

UNIVERSITY OF CAPE COAST

ASSESSING READINESS OF INDIGENOUS VEGETABLE WOMEN
FARMERS IN KAKAMEGA COUNTY TO SATISFY QUALITY
STANDARDS OF HIGH VALUE MARKETS IN KENYA

ANNAH INDECHE

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STANDARDS OF HIGH VALUE MARKETS IN KENYA

BY

ANNAH INDECHE

Thesis submitted to the Department of Agricultural Economics and Extension, of the College of Agriculture and Natural Sciences, University of Cape Coast in partial fulfillment of the requirements for award of Master of Philosophy Degree in Agricultural Extension.

MAY 2015

DECLARATION

Candidate's Declaration

I hereby declare that this thesis is the result of my own original work and that no part of it has been presented for another degree in this university or elsewhere.

Candidate's Signature:.....Date:.....

Name: Annah Indeche

Supervisors' Declaration

We hereby declare that the preparation and presentation of the thesis were supervised in accordance with the guidelines on supervision of thesis laid down by the University of Cape Coast.

Principal Supervisor's Signature:.....Date:.....

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Name: Prof. Festus Annor-Frempong

ABSTRACT

African indigenous vegetable (AIV) farmers have limited information in the areas for training and readiness to access and produce vegetables to satisfy the growing demands by retailers in Kenya. The study assessed the readiness of women AIV farmers in Kakamega County to satisfy quality standards for high value markets (HVMs). Descriptive survey design, multistage sampling technique and interview schedule were used to collect data from 276 farmers. Observations and discussions with key informants were used to collect primary data. Statistics such as frequencies, percentages, means, standard deviation and appropriate correlation coefficients were used to describe and/or identify the relationships among respondents.

Results of the study revealed that farmers had low knowledge on quality standards, especially the transaction attributes. The public extension was the main source of information but the perception of farmers on status of resources was low. The male headed households allocated less land for vegetables compared to females. Farmers were willing to a large extent to satisfy quality standards but had low competencies. Farmers' readiness to satisfy standards of HVM depends on knowledge, perception of resources, educational attainment, infrastructure, finance from credit institutions, contact with extension officers, number of years of marketing vegetables and membership to an organization. The study recommends among others that the Ministry of Agriculture train farmers on AIV production and marketing and develop trade policy to ensure that retailers purchase vegetables from certified local farmers.

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To God be all the glory.

DEDICATION

To my husband; Mr. Simon Alusiola Litembekho and children; William Maxwell
Wayra, Jewel Crystal Baraka and Joy Esther Pendo and the entire Indeche Family

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LIST OF ABBREVIATIONS

AIV	African Indigenous Vegetables
CGK	County Government of Kakamega
DFID	Department for International Development (UK)
FAO	Food and Agriculture Organization of the United Nations
HCDA	Horticultural Crops Development Authority
HVM	High Value Market
IFAD	International Fund for Agricultural Development
IFPRI	International Food Policy Research Institute
IIED	International Institute of Environment and Development
ISO	International Standards Organization
KEPHIS	Kenya Plant Health Inspectorate Services
KNBS	Kenya National Bureau of Statistics
MEMR	Ministry of Environment and Mineral Resources
NRI	Natural Resources Institute
QSMD	Quality Standards and Market Demands
ROK	Republic of Kenya
SSA	Sub Saharan Africa

UNDP	United Nations Development Programme
USAID	United States Agency for International Development
WEF	World Economic Forum

CHAPTER ONE

INTRODUCTION

Background to the Study

Agriculture is the mainstay of the Kenyan economy directly contributing 26 percent to the gross domestic product (GDP) annually, and another 25 per cent indirectly. The sector accounts for 65 percent of Kenya's total exports and provides more than 70 percent of informal employment in the rural areas. The agricultural sector is also a driver of Kenya's economy and the means of livelihood for the majority of the people (Republic of Kenya [ROK], 2012). The agricultural sector in Kenya is made up of five major sub-sectors namely: industrial crops, food crops, horticulture, livestock and fisheries sub-sectors (ROK, 2012). Horticulture is a promising sub-sector of Kenya because of the country's favorable environment. According to data from the Horticultural Crops Development Authority [HCDA] in Kenya, the sector has achieved an average annual growth rate of 20 percent since the 2000s (Aikawa, 2013).

The horticultural sub-sector has been the focus of most government policies, such as the Economic Recovery Strategy (ERS), the Strategy for Revitalization of Agriculture (SRA), the Agricultural Sector Development Strategy 2010-2020 (ASDS), and the Kenya Vision 2030: First Medium-Term Plan (2008-2012) (HCDA, 2013). The policies in the sector aim to strengthen competitiveness of

agricultural products and business improve productivity and promote commercialization and promote “Farming as Business” (ROK, 2009).

Despite the many policies aimed at boosting the horticultural sector in Kenya, it is beset with many challenges. Firstly, large-scale growers dominate commercial horticulture, yet the majority of horticultural growers (i.e about 80%) are small-scale farmers. The sustainability of the horticulture subsector depends on these small-scale farmers (HCDA, 2013). Secondly, the perceived high cost and difficulty in implementing quality standards and product safety for on-farm production of fresh produce pose as a major challenge, since the market continues to demand produce that meet customer satisfaction (HCDA, 2013).

The quality standards and product safety requirements for the domestic and export markets has brought about the need for Kenya to progressively implement traceability measures. KenyaGAP and KFC Silver Standards with effective certification procedures are examples of such measures. Furthermore, the segmented markets had added value to products with some farms specializing in organic farming (HCDA, 2013). Vegetables contribute a significant portion of the horticultural sector in terms of production and value. For example, 48 percent of the total value of horticultural produce was from vegetables (HCDA, 2013) whilst 95 percent of total horticultural produce was consumed locally.

Vegetables grown in Kenya fall into two broad categories: The ‘exotic’ and ‘African Indigenous Vegetables’ (AIVs). The export market considers mainly the exotic ones while the domestic market considers the exotic as well as the indigenous vegetables. Many studies have shown that AIVs contain high levels of nutrients

than commonly grown exotic species like swisschard (*Spinacia oleraceae*), kale (*Brassica oleraceae* var. *acephala*) and cabbage (*Brassica oleraceae* var. *oleraceae*) (Abukutsa-Onyango, 2003; Maundu, Ngugi, & Kabuye, 1999). Some research has also shown that amaranth (*Amaranthus* spp.) leaves for example, are rich in proteins, carbohydrates, vitamins and minerals. African nightshade (*Solanum* spp.) and spider plant (*Cleome gynandra*) are rich sources of vitamins and minerals and have medicinal properties (Weller, Omamo & Ojiewo, 2010). Recipes have also been developed that are high in iron and vitamin C and the amounts are adequate to supply consumers with the recommended daily allowances especially for iron (Habwe, Walingo, & Abukutsa-Onyango, 2009). The urban consumers appreciate indigenous vegetables as rich sources of important nutrients, while farmers recognize them as valuable commercial crops due to awareness created on importance of AIVs.

Traditionally, indigenous vegetables are grown in homestead gardens for subsistence and rarely traded. However, this has changed over the past decade and indigenous vegetables are now contributing substantially to household incomes (Pasquini & Young, 2007). This growing demand for AIVs among Kenyans is an opportunity for rural women to produce for specific markets and earn income which can improve farmers' livelihoods (HCDA, 2013). Increased demand has been noted, especially in major urban centres in Kenya, in formal and informal markets (Irungu, Mburu, Maundu, Grum, & Hoeschle-Zeledon, 2007; Muhanji, Roothaert, Webo, & Stanley, 2011; Ngugi, Gitau & Nyoro, 2006). Priority indigenous

vegetables grown by farmers in Kakamega County located in Western Kenya are shown in Table 1.

The local market for AIVs is diversified, ranging from rural markets to retail markets and supermarkets to restaurants and hotels. Nearly all the main chain supermarkets in Kenya (Uchumi, Nakumatt, Tuskys, Ukwala & Naivas) are stocking the AIVs (HCDA, 2010). The supermarkets who buy from wholesalers require the vegetables in certain large volumes and cultivated according to certain quality and safety standards (Irungu, et al., 2007).

Table 1: Priority African Indigenous Vegetables with Nutrition and Economic Potential Grown in Kakamega County

Local name (Luhyia)	English	Botanical name
Lidodo	Amaranth	<i>Amaranthu hybridus</i>
Likhubi	Cowpeas	<i>Vigna unguiculata</i>
Lisebebe	Pumpkin leaves	<i>Cucurbita</i> sp.
Lisutsa	Black nightshade	<i>Solanum nigrum</i>
Miro	Sunnhemp	<i>Crotolaria brevidens</i>
Murere	Jute plant	<i>Cochorus olitorius</i>
Tsisaka	Spider flower	<i>Gynandropsis gynandra</i>
Tsimboka	Pig weed	<i>Amaranthus blitum.</i>

Source: Abukutsa-Onyango (2007)

Statement of the Problem

In Kenya, the production, processing and marketing of indigenous vegetables are done mainly by women. Women are said to dominate in most of the AIV activities (Gotor & Irungu, 2010). The observations made by Gotor and Irungu (2010) on women and vegetable cultivation confirmed the assertions of Nekesa and Meso (1995) who concluded that anyone interested in rural women's welfare in Kakamega should consider AIVs production, processing and marketing as important entry points.

However, a study by Wawire and Nafukho (2010) revealed that although vegetable farming is the main horticultural activity among women in Kakamega, three quarters of the small horticultural enterprises by women in the area had a low sustainability index. The three main indicators of sustainability used showed that women lack continued delivery of services/benefits; maintenance of physical infrastructure; and long-term institutional capacity and support from key stakeholders. According to Ngugi, et al. (2006), most farmers lack inputs and skills to produce to satisfy the dynamic market requirements. Furthermore farmers are not able to access the high value markets such as supermarkets and are often exploited by middlemen.

In the Western Region of Kenya, where Kakamega County is located, AIVs are mostly grown for subsistence purposes and are considered as a “women’s” crop (Gotor & Irungu, 2010; Oniang’o, Grum & Obel-Lawson, 2008) without much economic importance. On the contrary, in Central Kenya, AIVs are grown mainly for commercial purposes and have been found to improve household wellbeing

(Gotor & Irungu, 2010; Mwaura, Muluvi & Mathenge, 2014; Ngugi, et al., 2006). The huge potential of AIVs transforming farmers' livelihoods in Kakamega as it has done for the AIV farmers in Central Kenya has not been fully exploited. According to KNBS (2009), 57 percent of the people in Kakamega County live below the poverty line.

Consumers are becoming more sensitive to sanitary and phytosanitary aspects of fresh produce (Ngigi, Okello, Lagerkvist, Karanja, & Mburu, 2011). This is exerting pressure on existing high value markets for AIVs to impose stringent conditions on quality of the produce purchased from farmers. For example, the retail outlets demand specific standards for leaf size and appearance. Further, checks to ensure that the zero tolerance residue level of chemicals allowed in the vegetables is not exceeded are done. The retailers also demand consistency in supply and prefer to deal with groups rather than individual farmers so as to cut on transaction costs (Ngugi et al., 2006).

The growing demands of the retailers have given rise to the need to train AIV farmers to produce vegetables to satisfy the demanded specifications and access the high value markets. However, no study has examined the preparedness of women AIV farmers in Kakamega in terms of the knowledge, skills and resources to meet these market demands empirically. The question is, are women AIV farmers willing to meet these quality standards in the first place? If so, do they have the ability to meet these standards? What factors are associated with the readiness to meet quality standards? Are there constraints that could be hindering the women AIV farmers to access HVMs? Hence the purpose of the study.

General Objective

The main objective of the study was to assess the readiness of African Indigenous Vegetable (AIV) women farmers in Kakamega County, to satisfy quality standards of High Value Markets (HVM) in Kenya.

Specific Objectives

The specific objectives of the study were to:

1. Determine the level of knowledge on quality standards and market demands set by HVMS among women AIV farmers in Kakamega County;
2. Examine the perception of women AIV farmers in Kakamega County on resources required to meet quality standards and HVM demands;
3. Explore the challenges hindering women farmers in Kakamega County to meet quality standards and demands of HVMS;
4. Determine the extent of willingness of women AIV farmers in Kakamega County to meet quality standards and demands of HVMS;
5. Establish the perceived competence level of women AIV farmers in Kakamega to comply with quality standards and demands of HVMS; and
6. Determine the factors associated with readiness to meet quality standards and market demands set by HVMS among women AIV farmers in Kakamega County

Hypotheses

The following hypotheses were set a priori and tested at 5% Alpha level

1. There is no significant difference in the level of knowledge of AIV farmers on quality standards and market demands of HVMs in the three Sub Counties of Kakamega County;
2. Perception of farmers on accessibility of credit does not depend on their crop zone, marital status, educational level, age and experience in marketing indigenous vegetables;
3. There is no relationship between income of farmers from sale of vegetables and the type of market accessed;
4. There is no relationship between farmer socio- economic characteristics (age, education, marital status, experience, membership to an association) and Readiness to satisfy quality standards of high value market; and
5. There is no relationship between farmers' social system environment (infrastructure, natural environment, institutions, culture) and Readiness to satisfy quality standards of high value market

Justification of the Study

This study addressed some of the key questions that must be answered if the training needs of women AIV farmers in meeting quality standards of High value markets are to be understood in Kakamega County. Accessing markets has been identified as a major challenge that the agriculture sector continues to face despite its central role in the Kenyan economy alongside other challenges such as productivity, land use and value addition (ROK, 2010).

According to IFAD (2011) empowering women economically and socially creates the potential force to bring about change leading to rural development. Information on the readiness of women AIV farmers in Kakamega in terms of the resources, knowledge, willingness, ability to comply with quality standards is important if the women have to be assisted in accessing high value markets. Such information is important to guide training content development for the farmers interested in accessing HVM. No formal assessment to this effect had been done for female AIV farmers in Kakamega leading to little information available for planning any interventions by extension service providers in the County. The results of this study revealed some of the factors that influence access to HVM for AIVs and hence improve rural women AIV farmers' livelihoods. In view of the above, the results of this research will inform:

- a. Policy Makers: - Firstly, to come up with appropriate policies to enable extension to focus training on preparing women AIV farmers to meet quality standards and access HVMs. Secondly, to provide opportunities for the local farmers to access HVMs within the County; and

- b. Extension Service Providers: - To mitigate the obstacles women vegetable farmers face by tailoring trainings towards their needs in accessing high value markets.

Delimitation

There are very many AIVs grown and utilized by people in Kenya. However this study focused only on nine (9) species namely: Amaranth (*Amaranthus hybridus*), Cowpeas (*Vigna unguiculata*), Pumpkin leaves (*Cucurbita* sp), Black nightshade (*Solanum nigrum*), Sunnhemp (*Crotalaria brevidens*), Jute plant (*Cochorus olitorius*), Spider flower (*Gynandropsis gynandra*), Pig weed (*Amaranthus blitum*) African spinach (*Basella alba*). These are species common in the markets (Abukutsa-Onyango, 2007).

Limitation

Kakamega County is geographically expansive consisting of 12 Sub Counties and AIVs are grown in all of them (County Government of Kakamega, 2014). Inadequate financial resources and time constraints reduced the chances of contacting respondents from all the Sub Counties.

Definition of Terms

Access: The right to gain entry to something. It is the capability of a farmer to gain entry to a high value market, through selling AIVs to the market because specified quality standards have been met.

African Indigenous vegetables: This refers to vegetable species, varieties or any taxa known to be native to or to have originated in a specified geographical location – in this case, Africa.

Competence: The ability to do something well (Merriam-Webster online Dictionary, 2014). In this study it is the ability of the farmer to comply with quality standards.

High Value Market: This is a place where high value products are traded. A high value product is something that is worth more to customers than generic or commodity products and returns a higher profit to the farmer than commodity crops. Specialty crops and value-added products can be high value products, if the farmer is able to differentiate the product, earning a higher price and generating more profit (IFPRI, 2013). In this study the high value product is African indigenous vegetables that meet the specifications of the high value market- supermarkets and high end specialty markets.

Knowledge: This is awareness or possession of information, facts, ideas, truths or principles. Specifically, its possession of information about quality standards and demands of HVMs.

Quality standards: In the ISO 9000 standard (International Standards Organization), quality is defined as the totality of features and characteristics of a product or service that bear on its ability to satisfy stated or implied needs (ISO, 1987) in this study, the high value market. Quality factors are classified as quantitative (ingredients, weight); hidden (nutritive, toxic substances); and sensory (appearance, kinaesthetic, flavor).

Readiness: According to the Merriam Webster's Online Dictionary (2014), readiness is defined as being "prepared mentally or physically for some experience or action". In this study readiness refers to women farmers rated willingness to produce African indigenous vegetables, process and transact business with high value markets and the farmers perceived level of ability to comply with the quality standards and demands of that market.

Willingness: The eagerness of AIV women to cooperate voluntarily with HVMS by meeting the quality standards expected.

Organization of the Study

The study is structured into five chapters namely: Introduction; literature review; methodology of the study; results and discussion; summary, conclusions and recommendations.

The chapter one focussed on the background to the study, statement of the problem, objectives of the study, research questions, research hypotheses, justification of the study, delimitations, limitation of the study and definition of key terms and organisation of the study.

Chapter two on literature review section examined the existing theoretical and empirical studies that provide the background and have basis for the study. A summary of the literature review is provided. The chapter ended with the conceptual framework of the study.

Chapter three was devoted to the methodology of the study. It provided explanation on the research design, description of the study area, population, sampling procedure, sample size, instrumentation and collection and analysis of data procedures. The chapter ends with the analytical framework of the study.

The results and discussion are presented in chapter four. I have used Tables and Figures to convey most of the results from data analysis and discussed them in this chapter.

Lastly, in chapter five, a summary of the results has been presented. Conclusions and recommendations made from the study have also been presented and a suggestion for further research has been stated.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

Introduction

The literature review section has examined the existing theoretical and empirical studies that provide the background and have necessary basis for the study. This chapter has attempted to review relevant works on women and agriculture. Two theories informed the study; the theory of psychological field and the systems theory. Further, this section attempts to review literature on quality standards, concepts of knowledge, willingness and ability. It has provided a review of literature on the contribution of women in agricultural production. Literature on African Indigenous vegetables has also been reviewed. Gender differences in accessing resources that are critical for enabling rural women in producing and marketing of quality produce that can meet high value market standards have been highlighted. Empirical evidence of farm and farmer characteristics that are associated with adoption of agricultural innovations has been presented. The socio economic characteristics that influence access to key resources have been discussed. The key resources discussed include: extension services, land, water, labour, markets, transport and information. Finally a summary and conceptual framework has been provided.

Theoretical Perspective of the Study

Theory of Psychological Field

The theory was developed by Kurt Lewin in the 1940s. It examines patterns of interaction between the individual and the total field, or environment. Lewin's field theory can be expressed by a formula: $B = f(p,e)$. Behaviour (B), being the function between the person (p) and their environment (e) (Burnes & Cooke, 2013). The theory emphasizes interpersonal conflict, individual personalities and situational variables and proposed that behavior is the result of the individual and their environment (Lewin, 1939). In viewing a person's social environment and its impact on their dynamic field, Lewin also found that a person's psychological state influences their social field (Martin, 2003). From both mathematics and physics, Lewin took the concept of the field, the focus of one's experiences, needs, and topography to map spatial relationships. Lewin further created a field theory rule that says analysis can only start with the situation represented as a whole, so in order for change to take place; the entire situation must be taken into account.

Main Principle of the theory

The theory lies on the principle of the life space. Components of the life space are the environment, the person and the behaviour.

The Life Space

Life space is the combination of all the factors that influences a person's behavior at any time. An individual's behavior, at any time, is manifested only within the coexisting factors of the current "life space" or "psychological field".

Behavior can be expressed as a function of the life space $B=f(LS)$. Furthermore, the interaction of the person (P), and the environment (E) produces this life space. In symbolic expression, $B=f(LS)= f(P, E)$ (Burnes & Cooke, 2013). An example of a more complex life-space concept is the idea that two people's experience of a situation can become one when they converse together. This does not happen if the two people do not interact with each other, such as being in the same room but not talking to each other. This combined space can be "built" up as the two people share more ideas and create a more complex life-space together (Parlet, 1991).

