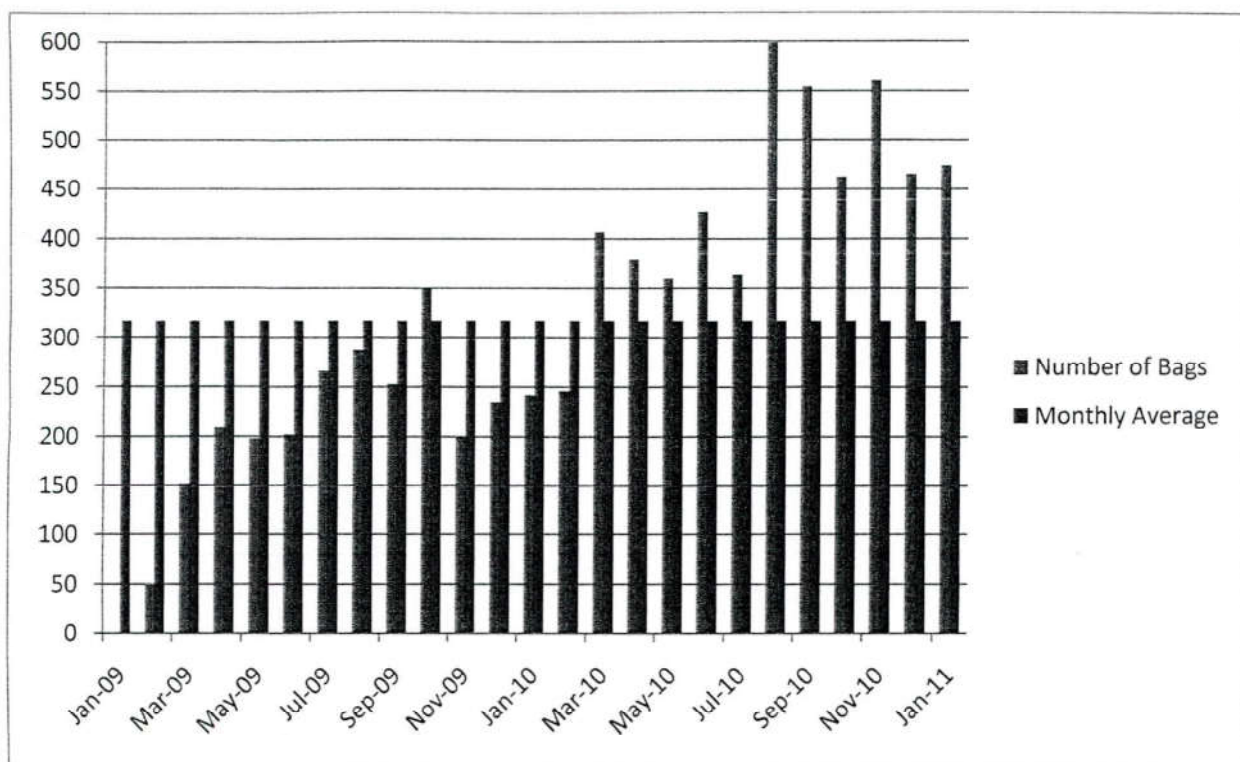


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To further gauge the preference of Star beans to the competing varieties, the researcher sorts to analysis the varieties that were processed during the peak season. Thus the performance of star frenchbeans measured on an intake basis in one leading exporter (East African Growers) during the month of December 2010 being the most lucrative month where all exporters position their best products for the European winter. This method was adopted to augment the unit seeds sales reviewed earlier to mitigate against any inconsistency and broaden the view from the produce of the product. The data was the opening balances of the raw material for processing. As illustrated from figure 4.7 below Star frenchbeans was accounted for 49.5% of the total, followed by Teresa at 20.20%, Samantha at 14.14%, Serengeti at 6.6% then Soria at 4.4%. At the bottom end was Tana 3%, Paulista 2.2% and Amy 1.1%.

