Economic Activity Diversification and Livelihood Outcomes in Smallholder Agriculture in Thika, Kenya

JOSEPH FRANKLIN NTALE

Thesis Submitted in Fulfillment of the Requirements for the Award of the Doctor of Philosophy Degree in Business Administration, School of Business, University of Nairobi

November, 2012

DECLARATION

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

Signed:  **Date:** 26/11/2012

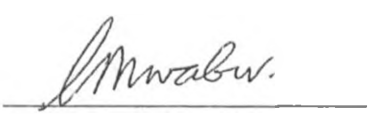
Joseph F. Ntale

D/80/P/8105/2000

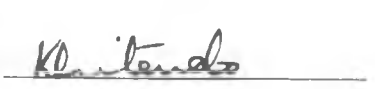
This thesis has been presented for examination with our approval as university supervisors

Signed:  **Date:** 26/11/2012

Prof. Martin Ogutu
School of Business
University of Nairobi

Signed:  **Date:** 26/11/2012

Prof. Germano Mwabu
School of Economics
University of Nairobi

Signed:  **Date:** 26/11/2012

Dr. Kate Litondo
School of Business
University of Nairobi

ACKNOWLEDGEMENT

I sincerely want to register my special appreciation to Prof. Martin Ogutu, Prof. Germano Mwabu, and Dr. Kate Litondo for the supervision of this thesis. I wish to acknowledge my PhD course work instructors, namely; Prof. G. P. Pokhariyal, Prof. Rosemary Atieno, Prof. Nixon Muganda, Prof. Peter K'obonyo, Prof. Francis Kibera, Prof. Isaac Mbeche, Prof. Dorothy McCormick, Prof. Henry Bwisa, and Prof. D. Kulundu.

I sincerely appreciate the logistical support of Mr. Vincent Mwinjiro, Sr. Patricia Lanigan and District Agricultural Officers of larger Thika district who were my research assistants and informants, namely, Murote Charles, Karimi Rahab, Esther Nyambura, Gitau Mary, Njau Alex, Kihara Philis, Mwangi Pricilla, Karanja Peter, Kiseve Stephen, Solomon Ndaiga, Nyoike Patrick and Mr. John Musina.

I would like to acknowledge the help of The Catholic University of Eastern Africa, The University of Nairobi and Maharishi University of Management, Iowa, Fairfield, USA for their financial support. I acknowledge the moral and financial support of Mr. Musyoki Dan, Mr. Oscar Mapopa, Ms. Elizabeth Ann Huesing, Mr. David Lutaaya, Dr. Chris Gakuu, Rev. Prof. John C. Maviiri, Fr. Pius Kitanywa and Ms. Otai Jane.

I sincerely like to thank my family members, namely, Moses Kizito Ntale, Elizabeth Zalwango Ntale, Isaac Karanja Ntale, Modester Njagi family, and James Murunga Family for their moral support and prayers. Special appreciations go to my parents, Mr. Joseph Serwadda and Mrs. Imelda Nabukalu for their unwavering love and prayers.

The wisdom of His Holiness Maharishi Mahesh Yogi; enshrined in his saying *'Nature is the best organizer'* is my source of inspiration. Above all I thank the almighty God for having brought me this far, and with grace.

DEDICATION

This thesis is dedicated to Tebyasa family of The Lion clan of the Buganda Kingdom.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ACRONYMS

2SLS	- Two Stage Least Squares
ALRMP	- Arid Lands Resource Management Project
ASALs	- Arid and Semi-Arid Lands
CDF	- Constituency Development Fund
CEC	- Commission of the European Communities
DFID	- Department for International Development
DIDC	- District Information and Documentation Centre
EPHTFCP	- Eastern Province Horticulture and Traditional Food Crops Project
EPZ	- Export Processing Zone
FAO	- Food and Agriculture Organization
GDP	- Gross Domestic Product
GEM	- Global Entrepreneurship Monitor
GoK	- Government of Kenya
HIV/AIDs	- Human Immunodeficiency Virus / Acquired Immunodeficiency Syndrome
ICT	- Information and Communication Technologies
KAPP	- Kenya Agricultural Productivity Programme
KENFAP	- Kenya National Federation of agricultural Producers
KEPOFA	- Kenya Poultry Farmers Association
KFSSG	- The Kenya food security steering group
KPCU	- Kenya Plantations and Planters Co-operative Union
KTDA	- Kenya Tea Development Authority
LPM	- Linear Probability Model
MDGs	- Millennium Development Goals
MLE	- Maximum Likelihood Estimate
MMS	- McGrath, McMillan and Scheinberg
MSME	- Micro, Small and Medium Enterprises Competitiveness
OECD	- Organization for Economic Corporation and Development
OLS	- Ordinary Least Squares
SACCOs	- Savings and Credit Cooperatives
SLA	- Sustainable Livelihood Approach
SMEs	- Small and Medium Enterprises
USAID	- United States Agency for International Development
VCT	- Voluntary Counseling and Testing
WDF	- Women Development Fund
YEF	- Youth Enterprise Fund

