

**RESPONSE STRATEGIES ADOPTED BY MAJOR
MAIZE SEED COMPANIES IN ADDRESSING
NATIONAL FOOD SECURITY CHALLENGES IN
KENYA**

By

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DECLARATION

This research project is my original work and has not been presented in any other University.

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This research project has been submitted for presentation with my approval as University Supervisor.

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God bless you all.

DEDICATION

I dedicate this project to my family for unfailing encouragement and love. To my dear wife - Joyce and my son Kiprotich, and daughters Chepkoech and Chemutai.

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ABSTRACT

In changing market environment, business firms are exposed to various external factors that jeopardize the very existence of the company. These changes come from government regulatory moves, changing environmental conditions, general business environment and rapid changes in the technology. In addition, the frequency of occurrence of these changes has become unpredictable and that chance to predict and prevent their occurrences is lessening day-to-day. Consequently, firms should come up with appropriate strategies that will address a problem existing to create an opportunity for them. The research objective was to determine the response strategies employed by major seed companies in addressing food challenge in Kenya. The specific objectives were to determine how access to market and marketing practices, provision of extension services and production of certified seeds was applied in addressing the food challenges in Kenya. Towards explaining the research objective, the study adopted the Resource - Based View and the Dynamic Capability theory. The research design adopted was cross-sectional with the population of the study being the 10 major seed companies that operate in Kenya. The main data collection instrument was a questionnaire that consisted of both the open and closed ended questions that was administered through a drop and pick latter system. The target respondents to the study were field managers for specific maize varieties, business development managers and the marketing managers. Data was analyzed using descriptive measures of mean and standard deviation while presentation of the findings was done using tables and graphs. The study established that the common challenges facing food production and therefore food security include poor seed varieties, changing climatic condition and unpredictable rainfall. The findings also indicate that the seed companies have entered into partnership with government and multinational agencies with an aim of connecting farmers to markets locally and outside the country. In addition, the seed companies were found to provide extension services to farmers as well provide climate condition tolerant seed varieties in the country. A strong correlation was found between the seed quality and provision of extension services to the farmers. This was also evident in the regression model that shows a significant relationship between the variables. The study recommends that due to the significance of the variables to the food security goal, the firms and government agencies were encouraged to facilitate extensive training opportunities, especially to the small scale farmers. The study was limited to its descriptive nature of its research design and therefore suggested adoption of more inferential analysis in another study in the same line.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

In the current context of globalization, never before have companies faced increased level of risk and competition in their operation than today. Indeed, faced with diverse political, economic, ecological and technological advancement O'Reilly and Tushman (2013) highlight that business entities need to identify the nature of risks and try to deal with in order to enhance sustainability. A firm strategic response to the challenges in the environment forms the cornerstone of decisions within companies and as Caldwell (2012) highlight, the managing board in a company should analyze properly on a continuous basis the significant relationship between strategic projects and its implication or influence to the firm's production channel and performance particularly in the process of strategy formulation. In the process of developing an appropriate strategic response, a firm should allocate adequate resources; human and capital, between those units that constitute an essential strategic aspect at that phase. The nature of relationship between organizational performance and competitive strategy can be attributed to Mason (1939) and Bain (1956) framework of industrial organization of industrial behavior, in that organizational profitability is perceived principally as the role of industrial structure. The main features of the industry, as opposed to its organization, are the primary factors that affect performance of organizations (Barney, 1986). With respect to Scholes and Johnson (2008), major competences are regarded as complex and robust to duplicate since they associate with the management of relationships within the value chain of organizations.

The study is guided by three theories that relate to a firm-performance relationship namely; Resource Based View (RBV) theory (Barney, 1991), the theory of core competence (Hamel & Prahalad's, 1994) and the Dynamic view of the firm (Teece, Pisano, & Shuen, 1997).

According to RBV and the core competence theory assert that organizations gain a competitive advantage by ensuring that their resources are valuable, non-substitutional, and difficult to imitate. However, the RBV and core competence theories has been viewed to lack the capacity to effectively explain the capacity of a firm to operate in a competitive business environment (Eisenhardt & Martin, 2000), since exaggerating specific capabilities and resources can avert the efforts of a firm from acclimatizing capabilities and resources to new economically aggressive environments. Consequently, Teece et al (1997) suggest that the dynamic capability view explains the ability of an organization to create, implement and reform external and internal competences to deal with the rapidly dynamic business environments. Business units should adapt their competencies to the changing demands of the market to remain competitive at present and into the future.

Kenya has several registered seed companies that serve both the local and regional market. The total number of seed as at December, 2014 was 112 (KEPHIS, 2014). However, most of these companies produce similar types of seeds to a particular area and consequently incidences of unhealthy competition have come into the limelight. The firms should instead come up with appropriate partnership that will increase their individual and corporate competitiveness. In Kenya, the adoption of certified or improved seed by smallholder farmers remains dismal, at 10%, with 90% of farmers using informal or traditional seed, and old seed technology is still in use (Smale and Olwande 2014; Mathenge, Smale & Olwande, 2014). Additionally, maize, which is a staple in Kenya and accounts for 20% of total agricultural production and 25% of agricultural employment, is 70% produced by smallholder farmers. This skewness to the use of unapproved seed varieties is what has let to Kenya being considered as food insecure (FAO, 2016).

1.1.1 Response Strategies

In the present day dynamic and turbulent environments, development of an appropriate response strategy has become an important way for a firm to survive. What constitute a response strategy has received varied definitions. In accordance with the sentiments made by Ye et al. (2010), a response strategy is useful while dealing with the problems of changes in environment, while Lansley (1987) argued that response strategies are creative and rapid responses that facilitates the establishments of new relationships and familiarity with the environment. Competitive strategy, as defined by Strickland and Thompson (2010) comprise of strategic measures established by an organization in order to acquire competitive advantage through value addition that will attract customers, hence increasing market share. Further, Porter (1985) described competitive strategy as an approach that involves acquisition of defensive or offensive measures to establish a defensible position in an economy, to manage with the existing competitive forces and therefore harnessing greater organizational return on investment.

Walker (2014) pose it that organizational competitive advantage can be achieved through efficient delivery of services to customers at an economical rate which, as a result, enhance firm's profitability that surpasses competitor's. In addition, sustainable financial performance can be realized if a firm maintains its long-term competitive advantage. Pearce and Robinson, (2007) proposed that competitive advantage comprises of two major aspects that facilitates its acquisition and maintenance. First is properly positioning of organization's products and services in the market and secondly is establishment of market strategies that will ensure the market share is uphold. Therefore, the important sources of firm's competitive advantage are established within the business' cost composition and its capability to distinguish the company from its competitors.

Hinterhuber (2013) suggest that there is need for a clear relationship between firm performance strategy, and competitive advantage to spawn higher returns. Different strategic frameworks have been developed but according to Chaganti et al., (2012) Porterfour competitive strategies model has been proved to be effective. The four Porters competitive dimensions are cost focus, broad differentiation, differentiation focus broad and cost leadership. Differentiation or cost leadership describes the leading concept of a competitive strategy, normally known as the strategic weapons, whereas focus describes the scope of market or product. However, focus as a tool for competitive advantage is not independent since low level of focus cannot yield high organizational performance there it needs the support of other strategies (Porter, 1985). Thusly, the two major components that facilitate competitive advantage are cost leadership – incurring reduced costs than market rivals and differentiation – establishing delivery and supply of quality service and products respectively than the average companies. According to Porter, the two concepts; cost leadership and differentiation are significant as far as organizational performance is concerned.