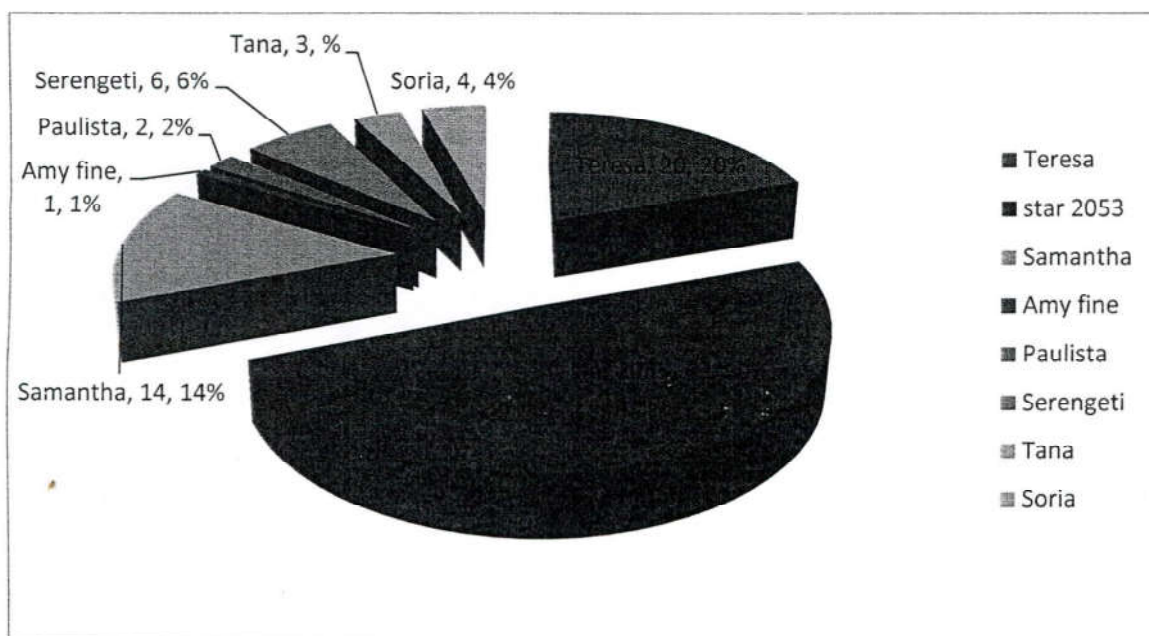


Figure 4.7 The proportion of the ratio of star beans of exportable beans as a measure of its performance.

Source. (Author 2011)

From the sales data and processing data presented, its evident Star 2053 is the most preferred variety by growers in Kenya, commanding nearly 50 percent of the market share. As a result, the conclusion is that the presence of many other frenchbeans varieties

in the market has not affected the adoption of Star frenchbeans varieties by growers. It's preferable because of its own strong attributes despite the presence of other varieties. These findings are opposed to earlier studies that indicated there is an influx of frenchbeans varieties in the market and any new introductions will not have an impact.

4.2.5 Post harvest traits.

Apart from good field production traits, a frenchbeans for export market must have good post harvest attributes. It should have the right pod length, pod diameter, uniform size, dark green colour, less fibre and slow seed develop, long shelf life. Star 2054 were tried by the leading fresh produce exporter in Kenya; Homegrown Kenya limited against 6 other varieties in the category of extra fine beans for their post harvest characteristics in line with the customer specification. The harvested pods were exported to Flaming UK in the United Kingdom and analysed by food technologists in an effort to determine which has the best attributes. The results are as presented in table 4.8 below.

Description	Bellini	Mayote	Twix	Goal	Samoa	Star 2054	Alexandre
Size	90mm	100mm	90mm	100mm	90mm	100mm	110mm
Appearance	Uniform, thin	Uniform, thin	Curved, varying diameter	Uniform, wider diameter	Curved	Curved, varying diameter	Fairly uniform
Colour	Dark	Dark	Mid-dark	Pale	Dark	Pale	Mid-dark
Scarring	5-8%	5-8%	1%	None	3%	1%	None
Russetting	None	5-8%	1%	None	None	1%	1%
Pest damage	None	None	1%	None	None	None	None
COOKED							
Appearance (raw)	20.5	19.5	19.5	19.5	18.5	24	20
Appearance (cooked)	21	23.5	21.5	18.5	21	26	24
Texture	20	17	23	25	18	24	23
Flavour	14	15	17	19	14	20	18
TOTAL (out of 120)	75.5	75	81	82	71.5	94	85
Overall rating	5	6	4	3	7	1	2

As cited in the literature (Cirad, 2009), the European market is very sensitive to particular post harvest attributes of the frenchbeans pods. The above results are in conformity with study. The pods must retain their true characteristics from the farm to the fork. Of particular importance the pods are graded in terms of size, appearance, colour, scarring, russetting and pest damage. They are then precooked and assessed for appearance, texture, and flavour. Star 2054 was best overall. Thus growers prefer the Star frenchbeans because of its post harvest characteristics as attested in the study above.