Environment

The environment as demonstrated in the life space refers to the objective situation in which the person perceives and acts. The life space environment (E) is completely subjective within each context as it depends not only on the objective situation, but also on the characteristics of the person (P) (Deutch, 1954). It is necessary to consider all aspects of a person's conscious and unconscious environment in order to map out the person's life space (Burnes & Cooke, 2013). Further, the combined state, influenced by the environment as well as the person's perspective, conscious, and unconscious, must be viewed as a whole. While each part can be viewed as a separate entity, to observe the totality of the situation one must take all inputs into consideration.

Person

According to Deutsch (1954), Lewin applied the term *person* in three different ways.

1. Properties/characteristics of the individual (needs, beliefs, values, abilities);
2. A way of representing essentially the same psychological facts of “life space” itself; and
3. The behaving self who may be seen as the individual’s perception in relations to the environment perceived.

Behaviour

This is any change within the life space subject to psychological laws. Accordingly, an action of the person (P) and a change in the environment (E) resulting from said action can be considered *behaviour* (B) (Deutsch, 1954). These behaviours can make large or small influences on the totality of the life space and the state of any part of the field depends on every other part of it. Experimental psychology studies have shown that the formation of aspiration, the driving factor of actions and expressions (behavior), is directly influenced by the presence or absence of certain individuals within one’s life space (Lewin, 1939).

Field theory also includes the idea that every person holds a different experience for a situation. This is not to say that two people’s experience of an event will not be similar, but that there will be some difference. This leads to the idea that no two experiences are the same for a person either, as the dynamic field is constantly changing (Parlet, 1991). Another piece of field theory is the idea that

no part of a person's field can be viewed as being pointless. Every part of a total field must be viewed as having possible meaning and importance. Regardless of how pointless or non-important the part of the field may seem, it should still be accounted for (Parlet, 1991).

Application of the theory of psychological field to the study

The theory describes the interaction of situational forces with the perceived environment as a field of forces, a system in tension or a psychological field. The forces are present in a state of equilibrium or disequilibrium with varying degrees of tension between them. Inhibiting forces comprise forces that negatively influence behavioural change and driving forces are those forces conducive towards a positive target. A woman AIV farmer in her subjectively perceived environment feels something is worth striving for (a target i.e. access high value markets). She then mobilizes her personal powers to achieve this goal by satisfying quality standards of the HVM.

In the context of this study, the inhibiting forces to behaviour change (state of readiness in the farmer to produce AIVs for HVMs) can be seen as the constraints a farmer perceives to hinder her from producing AIVs for HVMs, such as low soil fertility, limited liquidity (for labour hiring, buying fertilizers, pesticides, seeds of African Indigenous vegetables), lack of irrigation equipment and technologies, cultural values ingrained in the farmer and limited knowledge among others. In other words, these are the threats from the environment and weaknesses within the farmer that could hinder achievement of the goal.

Driving forces may include the strengths and opportunities that may influence women AIV farmers to access HVM. Strengths of the farmer include her personal and farm characteristics e.g. marital status, educational level, age, household size and size of land holding under vegetables. Opportunities are factors within the environment such as a favourable social system environment. Environment may comprise of a favourable natural environment, accessibility to financial assistance (credit), technical advice (from extension), training and linkage with market outlets (by development agents), support policies and trade laws. Once such forces (factors) are identified and found to be key in the farmers decision making process, it is possible that the chances of how the farmers can behave can be estimated and this can direct how training programs can be effected among the farmers by extension service providers.

Systems Theory

A system is defined by von Bertalanffy (1968) as a set of elements standing in interrelation among themselves and with environment. This includes any grouping with any sort of relationship for example a collection of people, in this study women involved in growing African indigenous vegetables in Kakamega County. There can be smaller systems (sub-systems) within other, larger systems for example a village in Kakamega. The subsystem is made up of elements such as households (Figure 1). The activities inside that house would be seen as taking place within a system (the family group involved in that household), which in turn exists within the larger system of the village itself. The village can also be seen as

a sub-system, one of a number of communities which together comprise an even greater system, the county in which they all are located.

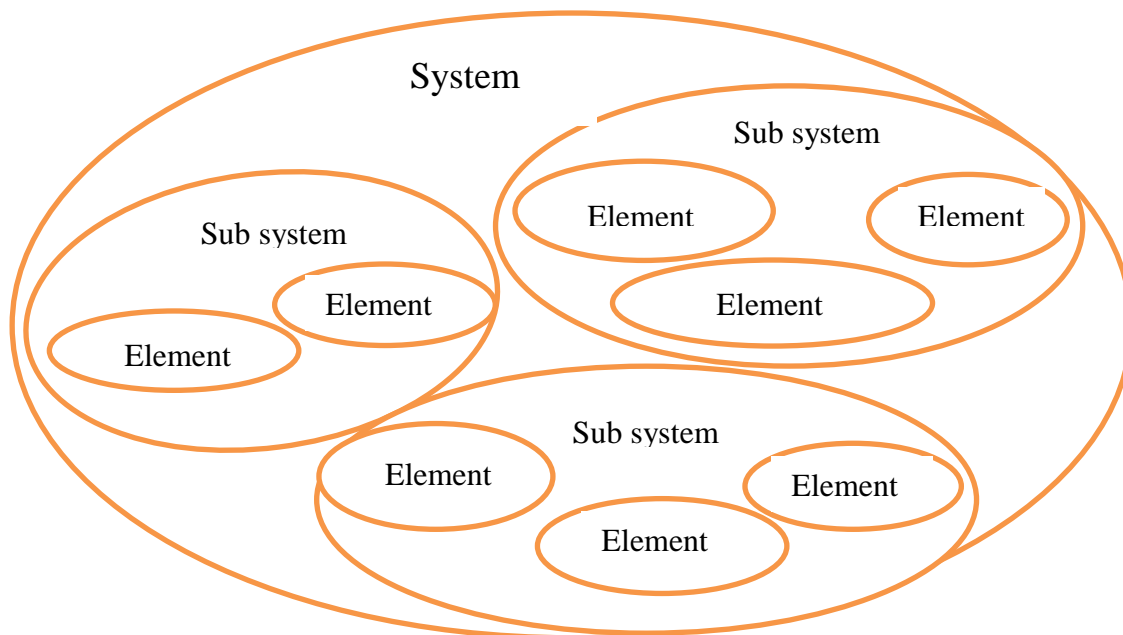


Figure 1: A Systems Diagram Based on von Bertalanffy (1968) Systems

Theory

The main principles of the systems theory are; existence of an internal environment, inputs, transformation process, outputs, existence of an external environment and lastly feedback. All social systems receive input from the environment, engage in transformation processes, and generate outputs (Figure 2).

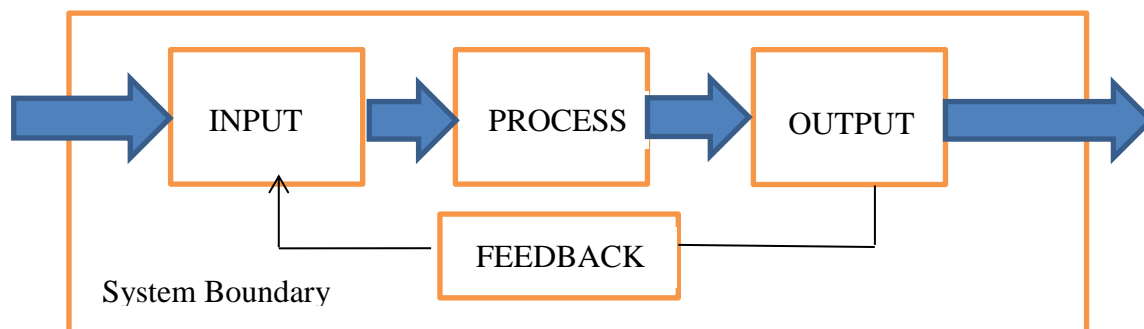


Figure 2: Simple Structure of a System based on Systems Theory Principles

In addition to having a structure, social systems serve particular functions. An AIV producing system requires inputs such as seeds, fertilizers, pesticides, labour, capital and irrigation technologies from the environment to be able to perform that function. The environment includes: favourable natural environment, policies, trade laws, institutional support in terms of access to credit and extension and cultural values and norms that govern the system. The farmers then engage in the transformation process of turning the inputs into AIVs that meet HVMS standards. For the farmer to do this, she needs to be knowledgeable about the requirements of the HVMS, she needs the skills to be able to produce the intended product effect and she needs to be motivated enough to engage in this activity (willingness). The product must be of such quality as to be accepted by the external environment (HVM). The external environment must be satisfied with the product effect (AIVs that meet HVM standards) as to give feedback (income for the farmer) to the system to enable the sustainability of that system.

Concepts in the Study

Concept of Readiness

Merriam Webster's Online Dictionary defines readiness as being "prepared mentally or physically for some experience or action" and also being "willingly disposed". The concept of readiness has found application in many disciplines such as in health, education, business and agriculture. In health, Shaw et al. (2013) defined organisation readiness to change as organizational members' shared resolve to implement a change and their collective ability to do so. To resolve to do anything is psychologically triggered as it involves willpower to achieve.

Readiness as used in technology adoption according to Parasuraman, (2000) is an evaluation process of overall state of mind that determines a person's predisposition to make use of novel ideas by using those technologies. In business, according to Basole (2007) preparedness, potential and willingness are the three phases in evaluating readiness. Shaukat and Shah (2014) used these three indicators to evaluate farmers' readiness to adopt mobile technology for agriculture development in Pakistan.

Freedman, Whiteside, Brandt, Young, Friedman and Hébert (2012) study to assess readiness for establishing a farmers' market at a community health center revealed that the dimensions of readiness include characteristics of the farmer and those of the environment as influencing readiness. In business, when assessing the readiness of an organization for an upcoming change, three assessments are recommended (Whittenberger, 2014). These are culture, operations and impact of the change on the organizational units. Under culture, willingness is the key issue. For operational assessment, the organization's ability is the focus, and impact assessment basically assesses the people the change will affect. In education, Maxwell and Clifford (2004) in school readiness assessments found that a child's skills and development was related to the child's family, interactions of the child with other people and environments before coming to school.

In view of the literature reviewed readiness assessments of farmers in whatever context are however not common and this is a gap. Farmers operate within a social system environment and knowledge of context specific factors of the environment that influence the farmers' behaviour should be a useful tool for

effective interventions for the farmer. Clearly for any readiness assessment, willingness and ability are important indicators and were used for this study.

Concept of Willingness and Ability

Thirteenth century philosopher Thomas Aquinas posited that “willingness” should be viewed as a psychological state (Stump, 2003). According to Stump (2003), Aquinas further posited that humans are pre-programmed (by virtue of being human) to seek certain goals, but able to choose between routes to achieve these goals. In facing these choices, humans are governed by *intellect*, *will*, and *passions*. The will according to Thomas Aquinas as quoted by Stump (2003) is "*the primary mover of all the powers of the soul ... and it is also the efficient cause of motion in the body*". According to O'Connor, (2010) choice falls into five stages:

- 1). Intellectual consideration of whether an objective is desirable;
- 2). Intellectual consideration of means of attaining the objective;
- 3). Will arrive at intent to pursue the objective;
- 4). Will and intellect jointly decide upon choice of means; and
- 5). finally, will elects execution.

To further build up on this concept of willingness, Walters, (1992) argues that it is will power that directs energy to the body toward any object of fulfillment. The effectiveness of our expectations of life depends on the energy we focus upon them. A person of weak will power will inevitably be also a person whose energy flow is weak. Willingness generates energy. So a person of great will power always finds reserves of inner energy from which he draws the ability to attain his

objectives. In this regard, the greater the extents of willingness farmers have to satisfy QSMDs the better.

Concept of Knowledge

According to the Webster new world dictionary, knowledge is the general awareness or possession of information, facts, ideas, truths or principles. It is clear awareness, acquaintance or familiarity (with something) and understanding. It is therefore all that has been perceived or grasped by the mind, learning and enlightening accumulated by mankind. There are two perspectives of knowledge; a state of knowing and a state of what is known (Ogunlade, 2002). Ogunlade goes on to link knowledge with learning and posits that farmers learn a lot from their own experience and their own experiments, from watching what other farmers do and from discussion with other actors in the Agricultural Knowledge Information System (AKIS). Botlhoko and Oladele (2013) noted that knowledge and information are basic ingredients for increased agricultural production and productivity.

Quality Standards for Fresh Produce in Kenya

According to the International Standards Organization [ISO](1987) in its ISO 9000-9003 standards protocol, quality constitutes all the features and characteristics of a product or service, that bear on its ability to satisfy stated or implied needs . Quality factors are classified as quantitative (ingredients, weight); hidden (nutritive, toxic substances); and sensory (appearance, kinaesthetic, flavor). Organoleptically, vegetables are valued for their supreme flavors and aroma, crisp

texture, attractive colors, and their overall appeal to human senses of smell, taste, touch, and sight (Shitanda & Wanjala, 2006).

Existing high value markets for AIVs in Kenya are exerting pressure on farmers to supply quality produce. This is to satisfy consumers who have become aware about issues of agricultural sustainability, food safety and quality that first dominated global trade in fruits and vegetables motivated partly by food scares. In Europe, codes of conduct, traceability and quality meta-systems such as Hazard Analysis and Critical Control Points (HACCP) have been established by supermarkets to reassure consumers of the quality and safety of products (Henson & Caswell, 1999). On the local scene, Kenya's Horticultural Crops Development Authority (HCDA) developed a code of conduct covering among others good business practices between exporters and suppliers, guidelines for good agricultural practices (e.g. use, application and control of pesticides), and traceability (HCDA, 1995).

The standard, for which farmers obtain certification, depends on the market supplied. Examples of certification bodies for fresh export produce are KenyaGap, GlobalGAP, Tesco supermarket's Nature's Choice or Sainsburrys' supermarket's Farm to Fork. In addition, the produce must be accompanied by a phytosanitary certificate issued by a competent authority in the country of origin guaranteeing absence of prohibited pests (Okello & Okello 2010). In Kenya, the Kenya Plant Health Inspectorate Services (KEPHIS) is the body mandated to issue such certificates. According to Graffham, Karehu and MacGregor (2007) crop and

environmental protection, and personal hygiene are mandatory critical control points in the certification process to KenyaGAP/GlobalGAP standard.

According to Ngugi et al., (2006), to access HVM, the process of assured compliance involves the dynamic sequencing of the actions through which the needs of the buyer are identified, achieved, recorded, verified, and communicated, and then adjusted as these specifications change over time. Here, the critical actor for small-scale producers is mainly an intermediary like extension. According to Reardon (2006), these specifications can be subdivided into three categories: 1). Product attributes: Physical characteristics of the product, including size, shape, degree of damage, maturity, variety, and so forth, as well as less visible attributes such as tolerance levels of decay, pathogens, filth, heavy metals, pesticide residues, and so forth; 2). Process attributes: Characteristics of the process by which the product is grown, processed, and marketed. These attributes can encompass practices that have a direct impact on the product's physical characteristics (for example, agronomic practices, producer hygiene) as well as wider concerns (for example, impacts on the environment, worker welfare, etc.); and finally 3). Transaction attributes: Characteristics of the physical delivery of the product, flow of information, payment schedules, contracting, and so forth. Examples may include the physical volume flow (according to some plan) and the identification of the origin and source on the packaging.

Contribution of Women to Agricultural Production

Literature on women's contribution to agricultural production suggests that rural women in particular are responsible for half of the world's food production and produce between 60 and 80 percent of the food in most developing countries (Mehra & Rojas, 2008; Oladejo, Olawuyi & Anjorin, 2011). This statement has however been critiqued. Raney et al., (2011) argue that the contribution of women to agricultural and food production is significant but it is impossible to verify empirically the share produced by women. Undeniably though Raney et al., (2011) posit that women play a fundamental role in all the stages of the food cycle in all regions, but these roles differ by region and advices that taking account of the heterogeneity of women's contribution is essential if policies and interventions are to be effective.

According to Oladejo et al., (2011) despite women's contribution to global food security, they are frequently underestimated and overlooked in development strategies. Raney et al., (2011) observed that agriculture sector is underperforming in many countries in part because women, who are often a crucial resource in agriculture and the rural economy, face constraints that reduce their productivity. One such constraint is weak property rights which limit women's ability to participate in land and other markets, to obtain credit, and to undertake other investments on the land (Peterman, Behrman & Quisumbing, 2010).

According to FAO (2009), the trend towards the growing dominance of women in agricultural production and the concomitant decrease of men in the sector is inevitable. There are an increasing number of female-headed households around

the world. A major cause of both these developments is male-out migration from rural areas to towns and cities or abroad and/or the abandonment of farming by men for more lucrative occupations.

Women contribute to food security in other significant ways such as preservation of biodiversity in addition to the other crucial roles women play in food production, According to Karl (1996) and Bunning and Hill (1996), the preservation of biodiversity and plant genetic resources is now widely recognized as essential to food security. Women often have special knowledge of the value and diverse use of plants for nutrition, health and income. Consequently, they are frequently the preservers of traditional knowledge of indigenous plants.

African Indigenous Vegetables (AIVs)

African Indigenous Vegetables as defined by Maundu, Achigan-Dako and Morimoto (2009) are vegetables that have their natural habitat in SSA and are a part of the food culture in the subcontinent. This section will look at the value of AIVs from the following perspectives: nutritional, medicinal and sociocultural. Further, literature on production, processing, marketing and utilization will be discussed.

Nutritional Value

According to Chweya and Mnzava (1997), AIVs are highly nutritious as they contain high levels of minerals such as calcium, iron and phosphorous. In addition, some contain significant amounts of vitamins and proteins. Table 2 shows the nutrient content of some AIVs and two exotic leafy vegetables (cabbage and

lettuce) for comparison purposes. Studies have shown that for these nutritional potential to be realized, factors such as stage of growth of the vegetable, storage, cooking and processing must be considered as nutrient losses can occur (Abukutsa-Onyango, 2007; Makokha & Ombwara, 2002; Muchoki, Imungi, Jasper & Lamuka, 2005). This notwithstanding, the superiority of the nutritional value of AIVs compared to that of exotic vegetables is undisputable as indicated in Table 2.

Table 2: Nutrient Content of 100g Fresh Weight Edible Portion of some African Indigenous and Exotic Leafy Vegetables

	Protein (%)	Calcium (mg)	Iron (mg)	Vitamin A (mg)	Vitamin C (mg)
AIVs					
Amaranthus (<i>Amaranthus spp</i>)	4.0	480	10	10.7	135
Spiderplant (<i>Cleome gynandra</i>)	5.1	262	19	8.7	144
Black nightshade (<i>Solanum villosum</i>)	4.6	442	12	8.8	131
Cowpea (<i>Vigna unguiculata</i>)	4.7	152	39	5.7	8.7
Pumpkin (<i>Cucurbita moschata</i>)	3.1	40	2.1	3.9	170
Jute mallow (<i>Corchorus olitorius</i>)	4.5	360	7.7	6.4	187
Exotic vegetables					
Cabbage (<i>Brassica oleracea</i> Var. <i>capitata</i>)	1.4	44	-	1.2	33
Lettuce (<i>Lactuca sativa</i>)	1.2	62	2.2	0.04	18

Source: Abukutsa-Onyango (2010)

Medicinal Value

Several studies have reported the long known health protecting properties and uses of African indigenous leafy vegetables and several of these indigenous leafy vegetables continue to be used for prophylactic and therapeutic purposes by rural communities (Kimiywe, Waudu, Mbithe, & Maundu, 2005; Okeno, Chebet & Mathenge, 2003). Olembo, Fedha and Ngaire (as cited in Kimiywe et al., 2005) also state that traditional vegetables have medicinal properties for the management of HIV/AIDS, stomach-related ailments and other diseases. This is encouraging for interventions geared towards motivating individuals to increase the consumption and utilization of indigenous leafy vegetables.

According to Johns and Sthapit (2004), countries that retain indigenous vegetable diets are much less likely to be affected by cardiovascular diseases, diabetes and other adverse consequences of nutrition in transition. Similarly, in Kenya and Tanzania, a potential relationship of indigenous vegetables and the ability to treat diabetes, gout, hyperlipidemia, gastro-intestinal tract infections, and protozoan parasites, amongst others was found (Johns, 2004; Musinguzi, Kikafunda & Kiremire, 2000).