1.1.2 Food Security in Kenya

Agricultural sector has an objective of achieving sustainable food security in the country. Precisely, food security is defined as the condition in which the entire population, from day to day, have economic, physical and social availability to nutritious, quality food which satisfy their nutritional demands and preference for an healthy and active life” (Kenya Food Security Steering Group, 2008). Over the last decade, and particularly commencing from 2008, there has been a continuous challenge of food insecurity in the country. This is evident from the fact that large portion of the population lack sufficient food quantity and quality. According to a report done by KNBS (2015), approximately 10 million individuals are faced with the challenge of food insecurity citing the main source of living is through donations and reliefs.

On the other hand, the cost of living has increased anonymously due to inflation of food products. Similarly, there has been inadequate supply of maize in the country due to prolonged droughts and adverse weather condition and perhaps it s the stable food in the country due to limited capacity to access alternative food stuffs.

Consequently, the persistent problems of food insecurity are associated with various ecological, socio-cultural and economic factors. For instance, environmental factors constitutes of regular incidences of droughts experienced in major regions of the country and also severe weather conditions such as floods. On the other hand, economic factors include inflation which has escalated cost of farm inputs and as a result, prices of farm produce will increase. Similarly, on socio-cultural concept as a cause of food insecurity, political instability experienced in the country particularly in the year 2008 has led to internal displacement of persons especially from highly agricultural and economically productive regions and as a consequence, many people were affected, increasing poverty level hence low purchasing power.

1.1.3 The Seed Industry in Kenya

Seed companies supply certified seed to farmers hence ensure national food security. The government of Kenya gets revenue through taxes from the sector. The trend internationally in the seed industry has been acquisition and mergers by Multinationals to adapt to the effects of globalization and changing key stakeholders expectations. The effect of this on seeds companies has been a reduction in market share, declining profitability and stiff competition. The regulator of the seed industry in Kenya is Kenya Plant Health Services, whose primary mandate is to check the seed sector to ensure conformity to set standards.

Seed merchants in Kenya are basically the producers, processors and marketer of high quality seed materials. In Kenya, this is made of informal and formal sector. Today, farmers are

getting more enlightened and with the emergence of more diseases that affect crops in the region and the need to go commercial in farming, there is general trend of more growth on the formal sector and diminishing level of traditional seed sector. The seed bulking of different cativas / varieties require specific micro climate for optimal results which makes production to be carried out in different regions to the extent of importation where local weather patterns and economics of production dictates so. In Kenya and the entire East and Central Africa the climate is rather tropical while some crops/products require extreme weathers to produce. Thus, seed merchants especially those dealing with horticultural seeds are net imported.

1.2 Research Problem

In a rapidly changing market, any company is exposed to various external influences, among which there often are those that jeopardize the very existence of the company. These changes include both changes in the general environment and the operational environment; and according to Tan, Shenand Langston, (2015) note that these challenges are becoming more and more common in their occurrence, and the chances to predict and prevent them are lessening. Therefore, for a business unit, the challenge of prompt identification of causes for such conditions and defining the most efficient ways to eliminate or atleast reduce their greatest gravity has become more important. Consequently, Tansey, Mengand Cleland, (2013) assert that a business strategy employed by a firm should focus on enhancing competitiveness of the firm's services and products in the sector. This is because, as Porter (1998) expounded, the failure or success of a firm will be evaluated by level of competition it is facing and that each competing organization develop a competing technique which will link the company to its environment. This is because firms do not operate in an empty space rather, they depend on the environment, implying that that firms have to compete more intensely.

In this era of shrinking markets, Seed industry of Kenya has not been spared the competitive pressure facing firms operating in a liberalized market. This calls for the development of appropriate strategies by the Seed companies in order to survive from the ever increasing competition from both the local and international Seed companies. At the same time the seed firms in Kenya can attain competitiveness over rivals by allocating valuable resources to enhance consumer satisfaction with the aim of retaining existing and attracting new customers. In order to establish a sustainable competitive advantage, firms should embrace strategies that facilitate market focus enhancing success of newly introduced quality products that meets the specification of customers and securing a lion's share market proportion. Seed industry therefore must adopt effective corporate strategy to overcome competition.

The need to develop appropriate strategies in the face of competition has attracted studies at both international and local market. Tansey, Cleland and Meng (2013) undertook a critical investigation of response approaches implemented by construction firms amid economic recession period. The findings suggest that there is a bold support for incorporation of cost leadership mechanisms as organizational survival means during the 2007 economic recession. Lechner and Gudmundsson (2014) researched on the nexus between small firm performance entrepreneurial orientation and firm strategy of manufacturing firms in France. The study found that competitive aggressiveness and risk-taking have a negatively relationship with both cost leadership and differentiation strategies. Gorev and Kozlovskiy (2014) investigated the adjustment of corporate strategy of a manufacturing company under strategic unexpectedness.

Kapto and Njeru (2014) investigated the strategies configured by Kenyan mobile phone firms to achieve competitive advantage. The findings of the study suggest that a strong association between strategies configured by the telecommunication firms to achieve competitive

advantage. Differentiation, focus and cost leadership was found to have a significant effect on firm competitiveness.

On the basis of the above relevant studies to the current research, it can be concluded that though an attempt as been undertaken to understand a firms response strategies and how it influences a firms outcome like performance, the research on seed companies, however, is sparse, and existing consumer research does not fully address the unique nature of seed company operations. There is therefore need to bridge this gap by investigating how response strategies influence the performance of seed companies in Kenya. Therefore, this research sought to answer the following question; what is the influence of strategic responses adopted by major maize seed companies in addressing food security in Kenya?

1.3 Research Objective

The general objective is to determine the role of response strategies adopted by major maize seed companies in addressing national food security in Kenya. Specifically, the study addresses the following;

- i. To establish the responses strategies adopted by major Maize Seed companies in Kenya to the challenges of food security
- ii. To determine the challenges of National food security faced in Kenya

1.4 Value of the Study

This research builds on prior academic works by contributing to agricultural debates on how best to deliver inputs to and to empower farmers towards intensification of farm productivity and subsequent commercialization of farm output. Additionally, this research supports the argument that the base of the pyramid markets also benefit from customer driven strategies where the market perspective on customer needs and preferences is incorporated.

The research lay more emphasis on academic works by contributing to agricultural debates on how best to deliver inputs to and to empower farmers towards intensification of farm productivity and subsequent commercialization of farm output arising from different strategies being adopted by seed companies in Kenya.

This research also contributes to the formulation and implementation of agricultural policies and strategies by both public and private entities by providing a more informed understanding and profiling of the smallholder dominated agricultural market in Kenya for certified maize seed. It enhances the effective delivery of marketing mix strategies, promotional and social initiatives, extension services and product development and innovation of improved maize seeds. By doing so, the research ropes in driving forces to and adoption of the right maize seed variety in order to enhance agricultural productivity in Kenya.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

The chapter elaborates the literature relating to the research objective which is to establish the response strategies adopted by major maize seed companies in addressing national food security challenges. The section covers theories that underlie the study which encompasses the Resource Based View and Dynamic Capability Theory.

2.2 Theoretical Framework

A theory is an arrangement of legitimately contended thoughts proposed to clarify a phenomenal by indicating provision of the laws that relate the variables to each other (Davidson, 2008). The study is underpinned by two theories, namely; Resource Based View and dynamic capability theory.

2.2.1 Resource Based View

The Resource-Based View (RBV) was advanced by Barney (1991) and recognizes that the fundamental drivers to firms' superior performance are attributes to the resources and capabilities which reside in the organization and are valuable and costly-to-copy (Peteraf & Bergen, 2003). The RBV contributes towards firms achievement and maintenance of a competitive advantage by clearly explaining the points of considerations and the fact that a firm is comprised of resources that are unique from other firms' hence stating that the uniqueness of resources leads to competitive advantage. In accordance with Barney (1991), for a resource that are internally sourced to be the key factor of competitiveness, then it needs to be unique and the combination of different organization uniqueness through formation of an alliance will create much higher level of performance.