CHAPTER FIVE

5.0 SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1.1 Price of seed

The turnover of a company is the product of seed sold and the unit price. But as reviewed, price affects sales volume. Consequently, in setting the seed price, one has to be clear on the overall objective (Machado, 1996). The pricing objective of Pannar seed Kenya limited was aimed at matching the market price based on the strong believe that the variety is as good. As shown in the study, there is no significant price difference between the frenchbeans varieties in the market. Adoption preference is thus not determined by the price differential. Thus the study has demonstrated that Star frenchbeans varieties adoption is not affected by the end user price.

5.1.2 Quality of seed

For a seed company to have the assurance or confidence that the seed it sells will satisfy the farmer, it is necessary to implement a quality assurance programme. This will specify all the systematic procedures that the need to be carried out in the entire seed chain to ensure that the quality of the seed is not the label but the seed itself. Every aspect of the seed company needs to be analyzed, documented and procedures described to ensure that quality is embedded in the system. Every employee should have a conscious understanding of his or her responsibility to conduct their work in a quality manner as ultimately the seed is as good as its quality. (MacRobert, 2009). This indeed has been demonstrated by the quality of Star frenchbeans varieties from Starkeayres. As drawn from the study, the positive quality attributes of these varieties has greatly affected their adoption by the growers in Naivasha.

5.1.3 Yield potential

The findings present evidence that adoption of seed for export crop production requires seed of high productivity potential as profitability is based on per unit of production. The findings further reveal that it is not just the yield per unit and stability of production, plus other inherent traits like disease resistance, ability to withstand lodging, tip coverage, pest

tolerance and ability to withstand a biotic stress. The high and stable yield potential of star frenchbeans varieties has led to its adoption by the growers in Naivasha.

5.1.4 Competition

The data analysed present evidence that despite the many seed products in the market, growers are quite sensitive on a variety that has cutting edge attributes in terms of pricing, productivity, and post harvest attributes. There must a balance of all the attributes to remain competitive as competition for market share has many facets to it. Thus, the presence of many competing varieties in the market has not negatively affected the adoption of Star frenchbeans varieties in the market, but rather it cutting edge characteristics in terms of quality, yield potential and post harvest characteristics has bolstered its adoption.

5.1.5 Post harvest traits

The study findings point strongly for a seed product that will have produce that meets the customer specification and the ever changing tastes and preference. The longevity of the shelf life, its physical appearance and cooking quality has to be superior given the wide range of choices. The acceptance of the seed as the source of the produce is determined from the 'fork to the field' basis i.e. the consumer who shops, prepares and cooks the beans will pass down the his or her preference to the importer / exporter who will then pass it down to the grower and ultimately the seed producer. Star frenchbeans varieties have proofed preferable and thus their adoption by the growers.

5.2 CONCLUSIONS

Despite the good performance of Kenyan horticultural sector, frenchbeans growers still faces challenges of accessing good seed material. There is limited investment in acquiring or improving the genetic material that is priced affordably, its high yielding per unit area has stability of production, withstand the competition and contain postharvest attributes preferred by the end users.

5.3 Recommendations.

Based on the findings, in order to achieve sustained frenchbeans production for the export market, there is need for more players to invest in technology to improve the genetic germplasm. There is also need for the seed industry players to focus on quality controls and inculcate it into the day to day activities of its operations. For government, there is need firstly to improve its quality regulatory organization to ensure a level playing ground for multinational and other small companies. secondly, the government should allocate enough resources to spur research in frenchbeans plant genetics that will result in breeding of frenchbeans varieties adaptable to the local climatic conditions and meets the end user requirements as relying on imported seed does not only expose the environment to undesirable biological risks, but also stifles growth due to increasing cost of inputs. However, KEPHIS is doing a good work in ensuring the seed material coming into the country meet the set local sanitary and Phytosanitary requirements.

5.4 Suggestion for Further studies.

From the literature review and findings of this study reveals that the high value seed industry is controlled by outside players yet horticultural exports plays a significant part in the Kenyan economy being second from tourism. This implies that key ingredients in this lucrative sector are beyond the control of Kenyan policy makers. The researcher therefore suggests that study be carried out to ascertain the feasibility of starting the production of frenchbeans seed for Kenyan vegetable crops under Kenyan conditions.

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Postharvest Evaluation of Introduced French Bean (Phaseolus vulgaris L.) Varieties by Muchui, M.N., Ndegwa, A., Wachiuri, S., Muthama, B. and Kimamira, J,

APPENDICES

Appendix 1:

Questionnaire cover letter

9th October 2010.

Dear Respondent,

PARTICIPATION IN PROVIDING RESEARCH DATA-FACTORS AFFECTING THE ADOPTION OF STAR BEAN VARIETIES BY EXPORT GROWERS IN KENYA.