Socio-Cultural Value

In some communities in Kenya, the importance of leafy vegetables is explained and sustained in folklore, sayings, proverbs, tales and lexical phrases. Among the Luo of Nyanza Region, a commonly used phrase stressing the importance of AIVs is “*alot ma ocha ema tieko kuon*” –translated literally as “the despised potherb is what relishes the corn cake”; this saying promotes the value of

leafy vegetables relative to other dishes. It is translated as: “a thing that is despised might become respected” (Ocholla-Ayayo, 1976 as cited in Owuor & Olaimer-Anyara, 2007). A leafy vegetable with a bitter taste was commonly associated with medicine while one with a sour taste was associated with food. The taste of the vegetable provides a clue of the social links of the person eating it. Leafy vegetables’ tastes tend to provide distinguishing marks for rural and urban influences or attachments. Persons eating vegetables with milder tastes are commonly associated with urban links, while those eating AIVs with a bitter taste tend to have stronger rural attachments (Owuor & Olaimer-Anyara, 2007). By virtue of their significance, AIVs enhance human capabilities and widen human nutrition, cultural rituals, environmental adoption and socializing choices (Malla & Chhetri, 2009).

Production

In western Kenya, production of traditional African vegetables is mainly on a subsistence basis. These vegetables are often intercropped and rarely occupy a significant proportion of the farm (Nekesa & Meso, 1995). Most of these vegetables have a short growth period with most of them being ready for harvesting within 3-4 weeks and respond very well to organic fertilizers (Rowell & Hadad, 2014). They can produce seed under tropical conditions unlike the exotic vegetables (Abukutsa-Onyango, 2007).

Most AIVs production is rain-fed. Supply of the vegetables is highest two (2) months after the onset of the long rains, when tender plants are uprooted for use. Supply then drops until the next short rainy season, when the vegetable is either

planted as a pure stand in small plots or interplanted with maize (Nekesa & Meso, 1995). In the dry season production is by supplementary watering or is done along riverbanks. Shepherd (2007) asserted that small-scale farmers face difficulties in providing consistent supply, even before they are required to meet sophisticated safety standards and good commercial practices.

Management practices are basically traditional. Seeds are broadcast, no precise spacing being applied. Weeding is done alongside the main crop and a number of cropping systems, including inter-row, mixed and sole cropping are used (Nekesa & Meso, 1995). In a study by Nguni and Mwila (2005) in Zambia, the commonest cropping systems were found to be mixed and sole cropping. Sole cropping was more prevalent in Okra (*Abelmoschus esculentus*) followed by Ethiopian kale (*Brassica carinata*).

Pests and diseases lead commonly to an overuse of chemical pesticides in small scale and commercial production systems, causing well-known toxicological and environmental problems. Several studies have confirmed AIV production is constrained by pests and diseases which severely impacts the quantity and quality available in the value chain (Nchore, Waceke & Kiriuki, 2011; Muturi et al. 2010; Sikora & Fernandez, 2005).

Production of AIVs is done on subsistence basis as maize and sugarcane are the crops considered as the main cash crops in Western Kenya. Waswa et al. (2009) study revealed that most farmers in the sugarcane zone perceived sugarcane farming to be more profitable than the production of food crops such as vegetables.

Processing

Most AIVs like many other horticultural produce are highly perishable with a shelf life of less than 24 hours at room temperature, a factor that affects the quality of the produce at the market. Post-harvest processes, in all their various forms, bring immeasurable benefits in terms of improving produce handling, reducing food losses, increasing shelf-life and adding value to the product (Madakadze, Masarirambi and Nyakudya, 2004). Some of these processes are as simple as sorting, cleaning, trimming and bundling, whilst others are as complex as fermentation and different types of drying. Sun food drying is one of the oldest agricultural techniques used to preserve food (Fellows, 2009). Blanching is a pretreatment that is used to destroy enzymic activity, mostly in vegetables, before unit operations of dehydration or freezing (Fellows, 2009).

Shitanda and Wanjala (2006) in investigating the effect of different drying methods on the quality of jute mallow (*Corchorus olitorius*) an AIV, found that freeze drying was the best drying method but acknowledged that freeze drying is an expensive method. Smith and Eyzaguirre (2000) noted that even though drying has been an African way of processing leafy vegetables to make them available during periods of shortages and is one solution to the problem of perishability, it does not satisfy the needs of a large population of consumers, particularly urban dwellers who prefer freshly harvested vegetables.

Utilization

There are obvious cultural differences in the way vegetables are prepared and consumed. In some regions, average daily consumption of vegetables is as high

as 64g per person or about 5.4 percent of the weight of all the foodstuffs consumed. In several parts of Sub Saharan Africa (SSA), leafy vegetables are for the most part consumed cooked in accompanying sauces to carbohydrate staples or cooked mixed with tubers such as yam, cocoyam, cassava or sweet potato.

According to Smith and Eyzaguirre (2005), Community women's groups, women's cooperative groups and other women's social groups would be valuable assets in recipe development projects aimed at show-casing AIVs. Organisations such as Bioversity International in collaboration with the Kenyan Centre for Indigenous Knowledge/National Museums of Kenya have taken the lead and have published a compilation of regional leafy vegetable recipes in a cookbook titled "African Leafy Vegetable Cookbook" featuring recipes from several SSA countries.

Traditional Marketing Channel

According to Nekesa and Meso (1995) marketing of AIVs is such that the farm women harvest, pack and transfer the vegetables to the buying point nearest to their farms, usually by a roadside. Women vendors from urban centres buy and transport vegetables to strategic wholesale urban markets. Women counterparts in the retail sector purchase and transfer the vegetables to strategic retail points. Proximity to the local marketplaces is a major advantage for producers because it allows the supply of quality products at reasonable prices. Pre-bundled, fresh, succulent vegetables represent a market advantage due to quality of presentation.

High Value Markets

The demand for high value products in both developed and developing countries is rising rapidly. This is because as incomes increase, consumers adopt more diverse diets. These products are typically perishable, they are increasingly sold through specialized markets, and the product price is highly sensitive to variations in quality. Supermarkets have had a major effect on the marketing of AIVs in Kenya (Ngugi et al., 2007). In Central Kenya, Kiambu County precisely, farmer groups have successfully penetrated the high-value segment of markets for leafy indigenous vegetables through collective action and collaboration with a support system (Weinberger & Pichop, 2009), thereby eliminating brokers, guaranteeing markets for farmer produce all-year round and maximizing income. Ngugi et al. (2007) further showed that profits as high as 35 to 72 percent were realized by farmers organized in groups, compared to farmers not organized in groups.

Empirical Framework of the Study

This section under some empirical evidence of studies done on key concepts discussed in this study. This will include knowledge, willingness, quality standards, women and resources, farm and farmer characteristics.

Farmer and Farm Characteristics as Factors Associated with Adopting Agricultural Innovations

If AIV farmers are to access high value markets, one strategy that has been used successfully is the market oriented approach by extension. Readiness to satisfy quality standards of HVMS is a precursor to adopting such an agricultural

innovation. In the literature, there are many variables that affect adoption. These include farm and farmer characteristics such as age, sex, educational level, income, farm size, experience, marital status and household size.

Oladejo, Olawuyi and Anjorin (2011) investigated women's access to economic resources and examined the influence of selected socio-economic characteristics of women on their participation in agricultural production in Osun State Nigeria and found that household size, marital status and local taboos had significant impact on the women participation in agricultural production.

Similarly in Turkey, Sezgin, Kaya, Külekçi and Kumbasaroğlu (2011), who reviewed 169 farmers in 7 counties, found that age, education level, and income level of the farmers, operational goal of the farm, participation in extension studies, making use of mass media means and benefitting from agricultural incentives were influential on the adoption of innovations to a great extent.

Botlhoko and Oladele (2013) results of a study to determine factors affecting farmers willingness to participate in agricultural projects in Ngaka Modiri Molema District North West Province, South Africa showed that household size was a factor with those with larger household sizes (above 5) being more willing. Oladele (2011) in a study to find the contribution of indigenous vegetables and fruits to poverty alleviation in Oyo state in Nigeria reported that experience in farming was a significant factor.

Factors Associated with Knowledge among Farmers

Many empirical studies involving knowledge have identified factors associated with knowledge level of farmers. However, factors that have been found

to influence level of knowledge among farmers vary with the study. Educational level and exposure to information through mass media were found to have a positive and significant relationship with knowledge (Ogunlade, 2002).

Jha (2012) study to determine factors influencing level of knowledge about social forestry among farmers in India, shows that variables namely; education, social participation, sources of information utilized, size of land holding, annual income, economic motivation and innovation proneness had positive and significant association with the variable knowledge level of the respondents. However, age, household size and credit behaviour were non-significant in this study.

In a study to assess knowledge level of dairy farmers in Nagpur district and the co-relation between socio-economic variables with their training needs (Patil, Gawande, Nande & Gobade, 2009), the findings show that age was not an important factor but the size of the farmer's herd, how much milk is sold and how much milk is produced were positive and significant factors. Social participation and annual income just like in the social forestry study were also found to be important factors influencing the level of knowledge of dairy farmers.

Tuei (2010), in a study to assess the awareness of regulations for milk quality control among dairy farmers in Kenya found that the farmers had low knowledge. Regulation in the dairy industry targets the small scale producers and milk traders with the aim of ensuring that they meet requirements for milk quality control. With this information for dairy farmers, it would be interesting to test the level of knowledge among AIV farmers on quality standards.

Factors Associated with Willingness

Understanding farmers' willingness to participate in agricultural programmes is an essential precondition for designing effective and efficient programmes. Empirically, the results of a survey by Botlhoko and Oladele (2013) to examine farmer willingness to participation in agricultural projects in Ngaka Modiri Molema district in North West province, South Africa using a random sampling technique to select 20 farmers from each of 6 selected villages, which gave a sample size of 120 farmers found that 97 percent of farmers were willing to participate in agricultural projects and also shows that only 3percent were not willing. Similar result by Kgosiemang and Oladele (2012) in Mpumlanga province in South Africa showed that over half of the farmers interviewed were willing to participate in agricultural projects

A study by van Slembrouck, van Huylenbroeck and Verbeke (2002) to explore the willingness of Belgian farmers to participate in two voluntary agri-environmental policies found that age and level of education were significant determinants of the acceptance rate of agri-environmental policies. Younger and better educated farmers were more willing to participate in the agriculture projects van Slembrouck et al., (2002) further found that farm size and previous experience of farmers themselves or of neighbouring farmers with agri-environmental measures had an influence on participation decisions.

Martey, Etwire, Wiredu and Dogbe (2014) in a study to find out factors influencing willingness to participate in multi-stakeholder platform by smallholder farmers in Northern Ghana and its implication for research and development, found

that age of household head, household size and household income significantly influenced willingness to participate on the platform. According to Chambers (1994) participation is as a linear continuum, implying a more intense form of participation as willingness increases.

In Kwara state Nigeria, Obaniyi, Akangbe, Matanmi and Adesiji (2014) found that farmers were more willing to participate in trainings due to the perception that; farmers' standard of living would improve, knowledge would be added, profitability of farming activities would increase, personal needs would be met, market would be available for produce, farmers would get loans and be provided with farm equipment. This indicates how farmers value motivation.

Benefits of Complying with Quality standards

A lot of studies have been done to find out the costs and benefits of complying with agri-regulation standards such as GLOBALGAP and KenyaGAP by small-scale growers. By the design and intent of them, GLOBALGAP standards require farmers to practice good agricultural practices thus constraining their behaviour to that which is considered relatively more sustainable and acceptable (Wanderi, 2013). Research conducted by IIED and NRI (2008) found that farmers who had attained GLOBALGAP certification were clearly reaping benefits from adoption of good agricultural practice, record-keeping and improved hygiene. Results further stated that many farmers said that they were using GLOBALGAP records to understand their financial viability and run their farms more commercially. However, Luvai (2008) noted that compliance can be difficult for

smallholder farmers who have neither the resources nor the capacity to comfortably meet standards.

Several studies (Asfaw, Mithofer & Waibel, 2008; Cuyno, Norton & Rola, 2001; Okello & Okello, 2010) have found that quantifiable health benefits accrued to compliant farmers owing to the use of protective clothing, proper storage and application of agro-chemicals as well as the use of what are considered to be safe human agro-chemicals. Compliant farmers were much more likely to practice more sustainable agricultural practices such as integrated pest management (IPM) as opposed to non-compliant farmers possibly leading to some environmental benefits. Similar results were found by findings of IIED and NRI (2008) further revealing that by expanding the potential markets for Kenyan produce, standards provide incentives to upgrade and are a stimulus for farmers to improve their practices.

Rural Women and Access to Resources

Household can be classified as either male headed or female headed. Due and Gladwin (1991) classify female headed households into two; de-facto and de jure. De-facto female headed households are those households where the male partner is away for long periods of time making it necessary for the female partner to make decisions and support the family. However the male partners may be sending income periodically. De jure female headed households are those in which the female household head is single or widowed and she makes all the decisions.

Studies by FAO (2009) found that a large share of women participate in economic activities as contributing family workers with no pay or control over

productive assets. Yet, according to IFPRI's (2005) study in Burkina Faso, women increased agricultural output by 10 to 20 percent when access to inputs was equalized between men and women. In Kenya, women farmers were able to increase yields by 22 percent when given equal access to education and inputs, and their improved status positively affected their own health and that of their children (Quisumbing & Pandolfelli, 2010).

Access to Credit

Access to credit or finance is considered as a major constraint in adopting almost all types of technologies by women as cited in several studies including: Drechsel, Olalaye, Adeoti, Thiombiano, Barry & Vohland (2005) on resource conservation technologies; Doss, Mwangi, Verkuijl & de Groote (2003) on production technologies of maize and wheat; Wickramasinghe (2009) on agroprocessing, Olwande, Sikei and Methenge (2009) on fertilizer adoption; Maguzu, Ringo, Mariki, Owenya, Kola & Leseyo (2007) and World Bank, FAO and IFAD (2008) on management practices such as conservation [zero] tillage agriculture.

In Kenya access to credit has been termed as the major hindrance to rural women accessing markets. In a study to determine the access and use of credit facilities by small-scale entrepreneurs in rural Kenya, Atieno, (2001) found that most enterprises (51%) had not used credit before. Out of those who had, the majority (67%) had used informal sources. In Rwanda, the likelihood of farmers participating successfully in formal credit markets increases with education, off-farm incomes, and agricultural extension (Muhongayire, Hitayezu, Mbatia, &

Mukoya-Wangia, 2013). In Nigeria, a study by Obisesan (2013) found determinants of credit accessibility as sex, age, main occupation, participation in off-farm activities, membership of farmers' association and crop yield among cassava farmers.

Anyiro and Oriaku (2011), in determining access to and investment of formal micro credit by small holder farmers in Abia state, Nigeria found age, education, farm income, extension contact and distance between home and loan source ,farming experience and farm size were at 5 percent level. Nimoh, Tham-Agyekum & Awuku's (2013) study to investigate the factors influencing poultry farmers' access to credit with particular reference to the Agricultural Development Bank (ADB) in the Ga-East Municipality indicated that secondary occupation and farmer-based organization membership positively influenced access to credit. The study found that the level of income, collateral, educational attainment and marital status have significant positive influence on farmers' access to formal credit, while age and sex have insignificant positive influence on the farmers' access to credit. Diiro (2013) found that having an off farm activity increased farmers agricultural technology adoption as they had more liquid income to purchase inputs.

Akpan, Ini-mfon, Udoka,Offiong and Okon (2013), in determining factors influencing credit accessibility and demand among poultry farmers in Nigeria, farmers' age, gender, farm size, membership of social organization, extension agent visits, distance from the borrower's resident to lending source, years of formal education and household size were important determinants.

From the literature it is clear that farmer characteristics have an influence on access to credit. Credit is an important resource if farmers have to produce vegetables that satisfy quality standards. This study therefore hypothesizes that the perception of the farmer in Kakamega about accessibility to credit will be influenced by the farmer's personal characteristics such as educational level, age, membership to an association and instead of gender, marital status.

Access to Extension

Agricultural extension contributes to improving the welfare of farmers and other people living in rural areas as extension advisory services and programs forges to strengthen the farmer's capacity to innovate by providing access to knowledge and information (Ragasa, 2012). Although impact evaluation of agricultural extension services is very limited, a consistent message from a rich literature on extension services is that remote rural areas and poor rural women tend to be underserved (World Bank & IFPRI 2009; Meinzen-Dick et al. 2010; Ragasa, 2011). However, a study on gender differences in access and use of selected productive resources among sweet potato farmers in Uganda shows that there is no unequal access to extension services by women (Okonya & Kroschel, 2014). Similarly, in Kenya, in a study to evaluate environmental benefits of compliance to agri-regulations, Wanderi, (2013) found that between 56 - 68 percent of the sampled households had benefited from extension contacts.

The value of extension cannot be overemphasized. Quisumbing et al., (2010) report that in Kenya, women who had less education than men excelled in the uptake of soil fertility replenishment technologies as long as explanations were

given in the simplest terms. Further, qualitative data suggest that the women understood the technologies better than the men did. In Bangladesh, a local NGO successfully taught illiterate women how to manage fish ponds by giving them notebooks with illustrated instructions. Umeta, Lemecha and Mume's (2011) study identified that participation of female headed households in agricultural extension package program in Ethiopia was very low when compared with male headed households. The major constraint to access and utilization of agricultural extension packages was cost of input related factors (cost of inputs is expensive).

Women's access to and use of extension services and technologies is often associated with the access to land or to other collateral with which to obtain credit. Several studies find that women are often disadvantaged in both statutory and customary land tenure systems and they face greater land insecurity (Agarwal, 2009; Kevane, 2004; Lastarria-Cornhiel, 1997; Meinzen-Dick et al., 2010).

Access to Water and Irrigation Technologies

Use of irrigation to produce AIVs during the dry season is extremely useful in optimizing farmers' returns when the supply is low in the market. Similarly, irrigation production ensures continued supply, which ensures stability in the prices of vegetables in the market thus enabling even the low-income groups to access the vegetables (Shiundu & Oniango, 2007). The lack of access to irrigation is also often associated with especially, much lower quality of landholding. Since women's land holdings are often small and of lower quality, applying these technologies becomes costly or does not yield requisite results. Access to water is important for women not only for irrigating field crops, but also for domestic use, including not only

drinking, washing, and bathing, but also watering gardens and livestock at the homestead (Ragasa, 2012).

Irrigation allows smallholder farmers to move from traditional food grain crop production for subsistence to producing high-value vegetables and fruits and to commercialize their production (Giordano, de Fraiture & van der Bliet, 2012). Findings by Giordano further show that female farmers are disadvantaged in accessing irrigation technology because of limited access to information, high initial costs, and lack of proper financial tools. Sijali and Okumu (2002) noted that small scale farmers tend to look for irrigation technologies that they can understand and afford to buy. Such technologies are found for example in traditional manual irrigation where water is hand carried over a distance to be splashed on vegetable plots. For consistent production of AIVs, irrigation is inevitable. It is therefore important to know the perception of women farmers regarding this key technology.

Access to Labour

Customary systems in most countries in Africa have it that men have control over women's labor, but women do not have control over men's labour. Women therefore often face constraints or shortages of hired male labor to work in the fields (Doss, 2001). These have implications to the adoption patterns of labor-intensive management practices such as, integrated pest management (IPM); biological nitrogen fixation technologies; and conservation (zero) tillage practices that often require more time and labor to adopt and thus increasing women's time burden. This greater time requirement can hinder women's ability and incentive to adopt these management practices (World Bank, FAO & IFAD, 2008; Quisumbing &

Pandolfelli, 2010). In Ethiopia, Pender and Gebremedhin (2006) showed that strong cultural norms prevent women from ploughing fields, thus disadvantaging women without adolescent or adult sons, who must hire additional labor to plough the fields.