RBV contemplates that every organization is basically a set of valuable capabilities and resources which decides the performance, culture and strategy of a company; implying that similarity of resources among firms will not create competition in the industry since the level of production will be similar across all the organizations in the market (Wilden & Gudergan, 2015).

The capacity of an organization management, as one form of internal organization resource, to forecast future environment happenings influences the firm ability to be competitive in the future. Scenario technique is regarded as one of the ways that interpretation of change and modelling of interdependencies among multiple factors are achieved. Foresight facilitates firms to establish a vision to enhance understanding of complex factors that prompts change, with the aim of supporting accordingly the process of decision-making and uphold R&D and strategy implementation. Gavetti (2012) suggest that scenarios analysis can be adopted by a firm to illustrate various ways that environment could develop and how firms can react to emerging changes. The capacity of an organizations' management to see challenging challenges in the future and predict market behaviour and to come with visionary strategic options can add value to the ability of the management in taking future-oriented decisions and initiating deployment and configuration of strategic resources of the firm. The RBV therefore can be used to explain the capacity of a firm to have a long term strategic horizon in their planning process.

2.2.2 Dynamic View of the Firm

The dynamic capability theory (DCT) was advanced by Teece and Pisano (1994) and further refined by Teece, Pisano, and Shuen (1997), and Eisenhardt and Martin (2000). Firm dynamic capabilities are resources both internal and external that enable an organization to integrate, learn and reconfigure its assets and process to achieve improved performance.

The theory predisposes that firm level differences in capabilities are rooted on their asset positions such that a firm's future position to change its operating condition is determined by their current stock of capabilities. In addition, firm's processes such as governance structures, resource allocation processes and managerial systems will shape the organizational flexibility and adoptability. Similarly, a firm's capability is determined by a path taken such that the power of a firm to identify and commit to the path for capability enhancement that lead to competitive advantage is an important resource.

Eisenhardt and Martin (2000) established that dynamic capability view explains the important role of capabilities to reconfigure resources that a firm has at present to cope with the highly changing environment. Therefore in business environments that are fast-changing DCV explains the critical place of dynamic capabilities in explaining an organizations level of competitiveness (Barreto, 2010). This is because, dynamic capabilities are considered as a transformer for translating resources into better performance. According to Laursen and Salter (2014) established that by incorporating past practices in previous markets, a firm can raise the chance of succeeding in a fresh market hunt, and that the capacity to integrate industry technology during product or service development is an important dynamic capability for new technology-based organizations.

Argote and Greve (2007) argue that transforming an organization through processes such as organizational learning, strategic discussions and decision-making, and breaking away from path dependences may benefit substantially from foresight conducted by the management team. Therefore corporate foresight can be linked to the basic dynamic capabilities sensing, seizing, and recombination and reconfiguration for monitoring business environment and technology developments, and for an appropriate response action through resource transformation.

Similarly, Zhou and Wu (2010) suggest that strategic flexibility, involving the flexible application and reconfiguration of resources, reinforces positive influence of corporate foresight and thus enhances organizational performance. Therefore, in dealing with dynamic business environments, organizations ought to swiftly react to the market and the strategic manoeuvre applied by competitors and this can best be achieved if the management has a long-term perspective of a firm. As the dynamic capability theory suggest, the key to

Corporate foresight enables a firm management to quickly spot signals about the future market conditions that are significant and further manipulate them, factor out complains and take on opportunities before competing firms or identify chances of expected minor challenges before developing into major problems that may jeopardise existence of the firm (Battistella, 2014). Dynamic capability theory advocate for firms to make a committed effort to discover potential technological change, since in most cases, they tend to focus more on internal success and from strengthening of factors that facilitated the success of organization in the past, at the expense of future firm position (Zhou & Wu, 2010).

2.3 Challenges of Food Security

The current worldwide challenge of food insecurity will be a persistent global issue for unpredicted time period as a result of failure in research programs that attempts to enhance food production through scientific methods developed by advanced research and development as well as touching on inadequacy of water (Nema, Nema, & Roy, 2012). The challenges that have hindered food security include climatic change, lack of marketing of produce and inadequate water. Hilton (2010) opines that food security is adversely affected by climatic change since a change in the weather conditions will affect the level of food production in many aspects.

Spatial changes in rainfall and temperature, for instance, may reduce the moisture content in the atmosphere resulting into unfavourable conditions for crop production.

In addition, extreme temperatures bring variations in the span of growing season. Consequently, these changes in climatic and weather conditions significantly affects the performance of agricultural sector reducing farm productivity and increasing risk of incurring total loss therefore agriculture as an industry calls for weather prediction departments to provide resilient information that may help strategic agricultural investments (Ingram, 2015). Gregory and Bolton (2014) argue that global warming may consequently reduce the duration that a crop such as rice, takes to mature and perhaps increase in other elements of the environment for example carbon dioxide gas enhances photosynthesis hence increases the level of crop production. Nevertheless, regular occurrence of natural phenomena for instance droughts and floods, extreme changes in weather condition and interference of nutrients interaction affect negatively productivity of crops.

Tilman and Maclight (2011) suggest that the prevailing limited distribution and hasty increase in freshwater demand has become a major limitation to potential growth in agricultural food security. They point out that internationally, the water demand is growing yearly at a rate of 2.4% with about 20% of the globally arable area being irrigated, utilizing an approximate 70% of the worldwide water sources and with the food demand increasing, the amount of water demand is projected to increase. Indeed, the number of countries expected to experience water stress is expected to reach 50 by the year 2025 (IFO, 2015). Hence, the lack of alignment between the expanding demand for and supply of water as had serious challenges for achieving the growth targets of food security and production in the world and therefore, strategies must be established to achieve a stability between the supply and demand of water resources.

Nema, Nema and Roy (2012) identify the need to produce new grain varieties of field crops that is able to withstand climatic changes. Different varieties of rice and wheat, for example have been identified to have a gap between the yield because of these genotypes and field performance level. One of the factors identified that might explain the low yield in these food varieties is the poor seeds. In particular soil conditions, the variety with higher potential of increased yield in constant condition cannot fit as expected leading in poor productivity. However, modern biotechnology techniques can improve these disparities (Hilton, 2010).

Aiga and Dhur (2006) discovered unavailability of markets for outputs and inputs at the regional international national and local levels establish the growth capacity and economic efficiency. From the findings, it is evident that most regions barely have markets, or inefficiently operate, and majority of pastoralists and farmers are only slackly connected through interactions facilitated by marketing system. However, there is a potential of enhancing marketing strategies among the marginalised groups such as pastoralists and small scale farmers by improving market information systems and physical infrastructure. Correspondingly, agricultural sector that still experience low level of development are associated with factors such as low soil fertility, environmental degradation and reduced usability of external arable farm input which has been realized to cause inadequacy in food preservation and storage that consequently influence significantly price fluctuation. In addition, particularly in developing nations, Sylla (2015) pose it that generally, farm input investment comprising of seeds, and technology and fertilizers has been decreasing significantly. The major factor attributing to fertilizer input is inaccessibility of this commodity due to complex trade tariffs which escalates prices of fertilizer relative to limited markets access, poor infrastructure and commodity prices.

2.4 Response Strategies to Environmental Challenges

Food insecurity is a matter of global concern, although it is most frequently observed in Sub-Saharan Africa (Webb, 2006). The most popular methods for establishing households that are faced with challenges of food insecurity are focusing on the types of coping strategies and frequency of accessing foodstuffs. Coping strategies are social responses used to counterbalance pressure to a household's economic and food resources in hardship times. Different strategies have been adopted by maize seed companies in addressing food challenges. These strategies include adopting appropriate marketing and identification of markets, promoting expansion of extension services and adoption of certified seeds.