DEFINITIONS OF KEY TERMS

Agro-entrepreneurship	- The process of an economic undertaking to improve the quantity and/or quality of agricultural produce through creativity and innovation.
Economic Activity Diversification	– The entrepreneurial activity of farmers participating in a variety of commercial and non-commercial activities over and above their core business of agricultural primary production.
Entrepreneurial Behaviour	– Undertaking of a novel economic activity that leads to better livelihoods.
Entrepreneurship	– The creative and innovative process of coming up with new products, new modes of doing business and new technology to displace the old ways of doing things for better livelihoods.
Livelihood	- A means of earning a living through capabilities, activities and social and material resources.
Livelihood Outcome	- A life improving item or a condition of life resulting from a certain economic activity. An achievement of livelihood strategies of farmers such as more income, improved standard of living, reduced vulnerability and improved food security.
Portfolio Diversification	- Farmers' participation in non-agricultural business activities
Small-Scale Farmer	- An individual involved in smallholder agriculture with less than 10 acres of land holding.
Structural Diversification	– Mixed farming characterized by a variety of crops and/ or livestock (including fish).
Vertical Diversification	– Value addition to the primary agricultural products by processing, branding or packaging.

ABSTRACT

This study investigates the determinants of entrepreneurship and its effects on livelihood outcomes. Economic activity diversification, resulting from risk-taking, alertness to profit opportunities, innovation and creativity, are viewed as entrepreneurial behaviours, with potential to improve livelihoods. In this study activity diversification encompasses vertical, portfolio and structural aspects of a livelihood, while the associated livelihood outcomes consist of physical assets, social capital, human capital and labour market achievements. There is an apparent lack of consensus among researchers on the determinants and the contribution of economic activity diversification on livelihood outcomes among farmers. The aim of the study is to analyze entrepreneurship and how it affects livelihood outcomes among small-scale farmers.

A cross-sectional survey research design was employed and a multistage sampling technique was used to identify 15 locations of Thika area from which 388 homesteads were picked using line transect sampling technique. Descriptive statistics were used to measure the extent of entrepreneurship among farmers. Linear Probability Model (LPM), Probit and Logit models were used to estimate the results of the study. The results show that only 6% of the small-scale farmers add value to their agricultural produce; 38% participate in non-agricultural businesses, and 88% practiced mixed farming. The determinants of vertical diversification are distance to the market and access to loan facilities. The determinants of structural diversification include farm size, electricity, running water and gender. The factors influencing portfolio diversification are running water, the size of the farm, distance to the market, gender, education level, cost of farming, existence of business opportunities and desire for social status.

The study shows that portfolio diversification has a strong positive effect on labour income, and vertical diversification is associated with significant employment creation. Further, structural diversification is shown to enhance survival chances through human capital formation. The study recommends that a policy be put in place to encourage financial institutions to advance credit to farmers in order to facilitate value addition to farm produce; partitioning of farm land should be discouraged to enable farmers act commercially and

entrepreneurship training should be intensified in order to sharpen the ability of farmers in identifying business opportunities in the environment. Further investigation is needed to establish the effect of livelihood outcomes on economic activity diversification and the extent of risk averse among the small-scale farmers.