Access to Markets

Combaz (2013), argues that the shift to commercial agriculture will only be possible when interventions pay attention to the critical constraints on market availability and access for women. Women face many barriers to accessing markets, including culturally inappropriate modes of transportation, harassment by market or health officials because the high cost of permits often leading women to market their wares just outside market boundaries, time burdens that constrain women from seeking the best prices for their output, and even marital conflict if fluctuating prices lead a husband to believe that his wife is withholding money based on earnings from past trips (Ragasa, 2012). Studies have shown that women are more risk averse and less prone to competition; hence they are more likely to choose activities with lower expected returns and with lower risks (Croson & Gneezy, 2009; Fletschner, Anderson & Cullen, 2010).

Constraints severely limiting many women's access to markets have been identified as poor adoption of appropriate production technologies, Improper pre-harvest, harvest and post-harvest procedures that lead to losses and lack of knowledge of the required technologies, quality standards and food safety protocols (Abukutsa-Onyango, 2007; HCDA, 2013; Ngugi, et al., 2006; de Putter, Koesveld & Visser, 2007).

Infrastructure

In much of the developing world, mobility in rural areas is hampered by the lack of all forms of transport facilities and by poor roads. Rural transport services are often infrequent and expensive (World Bank, FAO & IFAD, 2008). Adepoju and Salman (2013), in a study in Nigeria titled 'Increasing Agricultural Productivity Through Rural Infrastructure', over 60 percent of the variations in the productivity of the farmers in the study area could be explained by explanatory variables ; socio-economic and infrastructure.

According to Ulimwengu, Funes, Headey, and You (2009) agricultural growth can be achieved if investments in infrastructure are done. Infrastructure facilitates better market connections which increase the availability of inputs and agriculture extension services, all of which are likely to increase agricultural productivity and, consequently, welfare. Hettige (2006), evaluated a rural road investment near Yogyakarta, Indonesia. Results revealed that improved roads and the increased ability to transport goods provided opportunities for those with skills and/or savings to invest in businesses. Among the 17percent of project respondents who had started a business since the road's rehabilitation, 69 percent declared that the road was a factor in their decision to start a business. Infrastructure is therefore an important factor farmers consider before production.

Sources of Information

Studies have shown that access to information is vital for improving agricultural production (Adejo, Idoka, & Adejo, 2013; Oladele, 2006) especially in rural areas where agriculture is the main source of livelihood. Land, labor, and

capital have been critical to financial success for farmers in the past. Now, the relative importance of information is increasing also and its value can be judged by the intersection between its impact, specificity and accessibility (Boehlje & King, 1998).

Olajide (2011), in a study to assess farmers' access to agricultural information on selected food crops in Iddo District of Oyo State, Nigeria found that fellow farmers (76.3%), extension agents (63.6%), and friends (49.2%) frequently served as information sources for farmers accessing information on the food crop technologies studied. Access to agricultural information by women is low. In Ethiopia, findings of Umeta, et al. (2011) show that only 44.4% of women had access to an agricultural extension packaged program. Nlerum, Albert and Prince-Kaye's (2012) study in Eleme area of River state in Nigeria revealed that only 40 percent of the respondents had access to agricultural information, while as many as 60 percent were unreached.

In Ethiopia, Agricultural information has also been disseminated to women farmers through different extension methods like mass extension methods (Radio, TV, and printed media), individual extension methods (Office contact, farm visit) and different extension events (training, field days, demonstration). A study examined women access to these sources of agricultural information available in their woreda. The findings indicated that about 45.2 percent of respondents had radio and a paltry 7 percent have TV. In contrast, elsewhere in Nigeria, Alfred and Fagbenro (2006) in a study to determine the perception of fishermen on information sources, extension agents, radio and television were the most used sources to the

farmers, but radio, television and extension agents, in that order, were perceived as the most effective while the respondents also perceived radio, friends/ relatives and cooperative societies as the most affordable.

In a qualitative assessment of gender dynamics in the ownership, purchase, and use of irrigation pumps in Kenya and Tanzania, Njuki, Waithanji, Sakwa, Kariuki, Mukewa and Ngige (2014) learned that women knew less about the pumps than did men. This was attributed to several factors, among them unequal access to information. The main sources of information on the pumps for both men and women were NGOs that distributed pumps to farmers, agricultural shows, field days, and demonstrations, and women rarely participate in these activities.

Education

In a study to assess the contribution of agricultural education in secondary schools to rural agricultural productivity using small scale farmers in Uasin Gishu County, Kenya as a case, Saina, Kipsat, Nyangweso, Sulo and Korir (2012) found that farmers with secondary school agriculture knowledge perform significantly better than those without the secondary school agriculture knowledge. The secondary school agriculture knowledge not only broadens farmers' capacity, but also made them more effective, self-reliant, resourceful and capable of solving farming problems and as a result, significantly improved their crop productivity and hence guarantee food security for the family.

Weir (1999) posits that education may have cognitive and non-cognitive effects upon labour productivity. Cognitive outputs include the transmission of specific information as well as the formation of general skills and proficiencies.

Non-cognitive effects include changes in attitudes, beliefs and habits which may lead to greater willingness to accept risk, adopt innovations, save for investment and generally to embrace productive practices. Weir, (1999) further noted that educated farmers are able to interact more effectively with credit agencies, because they can understand financial transactions and keep records, increasing the likelihood of obtaining credit.

Membership to an Association

According to Benin et al., (2011); Cunguara and Moder, (2011), membership in farmers' organizations can influence participation positively due to, either extension workers might find it cheaper to target farmers group which helps them maximize the payoffs from efforts to build farmers capacity to demand advisory service or membership in a social group provides opportunities to discuss and observe practices of other members at no cost or time intensity.

Rural institutions such as farmer-based organizations, community-based organizations, cooperatives, water user associations, self-help groups, informal networks and various forms of collective action for agricultural and rural activities offer a potential in increasing the poor's bargaining power and in enabling them to pool extremely scarce resources together (Uphoff & Buck, 2006). Heemskerk et al., (2004) highlighted that at least 30-60 percent of farming households are members of community based groups.

Natural Environment

Land, water, climate and biological diversity form the natural base of agriculture, essential to rural development and sustainable livelihoods. There is

now a growing understanding that these natural resources are beginning, to a substantial degree, to limit economic growth and human wellbeing goals (Ringler, Bhaduri, & Lawford, 2013). Farmers interact with the natural environment in all farming activities and these resources must be managed so that they can sustain livelihoods.

Socio-Cultural Constraints

Women are key players in the agricultural sector of most developing countries of the world. However, despite this major role, men have reportedly continued to dominate farm decision making, even in areas where women are the largest providers of farm labour (Enete & Amusa, 2010; WEF, 2013). Customs, traditions, religious beliefs, and social norms widely vary across countries, regions, and villages and have restrictions placed on women's activities both on and off farm and their ability to access and use new technologies and information.

Review of methodology

The aim of this study was to assess how ready farmers were to satisfy quality standards and consequently access high value markets. Readiness was determined through measuring the women's perception of variables of the study.

Why perception?

As much as behaviour may be seen to be a simple interaction between the human being and the environment, humans are social and complex beings. There are those inclined towards individualism and others towards constructivism (Leeuwis & Ban, 2004). According to Adesina and Zinnah (1993) neoclassical

economic theory was based on the individualistic perspective that assumed individuals strive for profit or utility maximization only. Leeuwis and Ban (2004) critiqued this economic constraints model and posit that irrespective of the importance of profitability and economic constraints, it fails to conceptualize the social dimensions of knowledge, information, communication, and rationality. A model derived from Roling and Kuiper, 1994 and cited in Leeuwis et al (2004) suggests that what farmers and other human beings do or do not do depends on what they:

1. Believe to be true about the bio-physical and social world (That is what they know);
2. Aspire to achieve (That is what they want);
3. (Think they) are able to do; and
4. (Think they) are allowed to and or expected to do.

This model allows for the identification of factors that explain both what people do and what they refuse to do. This is in line with the constructivist perspective. Social construction sees an individual as a member of a society whose views are formed through primary and secondary socialization processes (Berger & Luckmann 1967). Different people may need different forms of support in reaching similar conclusions (Ngwira et al., 2014). Some decisions take place within limits of information and constraints existing in society (Long and Long 1992). In the context of this study therefore, the perceptions of the majority of farmers concerning any of the statements for which their perception is sought, their responses are considered to be as perceived because perception is socially

constructed. For example if the government's subsidized fertilizer is perceived by the majority of the farmers as being expensive, then, it is, despite the subsidized rate.

Conceptual Framework

As shown in Figure 3, the study conceptualizes that women AIV farmers' readiness to satisfy QSMDs of HVM is influenced by internal (farmer characteristics) and external factors (environment). Further the internal and external factors are divided into those that drive her towards readiness and those that inhibit readiness. In this study, willingness and perceived competence were used to measure readiness.

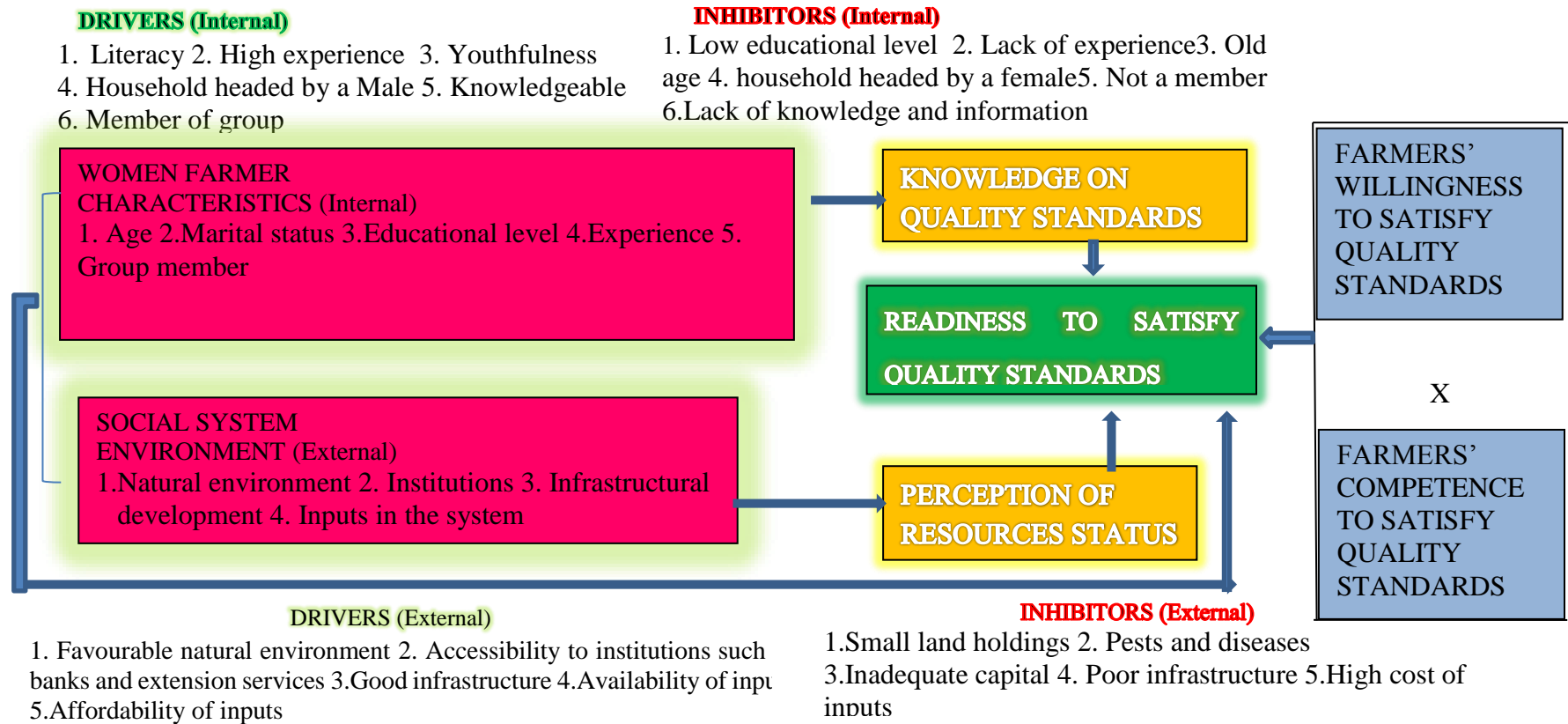


Figure 3: Conceptual Framework of Readiness of Farmers to Satisfy Quality Standards of High Value Markets

Source: Author's construct (2014) Based on Lewin (1939) Theory of the Psychological Field and von Bertalanffy (1968) Systems Theory

Summary of Reviewed Literature

The study was guided by the Kurt Lewin (1939) theory of psychological field which states that the way an individual behaves is a function of the person and the environment. It also found basis in von Bertalanffy (1968) systems theory that looks at outcomes as a result of the interplay of all factors in the system from a holistic view. The literature has shown that satisfying quality standards is mandatory to accessing high value markets and examples of codes of conducts were highlighted.

Empirical evidence of benefits of complying with standards has been given and has shown that benefits go beyond profit maximization alone. The literature has shown that as much women contribute greatly to agricultural productivity, they face many challenges such as inaccessibility to key resources such as credit, extension, water, markets to name a few. Empirical evidence of factors that are associated to knowledge, willingness, ability (competence) have been shown and they were similar in some studies but differed in others. There was no literature on assessment of farmers' readiness to access high value markets and factors associated with readiness to satisfy quality standards in Kakamega and this study will fill this gap. From the literature reviewed this study hypothesizes that there is a significant relationship between readiness and farmer's characteristics in combination with factors in the system's (farmer) environment.

CHAPTER THREE

METHODOLOGY

Introduction

This chapter presents the methods and procedures used to collect and analyse data for the study. It comprises of the study area, research design, study population sampling and sample size, instruments of data collection, validity, reliability of data collection instruments, procedure for data collection and analysis.

Study Area

The study was conducted in Kakamega County in the Western Region of Kenya which is 30km north of the equator. Kakamega covers an area of 3,244.9 Km². The average rainfall ranges from 1250-1750mm per annum and an average temperature of 20.5⁰C (minimum of 10.3⁰C and maximum of 30.8⁰C). The rainfall distribution is bimodal with the main rainy season occurring between March and June and the minor season occurring between September to November. However, due to climate variability, different patterns are being of late witnessed (MEMR, 2013)

Kakamega has a total population of 1,660,651. The population consists of 398,709 households and the population density is 515 per km² (KNBS, 2009). According to the 2009 census, 801,498 are males and 859,153 are females. In terms

of age distribution, about half the populaces are in the productive age bracket of between 15-64 years. Poverty levels in Kakamega County however have been estimated at 57 percent, despite her endowment with natural resources such as gold, arable land and forests.

Agriculture is the main economic activity in the county. Sugarcane farming is extensively practiced since several sugar factories have been established to process sugarcane into sugar. Other agricultural practices include production of maize, beans, millet, tea, vegetables, sunflower, soya beans and keeping of livestock. Non-agricultural economic activities in the county include: commercial businesses such as supermarkets, wholesale and retail shops, hotels and restaurants, and transport business commonly known as “Boda- Boda’ (bicycles and motor cycles especially among the youth) and “Matatu” (Privately owned minibuses).

Administratively, Kakamega consists of 12 subcounties namely: Butere, Mumias, Matungu, Likuyani, Mumias East, Khwisero, Shinyalu, Lurambi, Ikolomani, Lugari, Malava and Navakholo (Figure 4). The county is headed by an elected Governor who appoints county cabinet secretaries to head key ministries such as Ministry of Agriculture is one of these ministries. Other institutions found in the County include financial institutions (commercial banks and micro-finance groups), educational (primary up to university) and health (hospitals and clinics). There is at least one market in each sub county where everyone is free to trade upon payment of an entry fee to the local authority.

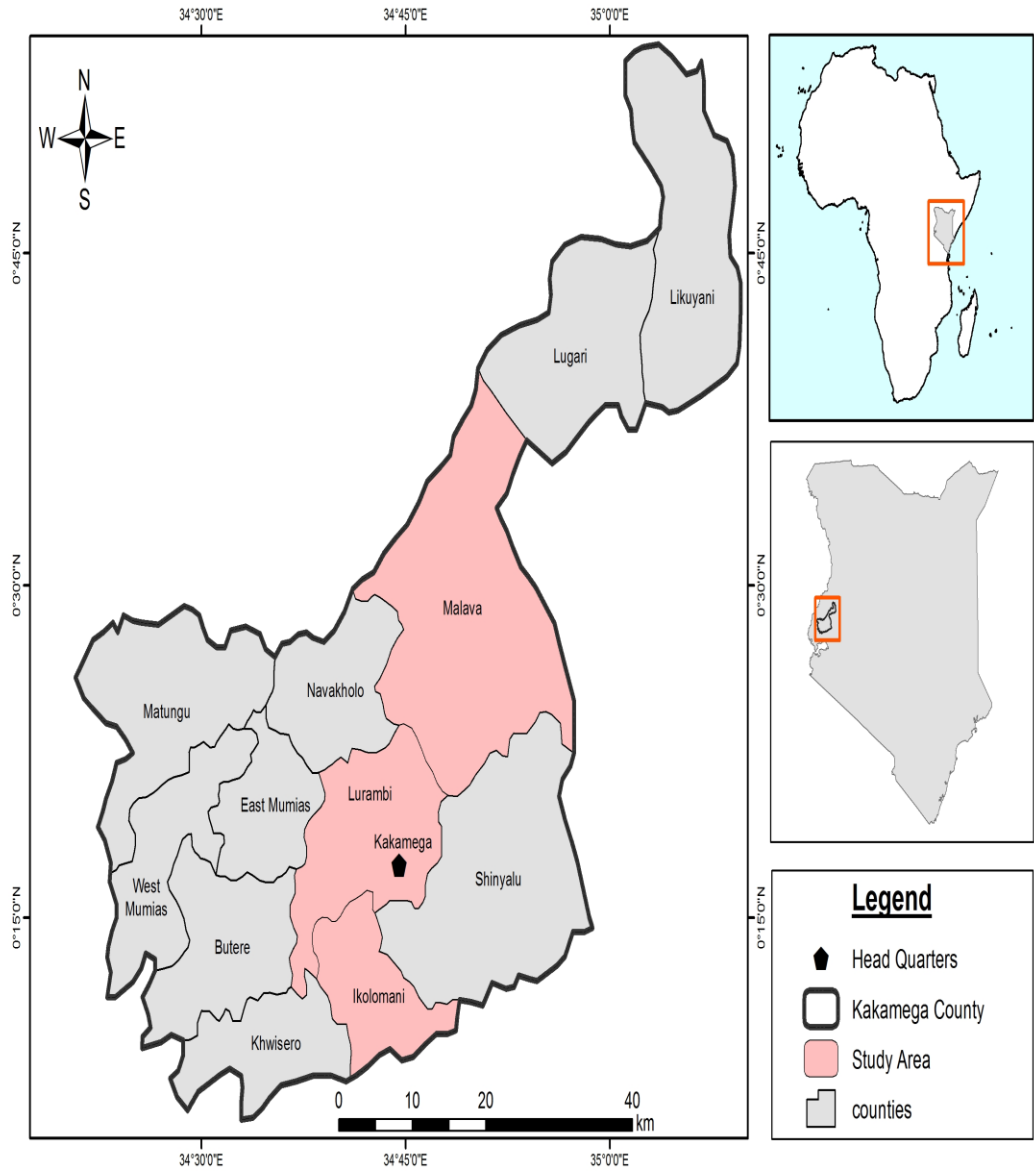


Figure 4: Map of Kakamega County

Source: KNBS (2013) and Redrawn by Department of Geography and Cartography, UCC (2015).

The Kakamega County is mainly inhabited by the Luhya (*Abaluyia* or Luyia) tribe which is one of the forty two (42) tribes in Kenya. Luhya is the second largest ethnic group in Kenya (KNBS, 2010). Luhya refers to both the people and their language. There are 18 subtribes that make up the Luhya, each with a distinct dialect. At least seven of these dialects are spoken by people in Kakamega County.

Luhya culture is comparable to most Bantu cultural practices. Daughters are expected to get married and have no permanent position in Luhya families. Decision-making within the family was done by men and women did not inherit property. Today, girls are allowed to inherit property, in accordance with Kenyan law. Many Luhya men live in urban towns and cities for most of their lives and only return to settle in the rural areas after retirement or the death of parents in the rural areas, leaving most of the running of rural homes to women.