2.4.1 Marketing and Markets Access by Farmers

Songwe (2012) argues that countries that face food insecurity need to assist their farmers to gain access to the market. The main purpose why this is important is to enable the distribution of farm produce to other areas where there is scarcity or deficiency. Enabling firms to access the market will also be beneficial to the farmers since unexpected increase in supply of agricultural inputs without a corresponding demand increase will cause minimization of price indices in agricultural products and food during the harvest and will subject farmers in huge debt crisis. This has been evident in countries such as Malawi, Nigeria and Ivory Coast. Therefore, for African governments to succeed in alleviating food insecurity there is urgent need to address the important issues that influence the forces of market supply and demand in order to control volatility of commodity price which is basically a sustainable factor for food security.

Porter (1980) appreciates the role of organizations in preparing suitable strategy of competitiveness to attain desired levels of financial performance. Development of an appropriate strategy is argued to have the capacity to change the operating principles of the industry in firm's favour, for example, an organization can select strategies that influence or

controls entry into their production channel and forming a marketing network with farmers and sellers. Cusumano, Kahl and Suarez (2015) observes that Porter suggests an analytical system to measure the effectiveness of an industry, the fraction of firms involved in production of goods that are close substitutes by advocating that a firm or industry focus on a product which they have a competitive advantage over the other players, in the market. This implies that business units should endeavour to differentiate their marketing system as well as concentrate on a product that they have a competitive advantage.

Enhanced market access is an important approach in improving the off take from pastoralists and tackling the stability between availability of resources and stock numbers (Aklilu, Little, Mahmoud, & McPeak, 2013). The major setbacks that bars sharing of quality seeds among countries that practices agriculture is the presence of complex trade policies and in adequacy of information regarding trade and market. The presence of significant relationship between international and local markets and enhancement of private investment particularly in export and local slaughter facilities, wool, leather, and meat dispensation and conveyance is very important in promoting bilateral and multi-lateral trade (Kanyingi, 2015).

In order to reduce commodity price volatility for food products Songwe (2012) argues that there is need to support Agricultural Market Information System (AMIS) hence improving transparency and flow of information within the food market while engaging private-sector players, governments and international organizations, to ascertain the public of efficient, quality and timely distribution of food market information concerning products available. However, in order to achieve this, countries should support the idea by coordinating responses during crises of increased food prices, especially through the use of Rapid Response Forum (RRF) and AMIS; improving transparency, supervision and regulation of agricultural imitative market; articulating that a predictable and transparent global trade in

food commodities is fundamental in reducing extreme price changes. Therefore, maintaining high focus on establishing an accountable multilateral system of trade considering nutrition concerns and food security, specifically in the least developed countries, and net food import from developing countries (CFS, 2013).

Shiundu (2011) suggests that although the support that farmers receive from the government with regard to agricultural inputs for instance fertilizer and seeds is always suggested, the same governments should not be involved in storage activities of farm produce since state board of marketing with a storage authorization have been ineffective at managing food security and prices. The most significant thing governments need to do is to involve the private investors or players to improve their engagement in the process of marketing and storage of agricultural and food products to construct community based silos for collection of agricultural commodities (Bryson, 2018).

2.4.2 Promoting Expansion of Agricultural Research and Information Dissemination

Short-term emergency reaction to food security, for example providing highly subsidized farm inputs, may not tackle the persistent problem of food insecurity in Africa in the many years to come and may perhaps alter prices (Maruti et al., 2014). According to Centre for Food and Safety, CFS (2013), there are a number of strategies that governments can put in place to enhance food production and alleviate food insecurity. Some of these strategies are to boost agricultural productivity, promote a significant advancement of agricultural R&D strategies and its financial support enhancing research institutions, public universities, and national research bodies as well as facilitating transfer of technology, knowledge sharing and practices involving capacity building.

The state corporation boards that regulate and control nutritional practices should involve non-governmental organizations particularly farmers' and women's organizations and civil societies especially in decision making (Kennedy et al., 2016). This will enhance policy consistency in particular sectors, as well as national economic principles, to tackle the issue of extreme food price instability; discover measures that promote agriculture such as incentives to minimize losses in food production system, and finally addressing potential losses expected during post harvest.

2.4.3 Adoption of Certified Maize Seed Technology

According to FAO (2008), other strategies that can be adopted to assist in alleviating food insecurity are planting different varieties of crop species especially those with ability to survive in even in drought conditions; developing new varieties of drought resistant varieties of crops; encouraging intercropping; training and developing the capacity of the people in to harvest water as well as implementing and improving existing irrigation systems. There is enormous disparity in agro-ecological circumstances in Africa and which is a challenge that bars the larger African population from attaining sustainable food production that will improve their living standards (Oldewage, 2006). As a result, food products may also be unavailable in the market or it may be available but with extremely high prices which will be accessible to respective households depending on availability of resources. Therefore, rural communities should not rely on agriculture as the main economic activity but rather they should take up available resources and manipulate in order to acquire valuable resources and enhance their knowledge base (Shuman, 2013).

In particular, in developing countries where food insecurity is prevalent, the government has the liability to provide a strategy for conflict resolution and to guarantee that contracts are appropriately respected and designed by assisting local communities get access to various

credit services through partnering with commercial banks as well as establish projects that will provide job opportunities to the locals.

2.5 Empirical Literature Review

De Cock et al (2013) investigated the state of Food security in Limpopo province, particularly the rural parts of South Africa. The study findings find that SA then did not have a generally accepted technique to evaluate the extent of food security and the policy that guides monitoring and evaluation process status of food security and the population increase of its people. The study identified that the major domestic feature that affected the status of its food security which include human capital (dependency ratio, household size and education), district the household lives and household income. The findings of the study suggest that that the government strategy main concern should instead focus on campaign of basic and quality education in rural areas and establishing a suitable working condition for labour market in the rural.

Ye et al (2013) forecasted on the influence of climate change on food security in China by 2050 by appreciating the effect that climate change is having on the global agriculture and food production worldwide. The researcher laments that there is a direct relationship between food security and climate change and that the national scale perception on climate change is understood poorly and there is need to therefore evaluate the impact of climate change on countrywide food security. The study finds that China food production will change by +3 – 11% by 2030 and that the better indicator to food security is a food security analysis and that the crop yield growth rate better shows the food rate per acre and that the climate change

moderately affect food security in relation to population growth, cropland area, technology development and socio-economic pathway.

Besi and McCormick (2015) investigated the possibility of moving towards a bio-economy food system in Europe; industrial, regional and national, strategies by highlighting the need for establishment of an innovative European bio-economy is an imperative phase in attaining change in the direction of achieving sustainable development. The study further highlight that the regional government should facilitate partnerships between research institutions and industries to enhance technological advancement which is a more effective way of boosting innovation than the national government initiatives. The findings further identifies the need to develop local markets that are necessary for bio-economy development, although transition of bio-economy needs should follow a lifecycle perspective with the aim of ensuring an economy initiated from a biomass is equitable and sustainable.

Sonnino (2016) investigated the new geography of urban centres food security strategies in United Kingdom. The argument advanced is that with many people moving to urban areas has necessitated the need to consider adopting urban farming. The study finds the need for the urban centres to identify food as a dimension that governments should pursue by coming up with urban food strategies that aims a definite territorial context and food culture. Further the urban government's authorities are encouraged to establish environmental, social and economic continuum between different interest groups, stakeholders and even policy makers. Hence the urban government's by-laws should be accommodative to farming activities in the areas of jurisdictions.

Kassie, Ndiritu and Stage, (2014) sought to determine the impact of gender inequality among the households on food security in Kenya. The study adopted multiple regression technique in testing statistical relationship between the variable of interest.

The study investigated the level of food security among the households headed by men and women from data collected in rural set-ups. The findings reveal that most of rural inhabitants are pastoralists and farmers and most of them are female headed households (FHH) and that there is similarity between the extent of food surplus and food security which reduces the chances of experiencing long term food insecurity in the region. In addition, FHHs are perceived to face frequent challenges of food insecurity as compared to MHHs.