CHAPTER ONE: INTRODUCTION

1.1 Background

Economic activity diversification is the entrepreneurial process whereby individuals get involved in diverse commercial and subsistence activities. Traditionally, entrepreneurship has been viewed as the primary engine for better livelihoods (Streeter et al., 1999, Barringer and Ireland, 2008). Barnett (1993) critically analyzed more than 70 viewpoints of scholars on entrepreneurship and concluded that there were divergences on the definition and description of entrepreneurship. Kilby (1971) stated it clearly that no one has been able to precisely describe or define entrepreneurship. He further argues that the choice of the working definition of entrepreneurship is work of scholarship and hence subjective. Therefore, Jennings (1994) suggests that each scholar should come up with a definition that suits the study under investigation. In light of this, the working definition of entrepreneurship for this study is largely informed by Kirzner's and the Schumpeterian schools of thought. Schumpeter (1934) states that entrepreneurship is a process of creative destruction whereby new businesses, new forms of commerce and new technology displace the old way of doing things. While Kirzner (1985) says that ability to identify profit opportunity is at the heart of entrepreneurship. The entrepreneurial behaviour in this study is the economic activity diversification among farmers. This research follows Carters (2001) classification of economic activity diversification among farmers in the UK, whereby farmers who are practicing mixed farming are in the category of structural diversification. While those who add value to their primary produce fall in vertical diversification category and those who undertake non-agricultural business activities are categorized in portfolio diversification.

1.1.1 Economic Activity Diversification

Markides (1997) defines economic activity diversification as an entrepreneurial behaviour whereby people are engaged in different commercial activities for their livelihoods. Ellis (1999) views livelihood activity diversification as the process by which households construct a diverse portfolio of activities and social support capabilities in order to improve their standard of living. Rantamaki-Lahtinen (2008) acknowledges that

diversification is not a new phenomenon among farmers and the sharing of farms with other gainful activities is on the rise in the European Union. She further states that, farmers who have diversified their livelihoods are well placed in harnessing resources to run their farm-firm complexes. According to Carter (1999) studies on entrepreneurial behaviour among the small-scale farmers have concentrated on the value addition chain of the farm produce; whereas, there are many non-agricultural entrepreneurship activities practiced by farmers which are ignored. He further says that diversification into non-agricultural activities by farmers make a big contribution to employment creation and rural economic development. In addition, Karugia et al (2006) observed that growth in farm productivity alone may not guarantee small-scale farmers sufficient incomes to escape from poverty however, diversification into non-agricultural business may be much more important in reducing vulnerability to poverty.

Agriculture in Africa, particularly on small-scale farms, is yet to be a gainful investment, while in developed countries, agriculture is a profitable venture because farmers demonstrate entrepreneurial behaviour by either processing their produce, practicing mixed farming or diversifying into non-agricultural businesses (Makaya, 2007). Fouracre, (2001) states that entrepreneurial activities among the small-scale farmers should lead to increased agricultural production, diversification into off-farm income generating activities, or looking for employment from other farms. Wasserman (2008) says that entrepreneurial agriculture which blends farming and non-agricultural business practices is a very promising path for better livelihoods.

1.1.2 Livelihood Outcomes

Livelihood is the way and means of making a living through creating and exploiting new opportunities. The Department for International Development (DFID) (1999) describes livelihood as a composition of human capabilities, assets, and activities required for a means of living. Furthermore, livelihood is said to be sustainable when it can cope with and recover from stresses and shocks emanating from the environment. Sustainable livelihood should also be able to maintain or improve its capabilities and assets without undermining the natural resources. Rural livelihood diversification is described as the

process by which households in rural areas construct a diverse portfolio of activities and social support capabilities in order to improve their standard of living (Ellis 1999). Chambers and Conway (1991) say that poverty reduction in rural areas is understood in the context of sustainable rural livelihood which is a process of constant change and positive transformation of rural people. Sustainable livelihood should also be able to secure people's present well being and that of their future generations.

Fouracre (2001) explains livelihood using a sustainable livelihood framework composed of vulnerability context, capital assets, transforming structure & processes, livelihood strategies and livelihood outcomes. The vulnerability context addresses the ability of the poor to withstand the impact of trends such as globalization and shocks (e.g. drought), and dynamism of culture. The transformation structures & processes are put in place by the private and government institutions that regulate people's livelihood options. These elements need to be understood because they are critical in determining the value of assets and who gains access to various assets. Ultimately, the livelihood strategies, that people adopt, determine the livelihood outcomes, such as more income, improved standard of living and reduced vulnerability (Boli, 2005).