Research Design

The study adopted the descriptive survey design employing both qualitative and quantitative research methods. A survey was used because it gathers data from a sample of a population at a particular time and therefore depicts the state of affairs as it exists (Kothari, 2004). Secondly survey was used because the study was attempting to discover causes yet could not control the variables as would be in experimental designs, as it was reporting what is happening. Thirdly, since ultimately the findings of the study are hoped to guide policymakers, extension and other researchers in decision making and planning, the survey design was found appropriate as it is used to obtain data useful in evaluating present practice and providing basis for decision (Shaughnessy, 2003).

In considering that the study was assessing women farmers engaged in indigenous vegetable production in Kakamega readiness to access high value markets by meeting quality standards demanded by such markets, sourcing only quantitative data from the women would not have depicted the women's state of affairs. An observation of how vegetables are handled on the farm and in the market was deemed appropriate. An interaction with key informants to collect qualitative data especially from supermarket staff was done to aid in understanding the way supermarkets operate. Information from extension officers was also deemed important to understand the farming communities and lastly an interaction with women leaders to see if what the women farmers perceived resonated with opinions of the leaders who mark a key entry point to embracing interventions by the women. The mixed methods approach was found to be the best for the study to triangulate the data sources (Ntifo-Siaw & Bosompem, 2009) and according to Creswell (2005) neutralise biases inherent in a single method. Triangulation provided information behind contextual issues underpinning the statistical inferences.

Study Population

The study population consisted of all the women growing AIVs in Kakamega County. Growing AIVs has been recommended as one of the suitable horticultural enterprises in all the sub counties in Kakamega (CGK, 2014). Women were targeted in the study because in the literature, AIV activities in western Kenya are dominated by women (Gotor & Irungu, 2010; Weller et al, 2010) and AIVs are considered a woman's crop (Gotor & Irungu, 2010; Oniang'o et al, 2008). In a

county with over half of its population living below the poverty line, women constitute 52percent of the population (KNBS, 2010).

Sampling Procedure

Sample Size Determination

Many authors have argued that in addition to the purpose of study and population size, three criteria usually will need to be specified to determine appropriate sample size: the level of precision, the level of confidence or risk, and degree of variability in the attributes being measured (Miaoulis and Michener, 1976; Israel, 2012;). For this study, Krejcie and Morgan (1970) table of sample sizes was used as a guide, bearing in mind though that for determination of sample size, no particular measure is absolute. According to the KNBS (2009) the three subcounties sampled for the study have 64324 households. Assuming all of them have a female AIV farmer, a sample size of 381 according to Krejcie and Morgan (1970) would have sufficed. However, due to the unlikelihood that all the households have female AIV farmers and since quantitative data was going to be triangulated with key informants, field observations, interactive discussions with farmers and farmers groups to provide information behind contextual issues underpinning the statistical inferences, a sample size of 276 was the most feasible and was selected for the study.

Sampling Method

The county government in Kenya is such that each county is made up of subcounties. Kakamega County has 12 subcounties. Each subcounty comprises of several county assembly wards. County assembly wards are divided into

sublocations and sublocations into villages which form the smallest unit of administrative office. Multi-stage sampling technique therefore was used to select the sample for the study. The county was stratified into three on the basis of crop zones in the county namely; maize, sugarcane and maize-sugarcane transition zones.

In the first stage, one subcounty was randomly selected from each stratum. The selected subcounties were Ikolomani (Maize zone), Lurambi (transition zone) and Malava (Sugarcane zone) (Figure 4). This was done due to the fact that the process of growing and marketing of AIVs in each zone was uniform and the research did not have sufficient resources to deal with many subcounties. In the second stage, all the county assembly wards (CAWs) in the selected subcounties were included in the sample. In the third stage, three sublocations with the highest number of women AIV farmers were selected from the CAWs. In the fourth stage, all the villages in the selected sublocations were included in the sample. Lastly, in the fifth stage, with the help of village elders and extension staff, a list of AIV farmers was developed and using systematic sampling, respondents were selected. Table 3 shows the sampling procedure.

Table 3: Multi-stage Sampling Procedure for the Study

Stage	Area involved	Number	Selected	Basis	Type of sampling
1	Sub Counties	12	3	Crop zone	Cluster
2	County Assembly Wards	17	ALL	-	-
3	Sub location	136	51	Highest no. of AIV farmers	Purposive
4	Village	168	ALL	-	-
5	Household	2520	276	Female AIV Farmer	Systematic

Source: Information from Sub County Agriculture Offices (2014)

Instruments of Data Collection

Structured and validated interview schedule was used to collect primary data (Appendix A). An interview schedule was used mainly because some women farmers were illiterate and could not read and write. Information was also sought from key informants such as extension officers, staff of supermarkets, women farmers' group leaders. Unobtrusive observations were also done in the markets. The face validity of the instrument was ensured by the researcher. This involved ensuring that each question was linked to an objective. The content validity was ensured by supervisors.

The interview schedule consisted of four (4) parts. Part I gathered data on the socio-economic characteristics of farmers. Part II was made up of 15 items that

focused on the level of knowledge of respondents on set quality standards and market demands. Part III consisted of items that measured extent of willingness and ability to comply with existing quality standards and market demands. Part IV gathered data on the perception of women AIV farmers regarding resources required to meet quality standards and demands.

Pre-testing

The pre-testing was done to ensure that the instrument was reliable. In other words, it consistently measures what it is measuring. According to Amin, (2005) and Mugenda and Mugenda, (2003), an instrument is reliable if it produces the same results whenever it is repeatedly used to measure trait or concept from the same respondents even by other researchers. Amin (2005) observed that a reliable instrument or device offers stability over time.

Thirty (30) women AIVs farmers from Shisasari area in Lurhambi and Bushitsiula area in Ikolomani were selected to pretest the interview schedule. The two areas were selected because the respondents had similar characteristics like the sample. Actually they were part of the population that were not selected. The selection of Shisasari area in Lurhambi and Bushitsiula area in Ikolomani used for the pretest eliminated the threat to internal validity caused by testing, whereby the respondents used in the pretest can get familiar with the questions and give biased answers at subsequent interviews. Cronbach's alpha coefficients were generated. According to George and Mallery (2003), a Cronbach's alpha of 0.7 is acceptable. The subscales had reliability coefficient of above 0.7 as shown in Table 4. The items on subscales were deemed reliable.

Table 4: Reliability Coefficients of Subscales of the Research Instrument

Subscale	Number of items	Cronbach's Alpha Coefficient
Extent of Willingness	15	0.87
Extent of Ability to comply	15	0.82
Perception about resources	18	0.80

Source: Pre-Data Collection Analysis (2014)

Data Collection/ Field Work

The introductory letter from Department of Agricultural Economics and Extension (Appendix B) was used to seek permission from the County Director of Agriculture. The County Director issued an introductory letter to the Sub County agriculture officers (SCAO) in the selected areas of the study (Appendix 4). The SCAOs further assigned extension officers in the operation areas who assisted the trained enumerators to enter the communities to collect data.

The enumerators were students pursuing agriculture at Sang'alo and Bukura Agricultural Colleges. The criterion used in selection of enumerators was ability to speak the local languages (Kiswahili and Kiluhya) fluently. To ensure that the enumerators collected the intended information from the women AIV farmers, the following steps were undertaken.

1. The enumerators were trained to transcribe the questions into the local language. This was to ensure that the questions asked were as intended to answer the objectives of the study;

2. After training, the researcher visited farmers with the enumerators and administered the instrument to demonstrate what was expected of them (Plate 1);
3. Each enumerator then tried interviewing a farmer in the presence of the researcher; and lastly,
4. Questions that were not asked well were clarified by the researcher before the enumerators went to the field to collect data.



Plate 1: Researcher Interviewing a Farmer in the Presence of Enumerators

Source: Author (2014)

Data Processing and Analysis

Statistical Package for the Social Sciences (SPSS) version 21 software was used to analyze quantitative data. Data was coded and cleaned by running some analysis to ensure that all the entries were correct. Descriptive and inferential statistics were generated according to the objectives of the study. Statistical techniques used in analyzing data for each objective are summarized below:

Objective 1: To determine the level of knowledge on quality standards and market demands among women AIV farmers in Kakamega, Frequencies, means and Standard deviation were used to describe the data. The QSMDs were grouped into product attributes, process attributes and transaction attributes and the score for each respondent was assessed on the attributes. The farmer was asked to indicate whether they knew each of the QSMDs. 1 point was scored for a “Know” answer and 0 for “Don’t Know”. A total score out of 15 was then computed for each respondent. A scale was used to categorize the farmers’ knowledge into levels as follows: 0-3=Very low; 4-6=Low; 7-9=Moderate; 10-12-High; 13-15=Very High. Chi-square test was used to determine if there was difference in level of knowledge among the farmers in the three sub counties and if relationships existed between knowledge and socioeconomic characteristics of the farmers.

Objective 2: To assess the perception of the farmers regarding resources required to meet HVM demands, Frequencies, means and standard deviation was used to describe the data. A cross tabulation of farmers perception with their socioeconomic characteristics was also done. A 6 point likert type scale with 15 items was used as follows: 1= Strongly disagree; 2=disagree; 3=moderately

disagree; 4=moderately agree; 5=agree; 6=Strongly agree. Means were computed and a scale of 1.00-1.44= strongly disagree; 1.45-2.44=disagree; 2.45-3.44=moderately disagree; 3.45-4.44=moderately agree; 4.45-5.45=agree; 5.45-6.00 = strongly agree, was used to interpret results.

Objective 3: To find the perceived challenges hindering women farmers in Kakamega County from growing AIVs for HVMs, frequencies were used and a cross tabulation between socio cultural characteristics of the farmers was done specifically decision making responsibility and marital status.

Objective 4: To establish the extent of willingness of women AIV farmers in Kakamega County to meet quality standards and demands of HVMs, frequencies, percentages, means, standard deviation was used to describe the data. A 5 point likert type scale was used to measure the perception of respondents as follows: 1=Very little Extent; 2= Small Extent; 3=Somewhat large extent;4=large extent; 5= Very large Extent. Means were then computed for each respondent and the following scale was used: 1.00-1.44=Very little extent; 1.45-2.44=Small extent; 2.45-3.44= somewhat large extent; 3.45-4.44= large extent; 4.45-5.00= Very large extent.

Objective 5: To determine the perceived competence level of women AIV farmers in Kakamega to comply with existing quality standards and demands of HVMs, frequencies, percentages, means and standard deviation were used. A 5 point likert type scale was used to measure the perceived competence level of respondents as follows: 1=Very Low (Can comply with a lot of difficulty) ; 2=Low

competence (Can comply with difficulty) ; 3=Average competence (Comply with quite some ease); 4=High competence (Comply easily); 5= Very high competence (comply very easily). Means were then computed for each respondent and the following scale was used: 1.00-1.44=Very low competence; 1.45-2.44=Low competence; 2.45-3.44= Average competence; 3.45-4.44= high; 4.45-5.00= Very high competence.

Objective 6: To assess the factors related to readiness to satisfy QSMDs among women AIV farmers the following procedure was followed to infer the variable “Readiness” operationalized from the variables “Willingness” and “Perceived Competence to Comply”: The overall mean of the farmers’ extent of willingness and perceived competence for each item was computed. The two means were multiplied to compute “Readiness”. The following scale was used: 1-5=Very Low; 6-10=Low; 11-15=Average; 16-20-High; 21-25-Very High. A correlation matrix was generated to establish the factors that are related to “Readiness”.

CHAPTER FOUR

RESULTS AND DISCUSSION

Introduction

This study sought to assess the readiness of women African indigenous vegetable farmers in Kakamega County to satisfy quality standards and market demands of high value markets. To meet this objective, data was collected and analysed. This chapter presents the results and discussions of the study and has been structured as follows: AIVs grown by the farmers, farmers socio-demographic characteristics, awareness status of the farmers regarding quality standards, level of knowledge among farmers, perception on resources, challenges farmers perceive as hindering access to HVMS, farmers extent of willingness, competence and readiness to satisfy quality standards and factors associated with readiness.

African Indigenous Vegetables Grown by Women Farmers in Kakamega

The study revealed that nine (9) AIV species were commonly grown by the women in Kakamega County as shown in Table 4. The results show that over 50% of the women grew black nightshade (*Solanum nigrum*), cowpeas (*Vigna unguiculata*), slenderleaf (*Crotalaria brevidens*), jute mallow (*Corchorus oliitorus*) and spider plant (*Cleome gynandra*). These were also the most common African indigenous vegetables in the supermarkets (Plate 2).



Plate 2: Black nightshade (*Solanum* spp.) an African Indigenous Vegetable in a Supermarket in Kenya. Source: Author (2014)

Discussion with the supermarket staff revealed that these vegetables were on high demand amongst customers especially black nightshade, spider plant and amaranth. All the nine (9) were readily available in the open market. Similar results were obtained by Abukutsa-Onyango (2007) in a market survey seeking to prioritize the vegetables for research on agronomy, postharvest and value addition. This implies that the vegetables are still the preferred choices of most farmers in Kakamega.

Table 5: Frequency Distribution of African Indigenous Vegetables Grown in Kakamega County

African Indigenous Vegetable	*Frequency.	Percent
Black Nightshade (<i>Solanum nigrum</i>)	202	73.2
Cowpeas (<i>Vigna unguiculata</i>)	201	72.8
Slenderleaf (<i>Crotolaria brevidens</i>)	189	68.5
Jute Mallow (<i>Corchorus oliitorus</i>)	182	65.9
Spider plant (<i>Cleome gynandra</i>)	137	49.6
Pumpkin leaves (<i>Cucurbita spp.</i>)	132	47.8
Pigweed (<i>Amaranthus spp.</i>)	111	40.2
Ethiopian Mustard (<i>Brassica carinata</i>)	23	8.3
African spinach (<i>Basella Alba</i>)	20	7.3
Total	276	100

* Multiple responses

Source: Field data (2014)

Socio-demographic Characteristics of Farmers in Kakamega County

The study revealed that many of the women were above 40 years of age (M=46.8, SD=12.1) as indicated in Table 6. This implies that AIV activities are dominated by older women. There is need to motivate the younger women to engage in AIV production and marketing to sustain production.

Table 6: Age of Women African Indigenous Vegetables Farmers in Kakamega County

Age range	Frequency	Percent	Mean	SD
20-29	27	9.8	46.8	12.1
30-39	49	17.8		
40-49	76	27.6		
50-59	85	30.5		
60-69	31	11.3		
70-79	8	2.9		
Total	276	100.0		

Source: Field data (2014)

Over 65 percent (65.6%). of the women farmers are married and in male headed households. Over a fourth (26.4%) are single women as shown in Table 7 and were heading households.

Table 7: Marital Status of Women African Indigenous Vegetables farmers in Kakamega County

Marital Status	Frequency	Percent
Single- Female headed	73	26.4
Married -Female headed	22	8.0
Married- Male headed	181	65.6
Total	276	100.0

Source : Field data (2014)

This study revealed that majority of the women had at least 8 years of schooling (Mean=8.7, SD=3.6). Over a tenth (11.2%) had no formal education and close to 40 percent (39.5%) had attained secondary school level education (Table 8). This implies that most of the women AIV farmers should be literate.

Table 8: Educational Attainment of Women African Indigenous Vegetables Farmers in Kakamega County

Level (Yrs of schooling)	Frequency	Percent	Mean	SD
No formal education (0)	31	11.2	8.7	3.6
Primary (1-11)	136	49.3		
Secondary and above (12 and above)	109	39.5		
Total	276	100.0		

Source: Field data (2014)

Results of this study (Table 9) show that majority (70.2%) of the women had less than 10 years of selling AIVs (Mean=7.4, SD=0.88). The standard deviation shows that there was very little variability among the women in terms of experience. This result contrasts Mwaura et al's (2014) study in Kiambu which found mean years of experience among AIV female farmers to be 14.53. In Mwaura et al's (2014) study most farmers were supplying to HVM and AIVs were found to be a very important contributor to household income of these farmers with more than 10 years' experience. This implies that the more years a farmer interacts with the market the more they gain experience and seek better markets for the crop hence increasing income.

Table 9: Experience (Years) in Marketing Indigenous Vegetables by Women Farmers in Kakamega County

Years	Frequency	Percent	Mean	SD
0-9	181	70.2	7.4	0.88
10-19	47	18.2		
20 and above	30	11.6		
Total	258	100		

Source: Field data (2014)

In the literature, one strategy that has been found to increase the capital available to increase uptake of the modern purchased inputs is diversification of household income through having off-farm income opportunities (Diirro, 2013). This study revealed that 56.5 percent of the women AIV farmers had no off farm activity (Table 10). Further, less than 10 percent (9.6%) of the women AIV farmers were engaged in formal employment. This implies that many of the women do not have other sources of income apart from that received from sale of farm produce.

Table 10: Women African Indigenous Vegetable farmers Alternative livelihood

	Frequency	Percent
No other occupation	156	56.5
Informal employment	94	33.9
Formal employment	26	9.6
Total	276	100

Source : Field data (2014)

Results of this study (Table 11) revealed that majority of the farmers belonged to organizations (81.5%). The farmers were members of women groups, community welfare groups, microfinance groups and farmers' groups. The farmers indicated that they benefitted from the organizations in terms of credit, labour, household goods and social support. This finding confirms Uphoff and Buck (2006) assertion that rural institutions such as farmer-based organizations, community-based organizations, cooperatives, water user associations, self-help groups, informal networks and various forms of collective action for agricultural and rural activities offer a potential in increasing the poor's bargaining power and in enabling them to pool extremely scarce resources together .

Table 11: Membership to Associations of Women Farmers in Kakamega

Membership status	Frequency	Percent
Not a Member	51	18.5
Member	225	81.5
Total	276	100.0

Source: Field data (2014)

Level of Knowledge on Quality Standards and Market Demands (QSMDs) of HVM among Women AIV Farmers in Kakamega County

Knowledge and information are basic ingredients for increased agricultural production and productivity (Botlhoko & Oladele, 2013). Awareness is the precursor to knowledge which is the first stage in adopting any innovation (Rogers, 2003). This study revealed that over half of the women (58%) were aware that QSMDs exist to access HVMs as shown in Table 12

Table 12: Awareness status of women farmers on QSMDs of HVMs

Awareness status	Frequency	Percentage
Aware	160	58.0
Not aware	109	39.5
No response	7	2.5
Total	276	100

Source: Field data (2014)

Awareness is a passive stage but very important because it creates the interest in a system to actively seek out new information, both explicit and tacit. The quest is informed by sources both outside and inside the community leading to an acquisition of knowledge (Rogers, 2003). Despite a majority (58.0%) of the women AIV farmers in Kakamega being aware that QSMDs existed, results of the study as shown in Table 13 showed that only five (5) out of the 15 QSMDs of HVM were known by the majority of the respondents representing 33.3 percent of the total QSMDs known by the farmers. The QSMDs known by many of the farmers were; cleanliness of vegetables (82%), neatly bundling of vegetables (62%), pest free (70.3%), disease free (58.7%) and vegetables being very fresh at point of sale (54.7%).

In contrast, the less known QSMDs were; growing vegetables with unpolluted water (19.6%), negotiating for a contract with high value market (17.4%), Farmer agreeing to undergo probation if contracted (17.0%), provision of samples before supply (15.9%) and adhering to specific market weight (14.9%). Of these five (5) less known QSMDs, three (3) are transaction attributes (negotiating

for contracts, undergoing probation and providing samples). This implies that most farmers lack knowledge on the requirements they need to fulfill to transact business with high value markets.

Since the farmers for this study were sampled from three different sub counties representing a major crop zone, the study sought to find out if differences existed in knowledge level of the farmers in the crop zones represented by the sub counties on each of the quality standards, Chi-square test was able to explore that that. The test results revealed that significant differences existed in knowledge on all the quality standards and market demands except on neat bundling of vegetables and harvesting at young stage at $p < 0.05$ in the crop zones (Table 13).

This study results showed that the women in the sugarcane zone know fewer quality standards than women in the sugarcane maize transition zone and maize zone. This implies that women in the sugarcane zone are less likely to access high value markets due to their low knowledge on quality standards demanded by the market. Observations made at Nakumatt and Tusksys supermarkets revealed that the vegetables sold by them met the visual attributes required. An interactive chat with the supermarket staff revealed that the vegetables were supplied from Nairobi (approximately 400km from Kakamega) and not from farmers in Kakamega.