Odingo (2014) sought to establish the ease of access of agricultural information by women farmers in Vihiga County, Kenya towards actualization of food security. In particular, the study sought to establish farming activities adopted by women farmers practicing small scale farming in the county; determine the means of obtaining necessary farming information and the farming approach they have incorporated with the aim of eradication food insecurity in the region. The findings from the study demonstrate that small scale farmers face challenges with regard to inaccessibility of modern farming technology due to high levels of illiteracy, inadequacy of extension officers, unavailability of appropriate information system, and absence of technical capabilities.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

In this chapter, the methodologies that facilitate the achievement of study objectives are discussed. The section discusses population of the study, sampling technique, research design, data collection process and analysis of data.

3.2 Research Design

A study design is a tactical plan intended to provide a go away mechanism used in collection, estimation and statistical analysis of data whose preference is reliant on the phase to which information about the topic of study has highly developed (Cooper and Schindler, 2003). For this study, the research will adopt a descriptive survey. This study design is considered relevant for in this research due to the fact that it enabled the researcher to come up with appropriate conclusion regarding the population in quest basing on the variables studied without manipulation of the respondent hence the measurement instruments was completely under control of the researcher.

3.3 Population of the study

The population of the study comprised of ten maize seed companies operating in Kenya. According to the Association of Seed Companies in Kenya, there were 10 maize seed companies in Kenya (Appendix I). Since the number of the seed companies is small, the study was a survey.

3.4 Data Collection

A questionnaire was the main research instrument that consisted of both open and close-ended questions. The close ended questions was used in the rating of various attributes and this helped in reducing the number of related response in order to obtain more varied

response. The open-ended questions provided additional information that may not have been captured in the close-ended questions. The questionnaire was administered through the “drop and pick” latter strategy and targeted the business development managers and strategy managers; and marketing managers of the Seed Companies. Mugenda, and Mugenda(2003) highlight that application of questionnaire saves time, easy to distribute and collect and also guarantees confidentiality. The respondents gave their response in a five point Likert scale.

The questionnaire was made up of three sections. Section A covered the respondents’ and organizational information while section B sought to determine the food security challenges. Section C aimed at determining the response strategies to food security challenges.

3.5 Data Analysis

Data analysis is a statistical approach of summarizing various variable measurements concerning the population of interest using statistical knowledge (Straub & Gefen 2005). Before the commencement of analysis procedures, the data collected was assessed to ensure completeness. The correctly filled questionnaires were coded for ease of identity. Analysis of data was achieved through the use Statistical Package for Social Sciences (SPSS Version 20.0). Descriptive statistics was computed include ratios, percentages and mean scores. These descriptive were presented by pie charts, bar graphs and tables for convenient interpretation.

The regression equation assumed the following form.

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \epsilon$$

Where:

- Y = Food Security
- B₀ = Constant
- β₁, β₂ = Regression Coefficients
- X₁ = Market Access ; X₂ = Support and Extension
- X₃ = Certified Maize Seed ; ε = Error Term

CHAPTER FOUR

DATA ANALYSIS, RESULTS AND DISCUSSION

4.1 Introduction

The objective this research was to establish the effect of response strategies adopted by major maize seed companies in addressing national food security challenges in Kenya. This chapter discusses the analysis, findings and the general discussion in conjunction with the objective of the study. In addition, analysis is presented in standard deviations and means whereas the study findings are given in tables and frequency distributions.

4.2 Response Rate

This study was facilitated by a sample size of 115 respondents. The relationship between variables was determined using statistical analysis. A total of 81 questionnaires were duly filled which is a representation of 70.4%. However, this response rate is regarded suitable to draw inferences and make conclusions on the study topic. In accordance with Mugenda and Mugenda (2003), a 50% of rate response is sufficient, 60% is regarded as good and whereas 70% is rated very well. In conjunction, Bailey (2000) ascertains that a response rate of 50% is deemed sufficient, whilst greater than 70% response rate is very good. With regard to the recommendations above, the response rate of 100% is very good.

4.3 Demographic profile

The target population for this study was the ten seed companies operating in Kenya. The respondents' demographic data deliberated in this study included the highest level of education, years worked in the company and the management level that the respondent is whereas organizations demographic include organizational ownership structure and the number of employees in the organization. In this section, demographic characteristics of the respondents are discussed. The length of service, experience level and ownership structure

provides an oversight on the extent at which a respondent is conversant with the company activities regarding strategies to eradicate the challenge of food insecurity in Kenya. In addition, results are presented in conjunction with objectives of the study.

Table 4.1: Background Information

Level of Education	Frequency	Percent
Secondary	21	25.9
Tertiary	20	24.7
Degree	37	45.7
Post-Graduate	3	3.7
Total	81	100

Length of Service		
Less than 5 years	17	21.0
5-10 years	33	40.7
11 – 15 years	21	25.9
Over 15 years	10	12.3
Total	81	100

Level of Management		
Lower level	40	49.4
Middle level	21	25.9
Top level	19	23.5
Others	1	1.2
Total	81	100

Total Number of Employees		
Less than 300	6	7.4

300-600	31	38.3
601-1000	41	50.6
Over 1000	3	3.7
Total	81	100
<hr/> Ownership Structure		
Privately owned	30	37.0
Government owned	42	51.9
Both government and privately owned	9	11.1
Total	81	100
<hr/> Role in strategy Implementation		
Yes	56	69.1
No	25	30.9
Total	81	100

From the results presented in Table 4.1, it is indicated that 25.9% of the respondents were secondary level, 24.7% were tertiary level, 45.7% university level and 3.7% were having post graduate certification as their highest academic level. In total therefore 49.4% of the respondents had attained university educational level. From the findings, it is however clear that majority of the employees from the seed companies mentioned are secondary level, which is the basic level of a quality workforce in which the companies have absorbed due to their eligibility and low salary demand.

In addition, the length of service variable sought to establish the number of years that the respondent has been working in the respective seed companies. From the findings, it is evident that 0-5 years is represented by 21.0%, 6-10 years is depicted by 40.7% while 6-10 years was 25.9% of the respondents and above 10 years was represented 12.3% which is the minority group. This implies that the seed companies are run by employees who have been

working for 6-10 years which is the majority group meaning that they are aware of the response strategies adopted by their companies in addressing national food security challenges in the country.

Similarly, the researcher sought to establish the management level that the respondent held in the companies. It is an important aspect to this study because information quality is dependent on the management level of an employee. As a result, the assumption has it that the higher the management level, the higher the quality of response. From the findings, the statistical results demonstrated that 49.4% of the respondents held a lower level of management while the respondents that held middle and top management levels were 25.9% and 23.5% respectively. In addition, among the respondents was a group of employees that fall under general staff duty which represented 1.2%, as depicted in Table 4.1.

In order to assess the number of employees in respective companies, the result in from table 4.1 indicates that 7.4% of the respondents opine that the company had a volume of less than 300 employees, 38.3% indicated that their company is run by between 301-600 employees while 50.6% depicted that their company is made up of between 601-1000 employees and 3.7% indicated that their firm had more than 1000 employees. However, it can be concluded from the findings that majority of the companies have high number of employees which is cumulatively over 300.

Similarly, the researcher sought to find out the role that the respondents play in the organizations' strategy implementation. The findings in Table 4.1 show that 69.1% actively participating in strategy implementation practices while 30.1%, the group that hold lower level management position indicated that they did not play any role in enhancing the Seed companies strategies in addressing food security challenges in Kenya. In respect to the ownership structure of the Seed companies, the results show that 37.0% of the respondents

mentioned that their company is privately owned, 51.9% indicated that the company is owned by the government while 11.1% indicated that their company is privately and government owned.