Nevertheless, Nee and Young (1991) suggested that the government should put institutions in place to facilitate sustainable rural livelihoods of small-scale farmers. Minniti (2004) argues that United States of America performs better in entrepreneurship than the rest of the world because of her liberal policy of providing enabling entrepreneurial framework conditions such as financial support, entrepreneurship education & training and social norms in support of entrepreneurial behaviour for better livelihoods. The relationship between entrepreneurship, economic growth, poverty, and sustainable development is crucial for national development therefore; viable policy and research findings should inform the economic initiatives. The European Union, for example has consciously adopted the entrepreneurship policy known as Gothenburg Strategy which is founded on the integrated development of economic, social and environmental factors as the pillars to drive the European economy to the next level (CEC, 2005a&b).

1.1.3 Agro-Entrepreneurship Initiatives

Agro-entrepreneurship is the process of backward or forward vertical diversification whereby farmers use creative ways of improving the quality and quantity of agricultural produce or get involved in agro-industry activities (Jaffee & Morton, 1994). Willingness and ability of a farmer to seek for investment opportunities in a creative and innovative way in agriculture and be able to run an agricultural enterprise is referred to as agro-entrepreneurship. This falls in line with Drucker's (1994) view of entrepreneurship whereby a person perceives business opportunities and takes advantage of the scarce resources and uses them profitably. Kenya is largely an agricultural country and majority of the citizens basically depend on agriculture for their livelihoods which is very vulnerable because of the dangers caused by climatic fluctuations, animal & crop diseases and market failure (Little, 2001). Based on this, policy makers are encouraging farmers to diversify their livelihood activities in order to hedge themselves against economic environment shocks and improve their livelihoods. For example, Kenya Vision 2030 and Millennium Development Goals (MDGs) 2015 underscore the importance of economic activity diversification by advocating for innovation and commercially oriented agriculture for better livelihoods.

The Kenyan government initiatives meant for the improvement of rural livelihoods include: i) Arid Lands Resource Management Project (ALRMP) whose main objective is to enhance food security and reduce livelihood vulnerability in drought prone and marginalized communities; ii) Eastern Province Horticulture and Traditional Food Crops Project (EPHTFCP) that aims at increasing incomes of small scale farmers and ensuring food security through increased production, processing and marketing of horticultural and traditional food crops; iii) Kenya Agricultural Productivity Programme (KAPP) which aims at improving the livelihoods of Kenyans through reforms in the agricultural sector; iv) Arid and Semi-Arid Land (ASAL) is a based livestock and rural livelihood support project whose objective is to improve incomes and reduce poverty through better marketing of livestock; v) Aquaculture Development program whose overall goal is to convert aquaculture from subsistence to commercial activity for income generation and food security. This project involves rehabilitation and operationalisation of fish farms;

and vi) Micro, Small and Medium Enterprises Competitiveness (MSME) Project has an overall objective of increasing growth and competitiveness of MSME. It also has an aim of strengthening enterprise management skills and market linkages. Furthermore, it addresses value addition in coffee, pyrethrum, cotton and leather sectors as a way of contributing to poverty reduction and improved livelihoods (Republic of Kenya, 2008).

The key agro-entrepreneurship policy areas of concern presented by Alila and Atieno (2006) are: i) Increasing agricultural productivity for small-scale farmers; ii) Encouraging diversification into non-traditional agricultural products and value addition to reduce vulnerability; and iii) Enhancing food security and poverty reduction. It should be noted that policies mentioned above are silent on portfolio diversification, that is, diversification of small-scale farmers into non-agricultural enterprises.

Ochango (2007) says that the current doubt about the viability of small scale farmers needs to be overcome and there is evidence to show that the small scale farmers are unable to perform commercially and consequently ignored on the value supply chain. However, attempts have been made by the Kenyan government, the private sector and civil society to improve the livelihoods of the small scale farmers, but the impact is yet to be felt because of lack of political will & commitment, appropriate political environment, adequate infrastructure, institutional innovations and public-private sector partnerships. Most governments in the third world countries tend to either neglect or fail to avail the necessary resources to small-scale farmers who are the backbone of their economies (Mburu and Massimos, 2005).