Table 13: Chi Square Analysis of Variations in Quality Standards and Market Demands Known by Respondents in Different Crop Zones in Kakamega

QSMD	Knowledge Status	Crop Zone			Total	χ^2	p-value
		Maize/Sugarcane Zone	Sugarcane Zone	Maize Zone			
Cleanliness of Vegetables							
	Know	79(81.4%)	86(97.7%)	60(65.9%)	225(81.5%)	30.02	0.00*
	Don't know	18(18.6%)	2(2.3%)	31(34.1%)	51(18.5%)		
	Total	97(100%)	88(100%)	91(100%)	276(100%)		
Neatly bundled vegetables							
	Know	67(69.1%)	50(56.8%)	54(59.3%)	171(62.0%)	3.33	0.19
	Don't know	30(30.9%)	38 (43.2%)	37(40.7%)	105(38.0%)		
	Total	97(100%)	88(100%)	91(100%)	276(100%)		
Disease free vegetables							
	Know	28 (28.9%)	80(90.9%)	54(59.3%)	162(58.7%)	40.61	0.00*
	Don't know	69(71.1%)	8(9.1%)	37(40.7%)	114(41.3%)		
	Total	97(100%)	88(100%)	91(100%)	276(100%)		
Pest Free Vegetables							
	Know	53(54.6%)	84(95.5%)	57(62.6%)	194(70.3%)	73.28	0.00*
	Don't know	44(45.4%)	4(4.5%)	34(37.4%)	82(29.7%)		
	Total	97(100%)	88(100%)	91(100%)	276(100%)		

Table 13: Chi Square Analysis of Variations in Quality Standards and Market Demands Known by Respondents in Different Crop Zones in Kakamega County (Continued)

QSMD	Knowledge Status	Crop Zone			Total	χ^2	p-value
		Maize/ Sugarcane Zone	Sugarcane zone	Maize Zone			
Harvested before flower/seed development(Young and tender)							
	Know	43(44.3%)	34(38.6%)	47(51.6%)	124(44.9%)	5.01	0.29
	Don't know	54(55.7%)	54(61.4%)	44(48.4%)	152(55.1%)		
	Total	97(100%)	88(100%)	91(100%)	276(100%)		
Vegetable should be of specific length							
	Know	24(24.7%)	6(6.8%)	31(34.1%)	61(22.1%)	21.67	0.00*
	Don't know	73(75.3%)	82(93.2%)	60(65.9%)	215(77.9%)		
	Total	97(100%)	88(100%)	91(100%)	276(100%)		
Bundled Vegetable should be of specific weight							
	Know	18(18.6%)	0(0.0%)	23(25.3%)	41(14.9%)	24.22	0.00*
	Don't know	79(81.4%)	88(100.0%)	68(74.7%)	235(85.1%)		
	Total	97(100%)	88 (100%)	91(100%)	276(100%)		

Table 13: Chi Square Analysis of Variations in Quality Standards and Market Demands Known by Respondents in Different Crop Zone in Kakamega County (Continued)

QSMD	Knowledge Status	Crop Zone			χ^2	p-value
		Maize/ Sugarcane Zone	Sugarcane Zone	Maize Zone		
Very Fresh at point of sale						
	Know	42(43.3%)	62(70.5%)	47(51.6%)	151(54.7%)	14.20 0.01*
	Don't know	55(56.7%)	26(29.5%)	44(48.4%)	125(45.3%)	
	Total	97(100%)	88(100%)	91(100%)	276(100%)	
Vegetables free from pesticide residues						
	Know	34(35.1%)	2(2.3%)	38(41.8%)	74(26.8%)	40.72 0.00*
	Don't know	63(64.9%)	86(97.7%)	53(58.2%)	202(73.2%)	
	Total	97(100%)	88(100%)	91(100%)	276(100%)	
Vegetables grown with unpolluted water						
	Know	19(19.6%)	0(0.0%)	35(38.5%)	54(19.6%)	42.05 0.00*
	Don't know	78(80.4%)	88(100.0%)	56(61.5%)	222(80.4%)	
	Total	97(100%)	88(100%)	91(100%)	276(100%)	
Farmer to negotiate for a tender						
	Know	19(19.6%)	5(5.7%)	24(26.4%)	48(17.4%)	13.84 0.01*
	Don't know	78(80.4%)	83(94.3%)	67(73.6%)	228(82.6%)	
	Total	97(100%)	88(100%)	91(100%)	276(100%)	

Table 13: Chi Square Analysis of Variations in Quality Standards and Market Demands Known by Respondents in Different Crop Zones in Kakamega County (Continued)

QSMD	Knowledge Status	Maize/ Sugarcane Zone	Sugarcane zone	Sub County		χ^2	p-value
				Maize Zone	Total		
Farmer to provide samples of AIVs							
	Know	16(16.5%)	3(3.4%)	25(27.5%)	44(15.9%)	19.37	0.00*
	Don't know	81(83.5%)	85(96.6%)	66(72.5%)	232(84.1%)		
	Total	97(100%)	88(100%)	91(100%)	276(100%)		
Farmer to supply on probation basis initially							
	Know	18(18.6%)	0(0.0%)	29(31.9%)	47(17.0%)	32.40	0.00*
	Don't know	79(81.4%)	88(100.0%)	62(68.1%)	229(83.0%)		
	Total	97(100%)	88(100%)	91(100%)	276(100%)		
Farmer should supply large Volumes							
	Know	24(24.7%)	23(26.1%)	46(50.5%)	93(33.7%)	17.30	0.00*
	Don't know	73(75.3%)	65(73.9%)	45(49.5%)	183(66.3%)		
	Total	97(100%)	88(100%)	91(100%)	276(100%)		
Farmer should supply consistently							
	Know	30(30.9%)	13(14.8%)	44(48.4%)	87(31.5%)	23.39	0.00*
	Don't know	67(69.1%)	75(85.2%)	47(51.6%)	189(68.5%)		
	Total	97(100%)	88(100%)	91(100%)	276(100%)		

* Significant at p< 0.05

Source: Field data (2014)

Observations made in the open markets at Amalemba in Lurhambi sub county, Imalinya in Ikolomani and Isanjiro in Malava sub county markets indicated that most traders were not meeting the QSMDs. For example, the roots of cowpeas (*Vigna unguiculata*), slenderleaf (*Crotolaria brevidens*) and jute mallow (*Cochorus oliitorus*) were not trimmed and carried soil. The bundled vegetables were of varying weights and length, and stored in bags instead of crates. Results of this study revealed that close to 50 percent of the women AIV farmers (48.6%) had “Low” level of knowledge as shown in Table 14.

Table 14: Level of Knowledge on Quality Standards among Women Farmers in Kakamega County

No. of QSMDs Known (Level of Knowledge)	Frequency	Percent	Mean	SD
0-3 (Very Low)	56	20.3	5.72	3.05
4-6 (Low)	134	48.6		
7-9 (Moderate)	51	18.5		
10-12 (High)	26	9.4		
13-15 (Very High)	9	3.3		
Total	276	100.0		

Source: Field data (2014)

A few of the farmers (3.3%) had “Very high” level of knowledge about QSMDs. Twei (2010) found similar results with milk farmers in Kenya. The farmers had low knowledge of regulations that aim at ensuring that the farmers met requirements of milk quality control.

**Perception of AIV Farmers on Status of Resources Required To Satisfy
Quality Standards and Market Demands of High Value Markets.**

The perception of farmers on the status of resources that are required to assist them to satisfy QSMDs was assessed and the result is presented in Table 15.

Table 15: Women Farmers Perception of Status of Resources in Kakamega

Statement	Agree		Disagree		Mean	SD	Ver- dict
	Freq.	%	Freq.	%			
Land is fertile for AIV production	259	93.8	17	6.2	4.83	1.02	A
AIV seeds are easily available	222	80.4	54	19.6	4.39	1.14	A
Labour is readily available	211	76.4	65	23.6	4.36	1.28	A
Fertilizer are easily available	159	57.6	117	42.4	3.73	1.43	A
Pesticides are easily available	147	53.3	129	46.7	3.62	1.44	A
Hired labour is affordable	138	50.0	138	50.0	3.47	1.44	A
AIV seeds are affordable	129	46.7	147	53.3	3.08	1.45	D
I have information on production	125	45.3	151	54.7	3.32	1.41	D
Fertilizers are affordable	110	39.9	166	60.1	3.04	1.33	D
I have information on marketing	108	39.1	168	60.9	3.15	1.44	D
Pesticides are affordable	100	36.2	176	63.8	2.93	1.32	D
Irrigation technologies are simple	88	31.9	188	68.1	2.84	1.39	D
Easily get Irrigation equipment	79	28.8	197	71.4	2.64	1.42	D
Credit is easily accessible	76	27.5	200	72.5	2.67	1.38	D

n=276.Scale:1.00-3.44-Disagree(D);3.45-5.00-Agree(A);Source:Field data (2014)

Women AIV farmers in Kakamega agreed that most resources required for meeting the QSMDs of HVMs, such as seeds ($M=4.39$, $SD=1.14$), fertilizers ($M=3.73$, $SD=1.43$) and pesticides ($M=3.62$, $SD=1.44$) were available in the market (Table 15). However, despite the availability of these inputs, farmers cited distance and high cost of transportation as constraints and disagreed that these inputs were affordable. A discussion with women leaders revealed that it was easy to get AIV seeds preserved from previous cropping from neighbours' and friends for kitchen gardening but not for commercial purposes.

Fertilizer was perceived to be available but not affordable. In Kenya, fertilizer is available to small scale farmers from the government at subsidized prices if the fertilizer is purchased from the National Cereals and Produce Board (NCPB) a Kenyan government run company. Using di-ammonium phosphate (DAP) as an example, 50kg retails at Sh2500 (around US\$25) subsidized. If the same is purchased from private traders, it would cost between Sh3500 (US\$35) and Sh3,700 (\$37US). This, to an ordinary farmer is expensive in a society with a high poverty level.

Results of the study in Table 15 further revealed that farmers disagreed to availability of irrigation equipment ($M=2.64$, $SD=1.42$) and simplicity of implementation of irrigation technologies ($M=2.84$, $SD=1.39$). This implies that irrigation equipment should be made more available and affordable to the women farmers and irrigation technologies made easier for the women to adopt through making them labour saving and appropriate. Sijali and Okumu (2002) posited that

small-scale scale farmers tend to look for irrigation technologies that they can understand and afford to buy.

One main channel of transmission of agricultural information is through the process of extension service. This study revealed that women AIV farmers feel they don't have adequate information on production ($M=3.32$, $SD= 1.41$) and marketing ($M=3.15$, $SD=1.44$) of AIVs. More than half (54%) of the women indicated that public extension service was the main source of information. The finding of this study on sources of information for farmers is contrary to that of Nlerum et al. (2012) that friends and family members are main source of agricultural information to farmers in Eleme area of Rivers State in Nigeria. It further contrasts a study by Olajide (2011) in which fellow farmers represented the most common (76.3%) source of information for farmers. It further contrasts Alfred and Fagbenro (2006) that radio was the most used source of information for fishermen in Nigeria. However, it confirms Wanderi (2013) who observed a similar trend for households in Eastern and Central Kenya which showed that 56 – 68 percent of households use services as major source of information. Okonya et al. (2014) also made similar observations in Uganda. This suggests that the type of information source dominating in a place depends on the place and its contextual factors.

The media ranked second in disseminating agricultural information. The media sources that were indicated by some farmers included radio and Television. ICT has been lauded as an effective tool for extension delivery and the mobile phone is being used for this purpose in some areas in Africa. Eighty eight percent (88 %) of the women farmers owned a mobile phone and further provided the

mobile phone number. Ten (10) of the numbers in each sub County were randomly called to ascertain who the respondent would be and majority (9 in Lurhambi, 7 in Malava and 6 in Ikolomani) answered the call personally.

Majority of the farmers (72.5%) perceived credit to be inaccessible with a mean of 2.67 (SD=1.38) which indicates disagreement. Results in Table 16 show that close to 61 percent (60.9%) of the farmers had not accessed credit before. Of the 39 percent women farmers who had accessed credit before, 74.1 percent accessed from an informal source whilst 25.9 percent accessed from formal source. This confirms findings by Atieno (2001) which showed that most farmers in Kenya had not used credit before. Out of those who had, the majority had used informal sources.

Table 16: Source of Credit for Women Farmers in Kakamega County

Source	Frequency	Percentage
Not accessed credit before	168	60.9
Accessed from informal sources	80 (80)	29.0 (74.1)
Accessed from formal sources	28 (28)	10.1 (25.9)
Total	276 (108)	100 (100)

NB: Figures in brackets indicate those who had accessed credit of some kind.

Source: Field data (2014)

In this study, formal sources of credit indicated by the farmers were commercial banks, cooperatives and micro finance banking institutions. Informal sources of credit indicated by the farmers were non-bank financial institutions, rotating savings and credit associations, commercial moneylenders, friends and relatives. This result supports the assertion by van Bastelaer (2000) that loans from family and friends are a common form of informal finance as they are characterized by uncollateralized loans that carry no or little interest, feature open-ended repayment arrangements, and have a strong focus on reciprocity.

This study further revealed that close to 57 percent of the farmers had no alternative livelihood activity apart from farming. Of the 43 percent who indicated having an alternative livelihood activity, less than 10 percent were in a meaningful employment for example teaching and nursing. The rest indicated involvement in petty trading, casual labour and operation of village shop commonly known as “Kiosk”. This result confirms the consensus arrived at, at the World Economic Forum (2013) that if women are employed, they are more likely to be in part-time, seasonal and low-paying jobs. In most cases in Kenya, people with formal employment are the ones who easily access credit from formal sources as the financial institutions use monthly salary as collateral security. This implies that credit is not easily accessed by majority of women since most are engaged in informal employment.

This study sought to find if the perception of farmers on accessibility of credit was independent of their socio-demographic characteristics. Results of the Chi square test of independence are shown in Table 17.

Table 17: Analysis of Socio Demographic Characteristics of Women Who Perceived Credit to be Accessible in the Different Sub-Counties

Credit is easily accessible	Sub-county			Total	χ^2	p-value
	Lurambi	Malava	Ikolomani			
Marital Status- Household head						
Single-FH	7(19%)	1(5%)	3(18%)	11(15%)	34.27	0.00*
Married-FH	8(22%)	1(5%)	1(6%)	10(13%)		
Married-MH	22(60%)	20(90%)	13(77%)	55(72%)		
Total	37(100%)	22(100%)	17(100%)	76(100%)		
Educational level						
No formal education	1(3%)	1(5%)	1(6%)	3(4%)	29.52	0.01*
Primary	13(35%)	10(46%)	10(59%)	33(43%)		
Secondary and >	23(62%)	11(50%)	6(35%)	40(53%)		
Total	37 (100%)	22 100%)	17(100%)	76(100%)		
Age						
20-39	12(32%)	8(36%)	5(29%)	25(33%)	19.51	0.77
40-59	20(54%)	13(59%)	10(59%)	43(57%)		
60 and >	5(14)	1(5%)	2(12%)	8(11%)		
Total	37(100%)	22(100%)	17(100%)	76(100%)		
Experience (years)						
0-9	25(69%)	15(75%)	10(63%)	50(69%)	25.28	0.19
10-19	4(11%)	3(15.0%)	4(25%)	11(15%)		
20 and>	7(19%)	2(10.0%)	2(13%)	11(15%)		
Total	36(100%)	20(100%)	16(100%)	72(100%)		

*Significant at $p < 0.05$ MH-Male headed; FH-Female headed

Source: Field data (2014)

The study results revealed that the perception of the women farmers on accessibility of credit differed in the three sub counties. More women farmers in Lurambi (Sugarcane/Maize zone) perceived credit to be accessible than those in Malava (Sugarcane zone) and Ikolomani (Maize zone). The perception of the women farmers on accessibility of credit also depended on marital status of the women ($\chi^2=34.27$, $p=0.00$) and their educational level ($\chi^2=29.52$, $p=0.001$). On the contrary, perception on accessibility of credit did not depend on farmer's age ($\chi^2=19.51$, $p=0.77$) or experience (years) ($\chi^2=25.28$, $p=0.19$). This contrasts with findings of Anyiro and Oriaku (2011); Obisesan (2013) in Nigeria that age is a determinant of credit accessibility among other components.

Less women in female headed households perceived credit to be accessible. Only two (2) women in female headed households in Malava perceived credit as being accessible. More married women in male headed households agreed that credit was accessible than married women in female headed households in all the three sub counties. This result confirms assertions by Fletschner and Kenney (2011), that rural financial programmes have been largely designed, crafted and implemented with the male head of household as the intended client and fail to recognize that women are active, productive and engaged economic agents with their own financial needs and constraints.

In terms of education, majority of the farmers with some formal education agreed that credit was accessible. With the exception of Ikolomani where more with primary level education perceived credit to be accessible, more women farmers with secondary education and above in Lurambi and Malava agreed that credit was

accessible. Anyiro and Oriaku (2011) and Obisesan (2013) also found that accessibility to credit was influenced by education. Similarly, in Rwanda, Muhongayire et al., (2013) observed that the likelihood of farmers participating successfully in formal credit markets increased with education. This implies that the higher the educational level of the farmer the more likely the farmer is to seek credit.

Challenges Hindering Women Indigenous Vegetables Farmers to Access

High Value Markets

A number of Challenges were cited by the women AIV farmers as hindering them from growing AIVs for HVMs and hence not accessing the markets as shown in Table 18. Inadequate information about high value markets was cited as a challenge by 188 of the 276 women farmers in this study. The women had scanty information on how the market operates and the requirements a farmer has to meet to access the market. Results of this study showed that out of the 276 respondents only 12 (4.3%) supplied to a high value market further confirming inadequate information about HVMs as a challenge.

Most farmers seek information from people in their immediate environment since these constitute the primary group of interaction. This result confirms findings of several studies as reviewed by Ragasa (2012) that lack of access to information about a technology or the lack of required complementary knowledge and skills to use technologies is a hindrance to a faster adoption of new technologies and improved management practices.

Table 18: Challenges to Production of Indigenous Vegetables for High Value Markets by women farmers in Kakamega County

Constraint	*Frequency	Percentage
Inadequate information about HVMs	188	68.1
Inadequate capital	172	62.3
Small land holdings	154	55.8
Low quality due to pests and diseases	147	53.3
Seasonal production of vegetables	143	51.8
Lack of zeal and motivation	139	50.4
Poor infrastructure	137	49.6
Culture	119	43.1
Total	276	100

*Multiple responses Source: Field data (2014)

Inadequate capital was the second most cited challenge that hinders the women AIV farmers to access high value markets. Of the 276 respondents 172 women perceived capital to be inadequate. This result confirms findings of Atieno (2001) that in Kenya access to credit is as the major hindrance to rural women accessing markets. Further, results of this study showed that level of income among the farmers is low. The findings in Table 19 show that over 90 percent (90.2%) of

the women made below 10,000Kshs (approximately US\$115) per month from sale of vegetables.

Table 19: Level of Income from Sale of Vegetables Among Women Farmers

Income (Kshs)	Level	Frequency.	Percent	Mean	SD
Less 1000	Very low	72	26.1	3028.80	4616.63
1000-9999	Low	177	64.1		
10,000-19999	Moderate	13	4.7		
20,000-29999	High	9	3.3		
Above 30,000	Very high	5	1.8		
Total		276	100		

NB: The Kenya Shilling was exchanging at 87 to the US dollar at the time of Field Survey. Source: Field data (2014)

The low income from sale of vegetables was unlikely to satisfactorily serve as collateral for credit which could serve as capital. Further a discussion with the women revealed that the low income from sale of vegetables was because most of the women did not engage in vegetable production for commercial purposes rather they produced for subsistence use and sold the surplus at farm gate or the open market. Table 20 shows the relationship between income and the type of market the farmer participated in.