4.4 Food security Challenges

The researcher sought to find out the challenges facing food security in Kenya. The researcher opted to use the range between ‘Not at all (1) to ‘Very great extent’ (5). The tallies of disagreement have been assumed to be represented by a variable with the mean score of between 0 and 2.5 on the incessant Likert scale; ($0 \leq S.D < 2.4$). In addition, the researcher assumed that the ‘Neutral’ took the variable with a mean point of 2.5 to 3.4 on the incessant Likert scale: ($2.5 \leq M.E. < 3.4$) whereas the score of both strongly agree and agree represented the variables whose mean score were between 3.5 and 5.0 on a continuous Likert scale;

Table 4.2: Food Security Challenges

Statement	Mean	Std. Deviation
The crop yield of food crops in the country is low due to the seed quality	3.833	.965
The influence of climate change has affected the crop produce	3.811	1.064
Rainfall variation in the country has become unpredictable	3.624	1.026
The maturity of the crops has been long	3.435	1.006
Unavailability of fresh water for crops	3.429	.951
Crop seeds that is able to withstand changes in climatic conditions	3.312	1.310
Lack of markets for the crop output	3.145	1.211

Reduction in government support in terms of resources in the agricultural sector	2.512	1.108
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Overall Mean	3.384
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Source: Research Data (2018)

The results in Table 4.2 reveal that crop yield of food crops in the country is low due to the poor seed quality (M=3.833, SD=.965) and climatic condition which has influenced crop produce (M=3.811, SD= 1.064). Similarly, the respondents indicated that rainfall variation in the country has become unpredictable (M=3.624, SD= 1.026) which is also a threat in food security. In addition, the researcher established that there has been inadequate production of crop seeds that is able to withstand changes in climatic conditions (M=3.312, SD= 1.310) was unavailable citing it as a major setback towards achieving sustainable food security. Lack of markets for the crop output (M=3.14, SD= 1.211) deters farmers from engaging in cash crop production. Finally, the respondents indicated that reduction in government support in terms of resources in the agricultural sector (M= 2.51, SD= 1.108) is also a problem facing food security strategy implementation.

4.5 Response Strategies to Food Security Challenge

This section of the questionnaire sought to establish the various response strategies to food security challenge that the seed companies had initiated in improving the standard of food security in the nation. However, the researcher used the range between ‘Not at all (1) to ‘Very great extent’ (5). The tallies of disagreement have thusly been assumed to be represented by a variable with the mean score of between 0 and 2.5 on the incessant Likert scale; ($0 \leq S.D < 2.4$). in addition, the researcher assumed that the ‘Neutral’ took the variable with a mean point of 2.5 to 3.4 on the incessant Likert scale: ($2.5 \leq M.E. < 3.4$) whereas the score of both strongly agree and agree represented the variables whose mean score were between 3.5 and

5.0 on a continuous Likert scale; ($3.5 \leq S.A. < 5.0$). A standard deviation of > 1.0 indicates a significant change on the effect of the questionnaire item among respondents.

4.5.1 Marketing and Market Access

Farmers that produce surplus food crops need to access constant and reliable markets for their produce. The researcher investigated how effective marketing practices and constant market access helps in alleviating food security challenge. The finding is presented in Table 4.3.

Table 4.3: Market Access

Statement	Mean	Std. Deviation
Our firm helps farmers to gain access to the market for their produce	3.965	0.854
The company is concerned with the needs of farmers	3.784	0.987
My organization advices the government to match demand and supply of crop output to control price fluctuation	3.543	1.143
We liaise with foreign countries to source markets for the farmers output	3.142	0.753
My organization provides information to farmers on market demands	2.986	0.636
Overall Mean	3.484	

The findings reveal that the seed companies helps farmers to gain market access for their produce (Mean=3.965, SD= .854) by being concerned with the needs of farmers. Further, the findings show that that seed companies advices the government on how to match demand and supply of crop output to control market price fluctuation (Mean=3.543, SD=1.143) though the higher standard deviation reveal that the responses were varied. In addition, the study

found out that the seed companies liaise with foreign countries to source markets for the farmers output (Mean=3.142, SD=.753) while other seed companies indicate that their organization provides information to farmers on market demands and where they can access new markets (Mean=2.986, SD=0.636). This implies that in various seed companies in the county, market access approach have different perspectives. The low standard deviation in the responses indicates that there was concurrence among the respondents on the questions with regard to the knowledge management strategies in response to organizational competitiveness.

4.5.2 Support and Extension services

The researcher also aimed at determining what support and extension services the seed companies offer to the farmers in enhancing food security in Kenya. The combination of the government support and that of the seed companies is expected to enhance food production.

The results of the role of the seed companies support and extension services are presented in Table 4.4.

Table 4.4: Support and Extension services

Statement	Mean	Std. Deviation
My firm offers extension services to farmers	4.040	0.798
My organization supports research institutions in coming up with better quality seeds	3.821	0.915
We share knowledge on capacity building with farmers	3.400	1.110
We provide post-harvest training to farmers	3.345	0.631
We provide capacity building trainings to farmers	2.961	0.844
Overall Mean	3.513	

From the findings, the respondents opine that the company offers extension services to farmers (Mean= 4.040) and that the organization supports research institutions in coming up with better quality seeds (Mean =3.821, SD =.915), whereas some respondents indicated that they share knowledge on capacity building with farmers (Mean=3.400, SD=1.110). In addition, the study found out that the respondents indicated that the company provide post-harvest training to farmers (Mean=3.345) while others indicated that their organization provides capacity building trainings to farmers (Mean=2.961, SD=0.844). This therefore can be concluded that among the seed companies in the county, support and extension services have been implemented.

4.6 Adoption of Certified Maize Seed Technology

The other variable that the researcher identified which is in the control of the seed firms is the production of certified maize seed using modern seed technologies. To this regard, the finding is presented in Table 4.5.

Table 4.5: Adoption of Certified Maize Seed Technology

Statement	Mean	Std. Deviation
My firm has produced seeds that are drought resistant	3.994	0.886
Our seeds are adapted to meet regional climatic conditions better quality seeds	3.721	0.975
We stimulate the capacity of farmers to adapt new variety seeds	3.528	1.010
Relevant knowledge on available seed varieties is provided	3.354	0.753
The firm has adopted biotechnology in its seed varieties	2.996	0.893
Overall Mean	3.505	

The findings show that among the steps that the seed companies have undertaken towards the adoption of the certified seeds is the ability to produce seeds that are drought resistant (Mean=3.994, SD=.886) and the ability to seeds specifically adapted to meet regional climatic conditions better quality seeds (Mean=3.721, SD=.975). Similarly, the findings show that the seed companies are able to stimulate the capacity of farmers to adapt new variety seeds (Mean=3.528, SD=1.010). Therefore, the findings suggest that the seed company's capacity to produce certified seeds was the popular strategy employed by the firms in addressing the food security challenge in Kenya.

4.7 Correlation analysis

A Pearson correlation analysis was computed to designate the degree of relationship between the independent variables. With regard to Soenen and Shin (1998), the coefficients spearman's rank correlations are located on the upper right triangle whereas the coefficients of Pearson product moment correlation are on the lower left triangle. Analysis of Pearson's Correlation is applicable to determine the nature and degree of association between variables the results on the correlation between the variables were found by establishing the mean of each of the strategy and the resulting are presented in Table 4.6.