1.1.4 Small-Scale Farming

According to Aina (2007) the problems facing agriculture in Africa are enormous given that a large number of inhabitants are involved in small-scale farming with small-farm holdings ranging from 0.5 hectare to about 4 hectares. Smallholder agriculture contributes 75% of total agricultural production and about 51% of total employment in Kenya. However, agriculture as a means of rural livelihood is a major concern for rural development programmes because of the high poverty levels among small landholders

(Alila and Atieno, 2006). FAO (2002) states that over 50 percent of the Kenyan population lives below the poverty line, therefore improvement of livelihoods in Kenya is a matter of' primary concern. The report goes on to state that over 80 percent of the Kenyan population lives in the rural areas and the majority of the residents are poor small-scale farmers. Waikwa (1998) observed that small-scale farmers are overburdened by agriculture which they depend on for their livelihood and is a high risk undertaking, especially for the poor. The problems start right from the initial stage of planting season when inputs required are too expensive for them, and at the end of the season, many farmers cannot break-even because of high interest co-operate loans or unpredictable sale prices. Alila and Atieno (2006) noted that poor households in Kenya are usually large families with limited agricultural land holding or have subdivided land into units that are not economically viable, worse still, the poor engage in farming practices that have a negative impact on the environment.

Entrepreneurial activities among the small scale farmers should lead to increased variety and/or quality of agricultural production, diversification into non-agricultural activities, or to looking for employment from other farms (Fouracre, 2001). A study conducted in Kiambu district in Kenya by Onduru et al. (2002) concluded that livelihood diversification is a survival strategy for most rural households which does not lead to meaningful development. They further ranked sources of income for farmers as agriculture, followed by livestock, then cash remittances from friends & relatives, and non-agricultural enterprises.

Alila and Atieno (2006) said that 84% of Kenya is classified as arid or semi arid lands (ASALs) and therefore unsuitable for rain-based agriculture. Moreover, better livelihoods for smallholder agriculture will have to come from intensification of improved inputs, commercialization of small scale agriculture and economic activity diversification. Furthermore, agricultural land continues to diminish because of its partition into uneconomic small pieces of land unsuitable for commercial agriculture, so also, is the increase in the rural poverty among small scale farmers. They further said that there is insufficient appreciation of entrepreneurial farming as most researches tend to focus on

inputs that are uneconomical to small-scale farmers. This has led to lack of well defined priorities to guide policy pronouncements. Climatic change has a big effect on small-scale farmers in Kenya, and the people that are most at risk of increased drought and other extreme events like floods, are those who are already experiencing poverty, live in vulnerable settings and have limited access to resources to help them cope with increased disasters (Terichow, 2009). FAO (2002) stipulates that although the agricultural sector is considered to be the backbone of the Kenyan economy and a major source of food and income for most people, recent studies indicate that rural household incomes in Kenya have increasingly diversified, with a big share coming from sources outside farming.

1.1.5 Smallholder Agriculture in Thika

According to Kinyanjui (2007) Thika district is a prototype of the central province in particular and Kenya in general as far as small scale farming is concerned. In the old administrative framework of Kenya, the larger Thika district was made up of four districts namely Thika East, Thika West, Ruiru and Gatanga (see appendix III). This study is based on the old administration structures which were still in operation during the data collection period. The larger Thika district is currently in Murang'a and Kiambu counties of the Central Province of Kenya. Gatanga district was the only district found in the upper zone of the larger Thika district which has a cool climate with rich volcanic soils that are well suited for coffee growing, tea planting and pineapple fields. It has a hilly terrain with many rivers passing through the zone which is good for eco-tourism. Thika East, Thika West and Ruiru districts are relatively dry areas with little rainfall, and many people derive their livelihoods from small scale farming and small businesses. Thika, Juja and Ruiru towns are the major trading centers situated along the Thika superhighway which traverses the larger Thika district. These towns are centrally located between the zones and serve as major commercial centres for the district. Thika town is the major commercial centre in the district with about 100 small-scale factories and about 20 major industries which provide additional economic opportunities for small-scale farmers in the district

The district enjoys a cool climate and an ample annual rainfall ranging from 965 mm to 2,130 mm (see appendix IV). According to Aliber (2004) rural villages of Thika district are predominantly occupied by small-scale farming. Kinyanjui (2007) states that some small scale farmers in Thika district had devised entrepreneurship strategies that could be copied elsewhere in Kenya for economic development.. The dynamics of rural livelihoods in the larger Thika district seem to represent a microcosm for rural livelihoods in Kenya.