Table 20: Relationship between Income and the Type of Market Accessed By Indigenous Vegetable Women Farmers in Kakamega County

	Market			Total (%)	χ^2	p-value
	Farm gate	Open	HVM			
Income level						
Very low	53(37.1%)	19(15.7%)	0(0.0%)	72(26.1%)	29.88	0.00*
Low	86(60.1%)	91(75.2%)	0(0.0%)	177(64.1%)		
Moderate	3(2.1%)	7(5.8%)	3(25.0%)	13(4.7%)		
High	1(0.7%)	2(1.7%)	6(50.0%)	9(3.3%)		
Very high	0(0.0%)	2(1.7%)	3(25.0%)	5(1.8%)		
Total	143(100%)	121(100%)	12(100%)	276(100%)		

*Significant at $p < 0.05$

Source: Field data (2014)

The Chi square test showed that there was a significant relationship between market and income at $p < 0.05$ ($\chi^2 = 29.88$, $p = 0.000$). Majority of the farmers who sold at farm gate (60.1%) got low income from sale of vegetables. In the same vein, of those who sold in the open market, 75.2 percent fell in the low income bracket. Less than five (5) percent (4.3%) of the women farmers sold indigenous vegetables to the high value market. These women were in the 'moderate' to 'very high' income categories with none of them in the 'low' to 'very low' groups. Generally many of the farmers did not make a lot of money from vegetable production (64.1%). However, asked if vegetable production and marketing was a profitable enterprise, majority of the women AIV farmers strongly agreed that they can make good profit from the sale of vegetables. This implies that the women were very aware that AIV farming can be a profitable agribusiness venture to invest in.

The third major challenge was small land holdings among the farmers. Land is one of the major factors of production and what is grown on it has implications on the households' wellbeing. More than half the women perceived the land to be small for production of AIVs for high value markets. Small land holding was a constraint as production by individual farmers is low and cannot meet the volumes demanded by the HVM. This study revealed that the percentage of total land available to the family for farming to the size of land under AIV production was low. The minimum land size under indigenous vegetables was 0.06 acres and the maximum was four (4) acres. This finding confirms Nekesa & Meso (1995) assertions that land put under AIVs is usually small. Results in Figure 5 indicate

that many of the farmers (68.0%) had between a quarter of an acre to 2 acres of land under indigenous vegetable production.

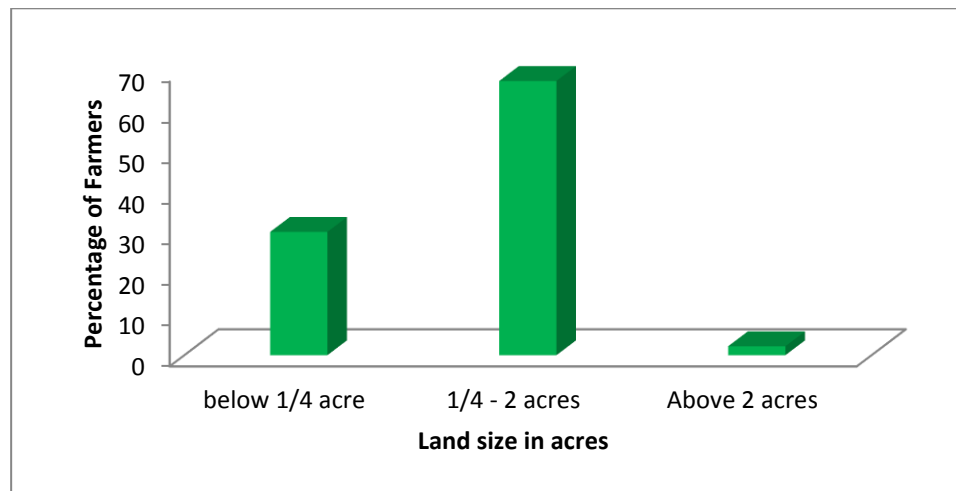


Figure 5: Land (acres) under Indigenous Vegetables Production in

Kakamega

Source: Field data (2014)

To satisfy quality standards of high value markets, AIVs must be of high quality. Many women farmers indicated that the vegetables were of low quality due to pest and disease incidences. This finding confirm Nchore et al. (2011) and Muturi et al's (2010) observations that disease incidences of up to 60percent on AIVs especially black nightshade (*Solanum* spp.). Pests and diseases lower yield and quality of vegetables (Sikora & Fernandez, 2005). This implies that for farmers to access high value markets safe control measures for pests and diseases in AIVS need to be adopted.

Results of this study revealed that the women AIV farmers lacked motivation to produce for high value markets. A discussion with women leaders in the villages established that if incentives such as provision of inputs (seeds, fertilizer) and loans were given to the farmers they would be willing to produce.

This finding corroborates that of Obaniyi et al., (2014) that showed that financial incentives was a major motivational incentive for rice farmers in Kwara State, Nigeria. This implies that for farmers to engage in agricultural projects the underlying motivational factors should be considered. There is a need for an external force other than the community itself to inspire the farmers to take initiative in embracing agribusiness ventures that can improve their wellbeing.

Most AIVs are produced under rain fed systems leading to seasonal production of the vegetables by the farmers. Results showed that 143 women AIV farmers regarded this as a constraint since they could not supply the market consistently. This confirms Shepherd (2007) assertions that small-scale farmers face difficulties in providing consistent supply, even before they are required to meet sophisticated safety standards and good commercial practices. Supermarkets, whether local or overseas, need to have a full range of produce available for their customers at all times. This implies that other production systems must be adopted by the farmers to ensure that AIVs are available throughout the year.

Other constraints such as poor roads in some parts of the county and long distance to the market were cited by close to half of the farmers (49.6 %) farmers. Further, cost of transportation was perceived by 21percent of the women to be high. AIVs being a perishable commodity should reach the market while still fresh, a quality standard demanded by the market. This implies that good roads and markets can be an incentive for production of AIVs for HVM. According to the Deputy Governor of Kakamega County (Prof. Kutima, Personal Communication,

September 2014) most rural roads would be upgraded and the Municipal market which had been built was underway for commissioning.

Results of this study showed that 43.1 percent of the women perceived culture to be a challenge in accessing high value markets. Close to half of the women (46.4%) perceived land issues to be the domain of men. The Luhya culture did not permit the women to own land and to take major decisions on crops to be grown on the land. A discussion with the women leaders in the villages revealed that most women did not have title deeds for land. This result confirms observations that weak property rights are an important agricultural constraint because they limit women's ability to participate in land and other markets, to obtain credit, and to undertake other investments on the land (Peterman et al., 2010) such as AIV production for high value markets.

This study further revealed that only 13.8 percent of the male headed households allocated over 50 percent of the land for vegetable production compared to 20.2 percent in female headed households. This implies a low culturally constructed perception of AIVs by the men. Without considering the marital status of the women, 61.2 percent were found to have decision making responsibility on which indigenous vegetables to be grown as shown in Table 21. This result confirms Gotor et al., (2010) and Oniang'o et al., (2008) assertions that AIVs are a woman's crop. This finding further confirms Njuki et al. (2014) that women have relatively more autonomy on crops such as leafy vegetables in Kenya and Tanzania.

Table 21: Frequency Distribution by Decision Making Responsibility of what Vegetable to be Grown on the Land

Decision maker	Frequency	Percent
Self	168	61.2
Husband	48	17.4
Both	49	17.8
Relatives-in Law	10	3.6
Total	276	100

Source: Field data (2014)

A lot of literature has portrayed African women as having little decision making power within the home especially farming (Enete & Amusa, 2010; Ogunlela & Mukhtar, 2009; WEF, 2013) and this study confirms this observation when marital status of the women is considered. The responsibility of deciding what indigenous vegetables to be grown on the land did not lie solely on the woman in nearly half of the male headed households (49.2%) and in over half of the de facto female headed households (54.5%).

Extent of Willingness to Satisfy Quality Standards by Women Farmers

Despite the potential of AIVs to improve the wellbeing of farmers in Kakamega County, the farmers have to be willing to meet QSMDs to access HVMs. Therefore a great extent of willingness among the farmers would be desirable. A will power within the farmer that they can meet QSMD is drive or energy they need to attain that objective. Results are as shown in Table 22.

Table 22: Frequency Distribution for Women Farmers' Extent of Willingness to Meet Specific Quality Standards

QSMD	Extent of Willingness					Mean	SD
	Very little	Small	Somewhat Large	Large	Very Large		
	Frequency	Frequency	Frequency	Frequency	Frequency		
Use of Organic Manure	15	24	28	50	159	4.14	1.23
Pest identification	12	20	43	58	143	4.08	1.16
Apply Post harvest procedures	28	15	45	67	119	3.85	1.31
Seek market information	28	26	31	65	126	3.85	1.36
Consistently supply	23	37	39	52	125	3.79	1.36
Produce in bulk (above 100 kg)	26	34	43	56	117	3.74	1.36
Disease identification	19	40	47	62	108	3.72	1.30
Safe use of pesticides	29	34	44	54	114	3.69	1.39

Table 22: Frequency Distribution for Women Farmers' Extent of Willingness to Meet Specific Quality Standards**(Continued)**

QSMD	Extent of Willingness					Mean	SD
	Very little Frequency	Small Frequency	Somewhat Large Frequency	Large Frequency	Very Large Frequency		
Negotiate for contracts	39	26	40	65	106	3.63	1.43
Proper crop nutrition	32	35	52	62	95	3.55	1.38
Disease control measures	29	43	54	64	86	3.49	1.35
Pest control measures	27	47	59	44	88	3.45	1.37
Irrigate AIVs	48	30	52	49	97	3.42	1.49
Keep records of farm activities	66	26	32	49	103	3.36	1.61
Adopt irrigation technologies	48	38	58	63	69	3.24	1.42
Overall Mean						3.67	0.26

n=276 Scale: 1.00-1.44=Very Little extent; 1.45-2.44= Small extent; 2.45-3.44= somewhat large extent; 3.45-4.44= Large extent;

4.45-5.00= Very large extent.

Source: Field data (2014)

Willingness to use organic manure for production of AIVs was greatest among majority of the farmers. The willingness by farmers to use organic manure in AIV production is very important as it has an implication on soil fertility and even production systems like organic farming which can create a niche in the market for the farmers if well-coordinated (Rowell & Hadad, 2014). Since most of the farmers perceived fertilizers to be expensive, presence of organic manure at the household level was a more readily available source of plant nutrients. From observation, cattle, fowls, sheep, goats and pigs, all of whose manure has been shown to contain the three (3) macro nutrients; nitrogen, phosphorus and potassium were kept by the women farmers.

Results as shown in Table 22 further explain the women farmers' willingness to satisfy quality standards and market demands. The study revealed that the farmers' willingness was to a large extent ($M=3.67$, $SD=1.26$). Specifically, the women AIV farmers were willing to a large extent to use organic manure ($M=4.14$, $SD=1.23$), learn how to identify pests attacking vegetables ($M=4.08$, $SD=1.16$) and also apply recommended postharvest procedures ($M=3.85$, $SD=1.31$). These three were the top ranking QSMDs in terms of willingness by the farmers to satisfy them. The farmers on the other hand were willing to somewhat large extent to irrigate AIV farms ($M=3.42$, $SD=1.49$), adopt different irrigation technologies ($M=3.36$, $SD=1.61$) and keep farm records of all the farm activities ($M=3.24$, $SD=1.42$). These were the least three ranking QSMDs.

A discussion with the women group leaders revealed that willingness to adopt irrigation technologies was ranked low due to the labour implications adopting such technologies can derive. The aged would need extra labour for this practice and younger women are in the child bearing stage, a stage with many responsibilities. Adopting irrigation would mean more work load for the younger women and additional cost of hiring labour for the older farmers.

The overall mean for extent of willingness was found to be 3.67 (willing to a large extent) with a standard deviation of 0.26 indicating that there was very little variability in the extent of willingness among the farmers. Farmers who had willingness to a “very little” to “small extent” were only 20.4 percent of the respondents. Majority of the farmers (79.8%) had “somewhat large” to “very large extent” of willingness as presented in Table 23.

Table 23: Overall Extent of Willingness to Satisfy Quality Standards among the Women farmers in Kakamega County

Extent of willingness	Frequency	Percent
Very little	21	7.6
Small	35	12.7
Somewhat large	105	38.0
Large	96	34.9
Very large	19	6.9
Total	276	100.0

Source: Field data (2014)

Similar result by Kgosiemang and Oladele (2012) in Mpumlanga province in South Africa showed that over half of the farmers were willing to participate in agricultural projects and is closer to that of Botlhoko and Oladele (2013) in North West province of South Africa that 97% of the farmers were willing to participate in agricultural projects and 48% of them were women. Production of AIVs to meet quality standards of HVMS is an agricultural project. Farmers' participation in agricultural projects stems from their willingness and therefore this is an indication to some level, of reception the farmers might have, if a project to supply HVMS with African indigenous vegetables is initiated. The higher the willingness the better as it implies a more intense form of participation according to Chambers (1994) who views participation as a linear continuum.

**Perceived Competence to Comply With Quality Standards among Women
Indigenous Vegetables Farmers in Kakamega County**

For a system to transform inputs into an output that can be released to the external environment, knowledge and skills must be present in that system. The competence (required for the transformation process) of the women farmers (System) to produce vegetables (output) that comply with QSMDS of the external environment (HVM) is very key. To determine the perceived competence of the farmers to comply with existing quality standards, results revealed that majority of the women farmers had "Very Low" competence in record keeping, irrigation of vegetables and negotiation for contracts as shown in Table 24.

Table 24: Frequency Distribution for Women Farmers' Perceived Competence to Comply With Existing Quality Standards

QSMD	Level of Perceived Competence					Mean	SD
	Very Low	Low	Average	High	Very High		
	Frequency	Frequency	Frequency	Frequency	Frequency		
Use of Organic Manure	40	40	59	44	93	3.40	1.44
Pest identification	34	61	64	54	63	3.18	1.34
Apply Post harvest procedures	42	55	79	44	66	3.04	1.33
Seek market information	81	63	38	47	47	2.70	1.47
Safe use of pesticides	78	62	46	44	45	2.69	1.44
Disease identification	73	76	52	35	40	2.61	1.38
Proper crop nutrition	73	74	63	30	36	2.57	1.33
Consistently supply	62	87	67	27	33	2.57	1.27
Pest control measures	68	90	51	25	32	2.49	1.30

Table 24: Frequency Distribution for Women Farmers' Perceived Competence to Comply With Existing Quality Standards**(Continued)**

QSMD	Level of Perceived Competence					Mean	SD
	Very Low	Low	Average	High	Very High		
	Frequency	Frequency	Frequency	Frequency	Frequency		
Disease control measures	87	67	63	25	34	2.46	1.34
Negotiate for contracts	93	72	45	29	37	2.44	1.39
Produce in bulk (above 100 kg)	71	95	62	25	23	2.40	1.20
Irrigate AIVs in the dry season	100	78	39	18	41	2.36	1.41
Adopt irrigation technologies	101	79	42	23	31	2.29	1.34
Keep records of farm activities	130	68	32	21	25	2.07	1.31
Overall						2.62	2.63

N=276 Scale for Means: 1.00-1.44=Very Low Competence; 1.45-2.44= Low competence; 2.45-3.44= Average competence; 3.45-4.44= High Competence; 4.45-5.00= Very High competence.

Source: Field data, 2014

The perceived competence level among women farmers to comply with QSMDs was “Average” for use of organic manure ($M=3.40$, $SD=1.44$), pest identification ($M=3.18$, $SD=1.34$) and application of recommended postharvest procedures ($M=3.04$, $SD=1.33$), the perceived competence level to comply for all the other QSMDs among the women AIV farmers was to ‘Low’ (Table 23). Women AIV farmers (71%) had “Low to Very Low” mean perceived competence level ($M=2.62$, $SD=2.63$). Only One (1) percent of the farmers had “Very High” perceived competence to comply with QSMDs in Kakamega County. Inadequate capital to purchase inputs, poor infrastructure, lack of knowledge and skills were cited as contributory factors to the inability of the farmers to comply with QSMDs (In objective 3).

This result agrees with the assertion of Luvai (2008) that compliance can be difficult for smallholder farmers who have neither the resources nor the capacity to comfortably meet standards. This implies that for women farmers to meet QSMDs the cost of compliance should be affordable, their technical capacity and knowledge should be enhanced and the requirements should be easily implementable within the local context.

Production of large volumes of vegetables was perceived by the farmers to be difficult ($M=2.40$, $SD=1.20$). Considering that the farmers have small land holdings and that the portion allocated to AIVs was even smaller, to satisfy this QSMD would mean that either more land is put under AIVs by individual farmers or several farmers have to collectively produce and bulk it to meet the required volume by the HVM and this can have an implication on the system. The system

would need 'extra' energy to manage its boundary. This implies that for farmers to be able to meet this bulk production ways of making it easy to produce must be adopted.

Although most women were willing to a considerable extent ($M=3.63$, $SD=1.43$) as shown in Table 22, to negotiate for contracts to supply HVM, the perceived competence level of the women farmers was "Low" ($M=2.44$, $SD=1.39$) as shown in Table 24. Mehra and Rojas (2008) posit that it is important for small-scale farmers to be able to negotiate terms and prices with powerful buyers. Mehra and Rojas (2008) further asserted that small-scale farmers in general, and women even more so, are at a disadvantage in these negotiations because they tend to have limited experience and lower levels of education and mobility.

Readiness of Women Farmers to Satisfy Quality Standards

According to the conceptual framework of this study, readiness is operationally conceptualized as the interactive combination of the willingness and perceived competence of the farmer to comply with quality standards was to be used to infer Readiness. Table 25 shows the readiness of the farmers to satisfy quality standards of high value markets. Results revealed that the farmers were ready to some considerable extent to use organic manure, identify pests, apply recommended postharvest procedures as the level of readiness for these standards was moderate (11-15). On the other hand, the level of readiness of the farmers meet all the other remaining standards was low (6-10). Overall, readiness of the women to satisfy quality standards of high value markets was Low (9.62).

Table 25: Level of Readiness of Women Farmers to Satisfy Quality

Standards			
Item	Willingness Mean	Competence Mean	Readiness (W*C)
Use of Organic Manure	4.14	3.40	14.08
Pest identification	4.08	3.18	12.97
Apply Post harvest procedures	3.85	3.04	11.70
Seek market information	3.85	2.70	10.40
Safe use of pesticides	3.69	2.69	9.93
Disease identification	3.72	2.61	9.71
Consistently supply	3.79	2.57	9.74
Proper crop nutrition	3.55	2.57	9.12
Pest control measures	3.45	2.49	8.59
Disease control measures	3.49	2.46	8.59
Negotiate for contracts to supply	3.63	2.44	8.86
Produce in bulk (above 100 kg)	3.74	2.40	8.98
Irrigate AIVs during dry season	3.42	2.36	8.07
Adopt different irrigation technologies	3.24	2.29	7.42
Keep records of all farm activities	3.36	2.07	6.96
Overall Mean	3.67	2.62	9.62

Scale for readiness: 1-5=Very Low; 6-10=Low; 11-15=Moderate; 16-20=High; 21-25=Very High

Source: Field data (2014)

Factors Associated With Readiness to Satisfy Quality Standards by Women Farmers in Kakamega County

According to Lewin (1939) theory of psychological field which informed this study, behaviour is a function of the interaction between a person and their environment. The study therefore in line with this theory conceptualised that farmer characteristics (representing the “person”) and the natural environment, institutional, infrastructural and cultural factors (representing the “environment”) would have a relationship with the readiness (“behavior”) status of a farmer.

Results in the correlation matrix presented in Table 26 to establish farmer characteristics associated with readiness, revealed that knowledge ($r=0.206$), educational attainment ($r=0.187$), experience in marketing AIVs ($r=0.210$) and membership to an organization ($r=0.186$) were positively and significantly correlated to readiness. The positive and significant correlation of knowledge to readiness implies that if farmers’ knowledge on quality standards is increased, readiness to satisfy those quality standards and market demands will also increase. According to the conceptual framework of this study, it was expected that there would be a relationship between level of knowledge and socioeconomic characteristics of the farmer. Results showed that age, education and marital status of the farmer had a relationship with level of knowledge at $p<0.05$. The relationship between age and knowledge was inverse and significant implying that as age increases, knowledge on QSMDs decreases ($r= -0.145$). This means that the younger women have more knowledge on QSMDs than the older women.