I'm pleased to inform you that you have been selected to be one of the respondents in this study. The purpose of the study is to explore factors determining adoption of star bean varieties in Kenya, using Naivasha as a case study. The study findings will be significant in helping researcher, the growers, consumers and general public in understanding more about Starkeyres bean varieties and what makes them acceptable and improve general knowledge of frenchbeans seed in Kenya.

As results, therefore, the interested parties can make informed decisions on investment and consumption and regulation.

I will uphold confidentiality of the information and at no instance will your name be mentioned in this research. Moreover, the information will not be used for any other purpose other than this research.

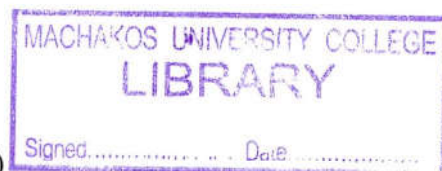
Kindly complete this questionnaire to facilitate the research. A copy of this research paper will be available to you upon request.

Thank you very much for your cooperation.

You're faithfully,

Henry Wanjala.

(REG. No. JKUAT/KIM HD 0334/033/0221/2010)



2. How is the seed tolerance level to diseases?

1 2 3 4 5

3. What is/are the reason for your rating in (2) above?

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

4. Does the inherent disease tolerance level affect pesticides application?

Yes No Not Sure

5. Is the physical quality of seed free of defects?

1 2 3 4 5

6. The seed colour coating is attractive and of acceptable standard?

1 2 3 4 5

7. The seed grading- size, shape and uniformity of seed in a pack is regular?

1 2 3 4 5

PART E. VARIABLES UNDER STUDY

For each of the following statements, please place the NUMBER that corresponds with your feelings to the left of the question number. Use the following codes: 1=Strongly disagree 2=Disagree 3=Neutral 4=Agree 5=Strongly agree

VARITEAL YIELD POTENTIAL

1. The yield potential is high and stable?

1 2 3 4 5

2. The Star bean varieties are easily adapted and appropriate for the farmer's environment?

1 2 3 4 5

3. The bean varieties have the following defensive traits;

Pertinent disease resistance	Yes	No	Not sure
Lodging resistance,	Yes	No	Not sure
Tip coverage,	Yes	No	Not sure
Pest and herbicide tolerance,	Yes	No	Not sure
Maturity and a biotic stress tolerance,	Yes	No	Not sure

PART F: VARIABLES UNDER STUDY

For each of the following statements, please place the NUMBER that corresponds with your feelings to the left of the question number. Use the following codes: 1=strongly disagree 2=Disagree 3=Neutral 4=Agree 5=strongly agree

UTILITY TRAITS

1. The varieties meet required pod specification as per the customer requirement?

1 2 3 4 5

2. The varieties have the preferred pod colour, texture and uniformity?

1 2 3 4 5

3. The variety has the right internal pod –gel retention attributes?

1 2 3 4 5

4. The variety has pods of the required shelf life for export supply chain requirements?

1 2 3 4 5

5. What are the reasons(s) for your rating in (4) above?

1 2 3 4 5

2. The Star bean varieties are easily adapted and appropriate for the farmer's environment?

1 2 3 4 5

3. The bean varieties have the following defensive traits;

Pertinent disease resistance	Yes	No	Not sure
Lodging resistance,	Yes	No	Not sure
Tip coverage,	Yes	No	Not sure
Pest and herbicide tolerance,	Yes	No	Not sure
Maturity and a biotic stress tolerance,	Yes	No	Not sure

PART F: VARIABLES UNDER STUDY

For each of the following statements, please place the NUMBER that corresponds with your feelings to the left of the question number. Use the following codes: 1=strongly disagree 2=Disagree 3=Neutral 4=Agree 5=strongly agree

UTILITY TRAITS

1. The varieties meet required pod specification as per the customer requirement?

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4. The variety has pods of the required shelf life for export supply chain requirements?

1 2 3 4 5

5. What are the reasons(s) for your rating in (4) above?

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PART G: VARIABLES UNDER STUDY

For each of the following statements, please place the NUMBER that corresponds with your feelings to the left of the question number. Use the following codes:1=Strongly disagree 2=Disagree 3=Neutral 4=Agree 5=Strongly agree

COMPETING VARIATIES.

1. Other seed varieties are easily accessible in the market?

1 2 3 4 5

2. There is a level playing field of seed regulation in the country?

1 2 3 4 5

3. The competing varieties have the same yield potential?

1 2 3 4 5

4. The competing varieties have superior post harvest traits?

1 2 3 4 5.

5. The unit price of competing varieties is competitive?

1 2 3 4 5

Please give reasons why you prefer star beans against the competing varieties

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Thank you for completing our survey. If you have any other comments please enter them here

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