Table 4.6: Correlation analysis

		Market	Access	Support and extension	Maize-seed technology
Market access	Pearson Correlation	1		.879**	.984**
	Sig. (2-tailed)			.001	.000
Support and extension	Pearson Correlation	.895**	1		.765**
	Sig. (2-tailed)	.001			.001

Maize-seed technology	Pearson Correlation	.974**	.865**	1
	Sig. (2-tailed)	.000	.001	

From the finding in the Table 4.6, there exists a very strong positive correlation between market access and support and extension of $r=0.879$ and the relationship were found to be statistically significant (0.001) which is less than 0.05. Additionally, there was also a strong correlation between support and extension and certified maize seed technology of $r = 0.765$ and this association were significant (0.001) at the 5% significance level. In conclusion, the study findings established that all the independent variables had a strong positive correlation and significant association.

4.8 Regression Analysis

The relationship between food security and response strategies was established by use of multiple regression analysis. The researcher utilized statistical package for social sciences (SPSS V 21.0) to input and run the study measurements. Coefficient of determination evaluates the degree to which variations in the independent variables explain deviations in the dependent variable or the variation proportion in the dependent variable (organizational competitiveness) that is described by all the four explanatory variables (knowledge source, knowledge type, knowledge process and knowledge breadth).

4.8.1 Model Summary

Table 4.7: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.923 ^a	.815	.798	0.634

a. Predictors: (Constant), market access, support and extension services, certified maize seed technology

b. Dependent Variable: food security

Table 4.7 above, shows model summary of regressed study variables. The correlation coefficient (R) value represents the degree and strength of association between predictor variable and the outcome variable. Coefficient of correlation ranges between -1 and 1 and in this model therefore the coefficient of correlation is 0.923 which indicates a positive correlation between food security and response strategies. The R Squared is the coefficient of determination which indicates the extent of the total variation in the dependent variable. From the above the R squared statistic gives the goodness of fit of the model which shows how good the regression model approximates the real data points. The R squared of this model is 0.762 which implies that the model is a good fit of the actual data. The coefficient of determination of 0.815 implies that 81.5% of the variance in outcome variable (food security) is described by changes in the explanatory variable.

4.8.2 ANOVA

Table 4.8: ANOVA^b

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	56.875	3	15.247	54.634	.001 ^a
	Residual	14.454	78	.265		
	Total	71.329	81			

a. Predictors: (Constant), market access, support and extension services, certified maize seed technology

b. Dependent Variable: food security

The model summary also indicates that the dependent variable (food security) is significantly predicted by the regression model. The statistical importance of the model of regression analysis that was computed is shown by the F test. The $P=0.001$, which is less than 0.05 designates that, generally the regression model significantly and statistically predicts the dependent variable that is good fit for the data.

4.8.3 Coefficients of correlation

Table 4.9: Coefficients of correlation

Model		Unstandardized		Standardized	
		B	Std. Error	Beta	Sig.
1	(Constant)	.346	.242		.324
	Market access	.325	.164	.423	.413
	Support and extension	.462	.132	.074	.614
	Maize seed and tech	.047	.175	.134	.523

a. Dependent Variable: food security

The overall equation model for predictor and outcome variables will take the following format.

$$Y = 0.346 + 0.325 \beta_1 + 0.462 \beta_2 + 0.047 \beta_3.$$

This implies that from the model, at any given point, food security will be 0.207 units when all the predictor values are zero. The model demonstrates that when market access changes by one unit the food security will increase by .325. In addition, when support and extension changes by one unit, food security will increase by 0.462 units. Similarly, when certified maize seed changes by one unit food security increases by 0.047.

4.10 Discussion of the Findings

The study was to establish the impact of the response strategies adopted by major maize seed companies in addressing national food security challenges in Kenya. The study adopted three major response measures to come up with an instrument of collecting opinions from the ten

maize seed companies in Kenya. These responses are market access, support and extension services and certified maize seeds technology.

There is an extensive geographic disparity in production of livestock and crop, even transversely the areas that with equal climatic conditions (Tilman, & Maclight, 2011). Yield gap is referred to as the existing difference between recognized level of production and the best outcome that can be attained by incorporating present genetic material and accessible innovative approaches and management. The suitable outcomes that can be locally achieved rely on farmers' ability to gain access and usage, amongst other things, water, seeds, nutrients, soils, pest management, knowledge and biodiversity. It has been projected that in the Southeast parts of Asia where there is availability of irrigation, on maximum average climate-adjusted condition, the rice yields are 8.5 metric tons per hectare, hitherto the actual average yields registered is 60% of this amount (Ye, Shen, & Tan, 2010). On a similar occasion, yield gaps are situated in rain-fed cereals in Argentina and Brazil and rain fed wheat in central Asia and this has imposed establishment of irrigation schemes.

Access of agricultural market is an important subject in the current policy debate of WTO. According to the current suggestions of the G-331, the G-20, the USA and EU, the situations on market entry strongly differ and therefore the success of the potential Hong Kong negotiations is evidently put at risk. In accessing foreign market for example, the issue that has come for discussion in various WTO conferences is the magnitude of tariff cuts that is necessary to open up foreign markets and whether tariffs should be pegged at the maximum level. Further, Songwe (2012) highlight that for opening up of the markets, countries should encourage special differential treatment (SDT) of among developed and developing countries, such as in Africa. Further, governments should aim at reducing non-tariff rate barriers by forming economic blocs, a goal set by the WTO. Jean et al. (2005), nevertheless,

established that merely large tariff reductions may cause a major effect on market accessibility. They acknowledged the disparity between applied and bound rates of tariff as the major motive for this outcome.

The major motive behind solving persistent problems in agricultural sector, suitable agricultural techniques should be incorporated in farming system which can be facilitated by both agricultural extension officers and researchers. Consequently, agricultural extension services are regarded as essential for the advancement of agricultural productivity, predominantly for cultural and food security (Tan, Ochoa, Langston & Shen, 2015). Agricultural extension services consist of various approaches including agricultural extension officials visiting the field, meetings, training, demonstration methods and agricultural exhibitions, agricultural visits, demonstration of results, VCD media, radio programs, TV programs, internet and printed material (Tansey, Meng & Cleland, 2013).

It was also established that farmers are faced with many challenges ranging from economic, social and climatic. Some of climatic changes facing agricultural production was established involve climate change, unpredictable rainfall due to fluctuations of rainy seasons and also lack of fresh water for plants. Other challenges include poor seed quality and prolonged maturity period for plants.

However, maize seed companies have been seen to come up with strategies that will boost food security. These strategies include offering extension and training services to the farmers, provision of quality seeds, and establishing market for agricultural activities.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

The chapter entails study conclusions, limitations, recommendations and suggestions for further research.

5.2 Summary

This study investigated the impact of the response strategies adopted by major maize seed companies in addressing national food security challenges in Kenya. Different maize seed companies have come up with various response strategies with respect to food security in Kenya to ensure that sustainable food quantity level is achieved through encouragement of farmers to adopt modern agricultural techniques in production in order to increase the volume of production. However, the response strategies implemented in respect to food security have taken a centre stage in most seed companies with the aim of increasing crop production for consumption and commercial that will enhance food security in the country. Therefore, seed companies should establish appropriate policies and mechanism to enhance implementation of suitable response strategies. Consequently, the government should play a vital role in facilitating establishment of suitable policies to distinguish the significance of eradicating poverty through agriculture and identify the true landscape of food production among farmers in all the spheres of the country, and considerably increase the level of independence and reduce government spending through food reliefs.

With regard to the findings of this study and theoretical finding of distinct researchers, it is therefore in conjunction that maize seed companies should endeavour to implement entirely the response strategies in enhancing crop production.

Additionally, it should exploit availability of resources from external funding such as the WFP and the World Bank in facilitating agricultural performance of the farmers since the study found that one of the effective response strategies is through support and extension services, the strategy that sharpens the skills of farmers and help discover new agricultural ideas. Therefore, the role of effective extension service is a key aspect in enhancing agricultural production. The study findings reveals that the seed companies plays a significant role in determining the achievement of sustainable food security in the. This means that these companies are the overall supervisor of agricultural production through offering extension service to farmers and therefore they can help implement these response strategies since the study findings depicted that employees were willing to take part in the process of response strategy implementation.