The result on education having a positive and significant relationship with readiness indicates that as farmers gained higher education, readiness increased. This result confirms Saina et al. (2012) that farmers with secondary school level education perform significantly better in all farming aspects. This implies that education leads to some improved attitude that may lead to greater willingness to accept risk, adopt innovations and generally to embrace productive practices. Further, educated farmers may be able to interact more effectively with financial institutions and even keep records.

The positive relationship of readiness with membership to an association indicates that farmers in an organization were more ready to satisfy quality standards. Other authors including Benin et al., (2011), Cunguara & Moder, (2011) and Olwande et al., (2012) found a relationship between membership especially in farmers' organizations and positive participation in agricultural projects. This implies that membership in a social group provides opportunities to discuss and observe practices of other members at no cost or time intensity. In this study, 81.5% women AIV farmers reported that they belonged to an association. This result is similar to that highlighted by Heemskerk et al., (2004) that at least 30-60% of farming households are members of community based groups. In the present study, the women belonged to groups such as women social group (65.6%), microfinance (11.6%) and farmers group (11%) collaborating on labour and credit.

Table 26: Correlation Matrix Showing Relationship between Readiness and Some Socio-Demographic Characteristics of the**Farmers**

		Y	X1	X2	X3	X4	X5	X6	X7
Readiness (Y)	r	-							
	Sig.								
Knowledge (X1)	r	.206**	-						
	Sig.	.001							
Age of respondent(X2)	r	.102	-.145*	-					
	Sig.	.092	.016						
Marital status(X3)	r	-.066	-.138*	.283**	-				
	Sig.	.272	.022	.000					
Educational level(X4)	r	.187**	.176**	-.264**	-.237**	-			
	Sig.	.002	.003	.000	.000				
Experience (X5)	r	.210**	.051	.427**	-.058	-.044	-		
	Sig.	.001	.411	.000	.352	.485			
Alternative livelihood(X6)	r	.035	.057	-.213**	-.075	.258**	.011	-	
	Sig.	.563	.346	.000	.211	.000	.856		
Membership to an association(X7)	r	.186**	.078	.172**	-.032	.049	.072	-.016	-
	Sig.	.002	.196	.004	.602	.420	.233	.797	

**Correlation is significant at p=0.01

*Correlation is significant at p=0.05

Source: Field data (2014)

The interaction of the farmer with the environment was measured in terms of the farmers' perception about various resources. This included; availability and affordability of production resources, good state of roads and markets (infrastructure), availability of irrigation water, good weather for AIV production and fertility of soils (natural resources) and having contact with extension and accessibility to banking institutions (institutional factor) These were positively and significantly correlated to readiness as shown in Table 27. Production resources included inputs such as seeds, fertilizers, pesticides, labour and capital. These resources were found to have a positive and significant relationship with readiness ($r=0.199$). The farmers who perceived resources to be available, affordable and accessible were more ready to meet the quality standards.

Hard infrastructure, such as roads facilitate the spatial integration of product and factor markets in both the agricultural and non-agricultural sectors (Ulimwengu et al. 2009). In this study, infrastructure ($r= 0. 238$) was positively correlated to readiness to satisfy quality standards. This indicates that farmers who perceived the road network to be good were more ready to satisfy quality standards. This implies that if roads are improved, farmers would be willing to engage in activities such as production and marketing of AIVs for the high value markets, since produce would get to the market whilst fresh which is one of the qualities demanded. In Nigeria, Adepoju and Salman (2013) also found infrastructure to be an important variable in explaining variations in the productivity of the farmers. In Indonesia, Hettige (2006), who evaluated a rural road investment found that among the 17percent of

project respondents who had started a business since the road's rehabilitation, 69 percent declared that the road was a factor in their decision to start a business.

Perception of the farmers of the natural environment had a direct and significant relationship with readiness. This has implications on utilization of the resources for agricultural productivity. Farmers who perceive water as available could be willing to use it for irrigation and be able to produce AIVs consistently throughout the year. Consistent supply of AIVs to high value markets all year round is only possible if irrigation technologies are adopted because the County experiences bimodal rainfall. This result further implies that the farmers who had a positive perception about the soils and the weather as being favourable for production of AIVs were more ready to access HVM by satisfying quality standards.

Agricultural extension represents a mechanism by which information on new technologies, better farming practices, and better management can be transmitted to farmers (Birkhaeuser et al., 1991; Evenson, 2001). Results showed that farmers who had contact with extension and had interacted with the financial institutions in the County were ready to a larger extent to satisfy quality standards than farmers who had not, as seen in the positive and significant relationship between institutions and readiness. This implies that extension and access to credit play an important role in farmers' decision to engage in agricultural projects and therefore services from these institutions should be accessible to farmers.

Table 27: Correlation Matrix Showing the Relationship between Farmers' Readiness to Satisfy Quality Standards of High Value Markets and Some Environmental factors

		Y	X1	X2	X3	X4
Readiness (Y)	r	-				
	Sig.					
Production resources (X1)	r	.199**	-			
	Sig.	.001				
Natural resources (X2)	r	.142*	.438**	-		
	Sig.	.018	.000			
Infrastructure (X3)	r	.238**	.442**	.401**	-	
	Sig.	.000	.000	.000		
Institutions (X4)	r	.172**	-.052	-.075	-.167**	-
	Sig.	.004	.390	.212	.005	

**Correlation is significant at p=0.01

*Correlation is significant at p=0.05

Source: Field data (2014)

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Introduction

This chapter concludes the study by providing the summary of the research process, the key findings, conclusions, recommendations and suggests an area for future research.

Summary

Over the past ten years, consumers have become increasingly aware of the nutritional and medicinal values of AIVs, and the demand has been on the rise especially in major urban centres in Kenya. This growing demand for AIVs among Kenyans is an opportunity for rural women to produce for specific markets and earn income which can improve their livelihoods. High Value markets are lucrative but not any vegetable can be acceptable in this market because consumers are becoming more sensitive on sanitary and phytosanitary aspects. The existing high value markets for indigenous vegetables now impose stringent conditions on quality of the produce they purchase. This study set out to assess the readiness of women African Indigenous Vegetables (AIV) farmers in Kakamega County to satisfy quality standards of High Value Markets (HVM) in Kenya. Data was collected from 276 women AIV farmers, key informants and through direct observations and analysed using SPSS.

Major Findings of the Study

1. The study revealed that over 50 percent of the women grew black nightshade (*Solanum nigrum*), cowpeas (*Vigna unguiculata*), slenderleaf (*Crotalaria brevidens*), jute mallow (*Corchorus oliitorus*) and spider plant (*Cleome gynandra*). These were also the most common African indigenous vegetables in the supermarkets;
2. The quality standards and market demands (QSMD) known by majority of the respondents were; cleanliness of vegetables, neat bundling of vegetables, pest free, disease free and vegetables being very fresh at point of sale. These five quality standards represented one third of the total QSMDs known by the farmers. In contrast, the farmers did not know the need to; grow vegetables with unpolluted water, negotiate for a contract, undergo probation, provide samples before supplying and adhere to specified market weights. The farmers in the three sub counties differed in their knowledge in QSMDs with exception of neat bundling of vegetables and harvesting at young stage. Knowledge in product attributes, process attributes and transaction attributes was deficient among the farmers but transaction attributes were the most unknown;
3. Generally the farmers perceived resources such as seeds, fertilizers and pesticides to be available but not affordable. Long distance and high cost of transportation further hindered accessibility to these inputs. Farmers cited unavailability of irrigation equipment and complexity of irrigation technologies available as constraints. Public extension service was the main source of information. Credit was perceived to be inaccessible by

women in female headed households, those without formal education and those who had never sourced credit before;

4. The main challenges faced by the farmers were inadequate information about HVMs, inadequate capital, small land holdings, low quality due to pests and diseases, seasonal production of vegetables, lack of zeal and motivation, poor infrastructure and culture. Decision making responsibility was related to marital status of the women. Married women had the least decision making power. Male headed households did not allocate much land to vegetables compared to female headed households;
5. The women AIV farmers were to a large extent willing to use organic manure, learn how to identify pests attacking vegetables and apply recommended postharvest procedures. Farmers generally perceived themselves to have low competence in complying with QSMDs of HVMs apart from use of organic manure, pest identification and application of recommended postharvest procedures. Competence was associated with education and experience of the farmers. Majority of the women farmers had low educational attainment (i.e. less than eight (8) years of schooling in Kenya) and majority of them had less than 10 years of experience in selling AIVs. Overall the women AIV farmers perceived that they could comply with the quality standards “with a little difficulty” (Average competence);
6. Overall, the farmers were somewhat ready to satisfy quality standards and market demands. The readiness of farmers to comply with individual QSMDs was varied. They were most ready for organic manure application and least ready on keeping farm records; and

7. Farmer characteristics associated with readiness were crop zone, knowledge, educational attainment, experience in marketing and membership to an organization. The system environment factors associated with readiness were farmers' perception about production resources, perception about infrastructure, perception about natural resources and institutional factor specifically contact with extension and accessibility to banking institutions. Though these factors were related to readiness the correlation was not strong.

Conclusions

The following conclusions were drawn based on the findings of this study:

1. The level of knowledge on QSMDs among the women AIVs in Kakamega is low. Women farmers in the sugarcane zone had the lowest knowledge. Most farmers have the lowest knowledge in transacting business with their commodity;
2. Most women perceived resources such as seeds, fertilizers, labour to be available but not affordable. The women AIV farmers perceived irrigation technologies to be complex and credit to be inaccessible. The farmers' perception of accessibility to credit differed with marital status, educational level of the farmer and source of credit. Credit was perceived to be inaccessible by more single women than their married counterparts;
3. Women farmers face many challenges that hinder them from participating in HVMs and all these challenges should be addressed;

4. The women AIV farmers are willing to meet QSMDs of HVM but their competence is low. Many of the women had low formal education and lacked experience in marketing AIVs;
5. Overall the readiness status of the women to satisfy QSMDs is low;
6. Knowledge and perception status of resources such as production inputs had a positive relationship with readiness to comply with QSMDs; and
7. The findings of this study are consistent with the theory of the psychological field as propounded by Kurt Lewin that behaviour (In this study readiness) is a function of the person (farmer characteristics- education, experience, knowledge) and the environment in which he finds himself (social system environment comprising roads, markets soils, water, contact with extension and banking institutions).

Recommendations

1. To address the low knowledge and low competence among the farmers, Ministry of Agriculture in Kakamega County should facilitate the women AIV farmers in their activities in terms of training them on QSMDs of HVMS. Trainings should focus on low knowledge areas such as record keeping skills, negotiation skills, appropriate irrigation technologies, group dynamics and interest areas such as organic farming of AIVs for niche market.
2. To address the perception that inputs were available but not affordable; the Government of Kenya should consider subsidizing the prices of most agricultural inputs like irrigation equipment to enable the women to participate in HVMS. Research institutions should research into

adoption of appropriate technology and farmers should use affordable appropriate technology for production.

3. To address the challenge of poor infrastructure, the County Government of Kakamega should improve appropriate infrastructure such as roads and markets. Development partners can be approached to address this challenge because it is directly related to readiness among the farmers to satisfy QSMDs.
4. Since the study established that farmers are willing to meet QSMDs, the County Government of Kakamega should formulate a policy whereby a certain quota of agricultural produce in the market in the county should be supplied by the local people. This may create more demand and motivate farmers to produce.
5. Based on the finding that small land holdings are allocated to AIV production and individual farmers could not meet the consistency and volumes required by the HVM, a conducive environment should be created by the County Government where extension service providers both public and private/NGOs can assist the farmers to form producer groups that pool resources for entrepreneurial benefits.

Suggestion for Future Research

1. The study suggests that extension agents in the county should conduct a study on why farmers are not complying with quality standards of high value markets.

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APPENDICES

Appendix A: Interview Schedule for Women AIV farmers in Kakamega

County



UNIVERSITY OF CAPE COAST

School of Agriculture

Department of Agricultural Economics and Extension

The main purpose of this study is to assess the readiness of rural women Indigenous vegetable farmers in Kakamega County, Kenya to access high value markets. It is anticipated that the results will be used by Ministry of Agriculture and other stakeholders to plan training programmes for Agricultural Extension officers and farmers and aid in formulating policies to address factors that affect women in agriculture in Kenya. This is part of the requirement for award of MPhil. Agricultural Extension at the University of Cape Coast, Ghana.

Research Title: Assessing Readiness of African Indigenous Vegetable Women Farmers in Kakamega County to Satisfy Quality Standards of High Value Markets in Kenya.

Please note that the information given will be used for the purpose it is provided only. Therefore be sincere in expressing your opinions and suggestions as much as possible. Your confidentiality is assured.

Thank you.

SubCounty.....Village.....Mobile phone number.....

Part 1: Background information of Indigenous vegetable women farmers

1. What is your year of birth as recorded in your Kenyan national identity card?.....
2. What is your marital status:
 1. Married and living with husband []
 2. Married but husband is away []
 3. Widowed/Divorced/separated/Single []
3. What is your highest level of formal education:
 1. No formal education []
 2. Primary certificate []
 4. Secondary certificate []
 5. Tertiary certificate []
6. What is the number of people in your house presently?.....
7. What is the total size of land available to you for farming in acres?.....
8. What size of your land have you put under vegetable cultivation in acres?.....
9. What is the ownership status of the land under vegetables?
 1. Rented []
 2. Family []
 3. Own []
10. Which of the following African Indigenous vegetables (AIVs) do you grow?

1. Cowpeas (<i>Vigna unguiculata</i>)	Yes []	No []
2. Black Nightshade (<i>Solanum nigrum</i>)	Yes []	No []
3. Jute Mallow(<i>Corchorus oliitorus</i>)	Yes []	No []
4. Slenderleaf (<i>Clotalaria brevidens</i>)	Yes []	No []
5. Pigweed (<i>Amaranthus spp.</i>)	Yes []	No []
6. Pumpkin leaves (<i>Cucurbita spp.</i>)	Yes []	No []
7. Spider plant(<i>Cleome gynandra</i>)	Yes []	No []
8. Ethiopian Mustard (<i>Brassica carinata</i>)	Yes []	No []
9. Any other.....	Yes []	No []
11. How long have you been growing Indigenous vegetables for sale (in years)?
.....
12. Where do you **mainly** sell your vegetables?
 1. HVM eg Supermarket/Institution []
 2. Open market []
 3. Farmgate []
 4. I don't sell []

13. How much do you get from sale of vegetables per month on average (Kshs)?

14. What else do you do for a living besides farming?

- 0. None
- 1. Informal employment Specify.....
- 2. Formal employment Specify.....

15. (i) Do you keep livestock? Yes No

(ii) Kindly indicate the animals you keep Cows[..]... Poultry[..].....Sheep and goats[..]..... Pigs[..]

18. (i) Are you a member of any community group? Yes No

(ii) If **Yes** tick which ones

- 1. Co-operative society Yes No
- 2. Microfinance Yes No
- 3. Community marketing group Yes No
- 4. Community producer group Yes No
- 5. Women social Group Yes No
- 6. Community/Village Group Yes No
- 7. Others (specify) _____

(iii). What is the biggest benefit for belonging to the group?.....

19. (i) Have you ever borrowed money from a banking institution to finance farming activities? Yes No

(ii) Which lending body below best represents your **main** source of credit?

- 1. Commercial banks Yes No
- 2. NGO Yes No
- 3. Non-bank financial institutions Yes No
- 4. Rotating savings and credit associations Yes No
- 5. Commercial moneylenders (Shylocks). Yes No
- 6. Friends and Relatives Yes No

20. (i)Have you received agricultural information from any extension service provider in the past two years? Yes No

(ii) Tick your **main** source of agricultural information form the list below:

- 1. Government Extension officer Yes No
- 2. Research / Institutions Yes No
- 3. Farmer Association Yes No
- 4. Relative /friends Yes No
- 5. Church/Mosque Yes No
- 6. NGO Yes No
- 7. Private sector Yes No

21. Who decides on what vegetables should be grown on the land allocated for vegetable growing ?

- 1. Self []
- 2. Husband []
- 3. Self and husband []
- 4. Others [] specify.....

22. What is your level of agreement with the following statements: Give comments.

[6] Strongly agree [5] agree [4] moderately Agree [3] Moderately disagree [2] Disagree [1] Strongly disagree

- (i) Issues of land are best handled by men [..].....
- (ii) One can get good profit from growing and selling AIVs [..].....
- (iii) There is market for AIVs [..]
- (iv) The roads to the market are good []
- (v) The weather is suitable for growing AIVs []

Part 2: Level of Knowledge regarding quality standards and market demands of HVM

1 Do you know that to supply AIVs to high value markets :

The AIVs should be:

- 1. Clean (without soil on it) [] know [] Don't Know
- 2. Neatly bundled [] know [] Don't Know
- 3. Free from pests [] know [] Don't Know
- 4. Free from diseases [] know [] Don't Know
- 5. Be of the required length (between 12 and 18 inches) [] know [] Don't Know
- 6. Be of the required weight (between 500g and 700g) [] know [] Don't Know
- 7. Harvested before flowering or seed development (Young) [] know [] Don't Know
- 8. Fresh – harvested on the morning of delivery to the HVM [] know [] Don't Know
- 9. Free from chemicals [] know [] Don't Know
- 10. Grown with unpolluted water (not sewerage water) [] know [] Don't Know

The AIVs farmer should :

- 11. Apply to supply to the HVM [] know [] Don't Know
- 12. Be prepared to provide a sample [] know [] Don't Know
- 13. Be prepared to undergo probation in supply [] know [] Don't Know
- 14. Be ready to supply in bulk [] know [] Don't Know
- 15. Supply consistently throughout the year [] know [] Don't Know

Part 3 :Willingness and perceived competence to comply with existing quality standards and market demands of HVM for AIVs

A. Kindly indicate to what extent you are willing to meet quality standards and market demands below:

1= To a very small extent 2=To a small extent 3= To some considerable extent 4= To a somewhat large extent 5= To a great extent

B Kindly indicate the ease/difficulty with which you are able to comply with quality standards and market demands in A.

1= With a lot of difficulty (Very low competence) 2=With some difficulty (Low competence) 3=With a little difficulty (Average competence) 4=Quite easily (high competence) 5=Very easily (Very high competence)

		A	B	Comment
1.	Supply AIVs to a market on a weekly basis			
2.	Produce AIVs in bulk			
3.	Provide proper crop nutrition for vegetable production			
4.	Apply organic manure on your farm			
5.	Identify pests attacking your vegetables			
6.	Identify diseases attacking your AIVs			
7.	Protect your AIVs from pests and diseases			
8.	Apply correctly the recommended pesticides for crop protection			
9.	Practice safe and effective use of pesticides to protect yourself and the environment			
10.	Do irrigation during the dry season to ensure consistent supply of AIVs			
11.	Apply various irrigation technologies to conserve water			

12.	Observe postharvest handling procedures e.g sorting, cleaning , grading, storage			
13.	Seek information regarding standards of different supply chains			
14.	Negotiate for contracts to sell your AIVs to specific customers			
15.	Keep records of all your farm activities for traceability			

PART 3: An assessment of the resources available to AIV farmers that can assist them to meet quality standards and market demands

Indicate your level of agreement with the following statements regarding resources required for production and marketing of AIVs and give a comment where applicable

[6] Strongly agree [5] agree [4] moderately Agree [3] Moderately disagree [2] Disagree [1] Strongly disagree

1. My land is fertile for AIV production [].....
2. Generally, AIV seeds are easily available []
3. AIV seeds are affordable [].....
4. Fertilizer required for farming AIVs are easily available [].....
5. Pesticides required for farming AIVs are easily available [].....
6. Fertilizers required for farming AIVs are affordable [].....
7. Pesticides required for farming AIVs are affordable [].....
8. Water for irrigation is readily available [].....
9. I can easily get Irrigation equipment [.].....
10. Irrigation technologies that can be used to grow AIVs are simple to implement [].....
11. Credit is easily available [].....
12. I have information on production of AIVs for HVMs [].....
13. I have information on marketing of AIVs to HVMs [].....
14. Labour is readily available[].....
15. Hired labour is affordable [].....

3.What are the problems that hinder you from accessing high value markets for your vegetables?

.....

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Thank you very much for your time. I wish you well in your farming activities.

**Appendix B: Letter of Introduction from Kakamega County Director of
Agriculture for Data Collection**