Furthermore, the study found market access, support and extension services and certified maize seed technology play significant role averagely in enhancing food security. Additionally, maize seed companies should create measures and implement strategic management principles that will facilitate response strategies through effective implementation of response strategies. As a result, the study suggests that the companies should focus in current market and customer demand in order to improve problem solving processes and enhance service delivery. A proper response strategy should be adopted for instance extension services necessarily to equip farmers with appropriate agricultural technology.

5.3 Conclusion

The high population in Kenya has put pressure on the existing resources including suitable land for agricultural output with the result being a high demand for residential space at the expense of agricultural activity. In addition, the high population has had negative effect on

deforestation of the catchment areas which has led to disruption of the rainfall patterns in the maize producing areas, resulting in a lack of water to the populace as people depend on firewood and charcoal for cooking and heating. As a result water catchment areas are now destroyed and lack of water is such a great challenge contributing to food insecurity in the county. There is also the issue of soil erosion that renders the soils deficient of the required plant nutrients and lowers agricultural productivity. Over reliance on maize and beans has made it impossible to achieve food security since these crops are less drought resistant. Dependence on rain fed agriculture is perhaps the main cause of food insecurity since climatic conditions have changed and rain patterns are not predictable and reliable.

The strategic responses adopted to overcome these challenges include harvesting of rain water by constructing sand dams, exploiting other ways of expanding agricultural activity through irrigation, reversing the rapid population growth rate through provision of family planning education to people, diversification of crops to ensure that farmers plant crops that are more drought resistant, livestock diseases surveillance and vaccination as well as livestock improvement. Other strategic responses also include value addition of food crops, employment of extension officers, and development of drought and disease resistant crops. Further, the county government as well as the national government should come up with proper marketing, construction of storage facilities to assist in grain storage during a bumper harvest.

5.4 Recommendation Policy Implications

Having considered of all the aspects of food security, the recommendation of the researcher is that the maize seed companies in Kenya should enforce effectively the principles and policies that spearheads the response strategies particularly training farmers on the new agricultural techniques and creating active response strategies to food security that contributes towards

sustainable agricultural production. Alongside this approach, the researcher further opine that suitable agricultural market access approach and implementation of suitable response approach for instance certified maize seed provision should be implemented

The study also established that there is overreliance on rain fed agriculture as well as on maize crops that are less drought resistant. There is need to introduce modern agricultural practices such as use of green houses and diversification into other crops that are more drought resistant.

5.4 Limitations of the study

This study was limited by the area of coverage; scope of the study, which the researcher termed as the weakening factor. This therefore implies that the study outcome cannot take the general assumption. In addition, the adopted a descriptive study design which calls for implementation of distinctive inferential approaches to further validate the findings. Furthermore, this study was limited by integrity concerns from the employees since it is perceived that employees will always protect the image of his/her employer thereby giving a biased response. For enhanced consistency and competency of the study items, it could have been more precisely if the respondents would have been more to give opinions that may be used to characterize the entire population of study with much precision. Though, notwithstanding the mentioned restrictions, the study findings demonstrated in this research have significant contribution and impact on policy implementation.

It was also evident that in some occasions the farmers experience challenges in getting good returns from their agricultural produce due to lack of market information and storage facilities. There is need to invest in the construction of storage facilities and value addition factories that will assist the farmers to get better returns from their produce

5.5 Suggestion for Further Research

This study has established that there are a variety of strategic responses being adopted by maize seed companies and some are yet to be implemented. It will be important to replicate this study after ten years to allow for implementation of the proposed strategies comprehensively. This will assist to establish the level of success achieved in implementing some of these strategic responses. It will be necessary to carry out a comparative study with other regions or countries that have been successful in overcoming food insecurity. This will assist in gaining more understanding on the strategic responses they adopted.

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APPENDIX I: QUESTIONNAIRE

This questionnaire is designed to gather information on the response strategies adopted by major maize seed companies in addressing national food security challenges in Kenya and is purely for academic purposes only. Kindly provide information to all items in the questionnaire by putting a tick (✓) on one of the options. For questions that require your own opinion, fill in the blanks. (.....)

Section A: Background Information

1. Name of the organization (Optional).....
2. What is your highest level of education qualification?
 - a) Secondary ()
 - b) Tertiary College ()
 - c) Post Graduate ()
 - d) Secondary ()
3. For how long have you worked with the organization?
 - a) Less than five years ()
 - b) 5-10 years ()
 - c) 10 – 15 years ()
 - d) Over 15 years ()
4. At what level of management are you?
 - a) Lower Level ()
 - b) Middle level ()
 - c) Top Level ()
 - d) Others (Specify) ()
5. How many employees are there in your organization?
 - a) Less than 300 ()
 - b) 300 – 600 ()
 - c) 600 - 1000 ()
 - d) Over 1000 employees ()
6. Ownership structure of the organization?
 - a) Privately owned ()
 - b) Government Owned ()
 - c)Both Government and privately owned ()
7. Do you play a role in developing organizations strategy?
 - a)Yes ()
 - b) No ()

SECTION B: Food Security Challenges

8. Below are challenges the food security condition that your company aims in reducing in the country. Please indicate the extent to which the following challenges have affected the strategies your company has developed. Key:

5 - Very great extent 4 - Great extent 3 - Moderate extent 2 - Little extent
1 - No extent

	Statement	1	2	3	4	5
1	The crop yield of food crops in the country is low due to the seed quality					
2	The influence of climate change has affected the crop produce					
3	Rainfall variation in the country has become unpredictable					
4	The maturity of the crops has been long					
5	Unavailability of fresh water for crops					
6	Crop seeds that is able to withstand changes in climatic conditions					
7	Lack of markets for the crop output					
8	Reduction in government support in terms of resources in the agricultural sector					

SECTION C: Response Strategies to Food Security Challenge

9. Below are response strategies to the food security challenge. Please indicate the extent to which the following challenges. Key:

5 - Very great extent 4 - Great extent 3 - Moderate extent 2 - Little extent
1 - No extent

a) Market Access

	Statement	1	2	3	4	5
1	Our firm helps farmers to gain access to the market for their produce					
2	My organization advices the government to match demand and supply of crop output to control price fluctuation					
3	We liaise with foreign countries to source markets for the farmers output					
4	My organization provides information to farmers on market demands					
5	Our firm listens has established a multilateral trading system to help cushion farmers					

What other market access strategy does your company avail for market access

.....

b)Support and Extension services

	Statement	1	2	3	4	5
1	My firm offers extension services to farmers					
2	My organization supports research institutions in coming up with better quality seeds					
3	We share knowledge on capacity building with farmers					
4	We provide post harvest training to farmers					
5	We provide capacity building trainings to farmers					

What other support and extension services strategy does your firm employ

.....

c. Adoption of certified maize Seed Technology

1	My firm has produced seeds that are drought resistant					
2	Our seeds are adapted to meet regional climatic conditions					
3	We stimulate the capacity of farmers to adapt new variety seeds					
4	Relevant knowledge on available seed varieties is provided					
5	The firm has adopted biotechnology in its seed varieties					

What other seed certification strategy does your firm employ

.....

THANK YOU SO MUCH FOR YOUR TIME

APPENDIX II: LIST OF REGISTERED MAIZE SEED COMPANIES IN KENYA

No.	Name of the Company
1.	Kenya Seed Co.Ltd
2.	East African Seed Co.Ltd
3.	Western Seed & Grain Co.Ltd
4.	Pannar Seed Co. Ltd
5.	East African Growers Ltd
6.	Amiran (K) Ltd
7.	Kenya Highland Seed Co.
8.	Safari Seeds Limited
9.	Dryland Seeds Ltd
10.	Elgon Kenya Limited