Kinyanjui (2007) observed that limited use of relevant technologies and low level of education among the small scale farmers are responsible for the limited entrepreneurial activities in Thika. Commercial agricultural practices are largely lacking among the small scale coffee farmers in Thika as Nzioka (2007) said that Kiambu County where Thika district is found, operated at about 60% of their optimum level of agricultural production owing to lack of agro-entrepreneurship. He further stated that if farmers were to organize themselves into marketing groups, they would strengthen their bargaining power and consequently improve their livelihood outcomes. There is limited number of entrepreneurial activities among small scale farmers in Thika which need to be intensified, like bee keeping, keeping graded cattle and goats, fish farming, grafting and growing genetically modified crops (FAO 2002). Kinyanjui (2007) observed that entrepreneurs are at the forefront of manufacturing energy saving cooking stoves, brooders, food warmers, milk coolers and chaff cutters. She went on to say that such SMEs are indirectly cleaning the environment by recycling plastics and waste metallic materials.

1.1.6 Cross Cutting Issues in Livelihood Diversification

Literature on economic activity diversification and livelihoods of small scale farmers tends to give contradicting results and recommendations. Michuki (2008) observed that the first impression one would get on households in the Kenyan rural areas is purely agricultural, but upon close scrutiny the households are doing more than farming. He discovered that the non-agricultural economic activities are either opportunity-led for the rich or survival-led for the poor, but he did not investigate economic agricultural

activities. Furthermore Barret et al (2001) are of the opinion that any increase in economic activity diversification among the poor farmers represents a survival strategy rather than a sustainable livelihood strategy. Little (2001) argues that wealthier farmers may seek economic activity diversification to promote their economic growth while the poor farmers diversify their economic activities for survival. Dose (2007) discovered that economic activity diversification did not make a significant change in the livelihoods of small-scale farmers in Western Kenya. She speculated that it was the case because education, infrastructure and accessibility to finance were lacking.

Pascotto (2006) found out that activity diversification on Italian farms made high contribution on total revenue of a farmer because of the optimum use of agricultural resources. Rantamaki-Lahtinen (2008) used the resource based theory to explain that rural areas have many resources available in the environment that small-scale farmers can exploit for business opportunities. She underscored the importance of intangible resources, such as social networks, linkages, clusters and technical know-how in the success of farm activity diversification. Block and Webb (2001) in their study on the dynamics of livelihood activity diversification in post-famine Ethiopia discovered that, wealthier households tend to have more diversified income streams and that households that were initially less diversified realized greater gains after economic activity diversification. Chapman and Tripp (2004) argue that in Latin America, economic activity diversification is common among the rich because they are able to employ people to work for them in their non-agricultural enterprises. By contrast the poor farmers have limited education and land holding and therefore, it is difficult for them to diversify into non-agricultural businesses. Orr (2002) advised small-scale farmers in Malawi to diversify into non-agricultural micro-enterprises in preference to further specialization in commercial agriculture.

Ellis (1999) introduced the issue of gender, in the debate of economic activity diversification whereby he states that economic activity diversification opportunities that can be exploited by women for addition income earning can lead to women empowerment and improvement in family welfare. Little (2001) observed that diversification options vary according to gender and proximity to town. Women tend to

have different options for diversification from those for men and farmers residing near towns have more alternative income generating activities than those living far from town. Bryceson (2000) on the other hand acknowledged that Africa transfer payments (remittances and pensions from absent family members) are playing an important role in income diversification of small scale farmers. Pascotto (2006) using a resource based approach explains that, farmers who have diversified their economic activities in Italy are making high contributions to their total revenue; even though the great part of their work time is spent in agriculture, and agricultural resources are used to finance the diversified activities.

Wasserman (2008) asserts that economic activity diversification of farmers into non-agricultural activities is the way to go because it increases the farmers' income. Butler and Mazur (2007) viewed Uganda's agrarian economy as suffering from limited economic activity diversification and therefore recommended efforts to stimulate and support innovation in order to promote better rural livelihoods. However, Rantamaki-Lahtinen (2008) observed that although there is an increasing interest towards economic activity diversifications in countries like Norway, Finland, France and UK, it is yet to be established how activity diversified farmers can compete with the specialized farmers benefiting from production economies of scale coupled with specialization advantages.

1.2 Research Problem

The controversy surrounding the World Bank report on poverty 2000/1 and the economic strategies of the other Bretton Woods Institutions indicate that there is lack of consensus on what can be done to improve the African rural livelihoods (Tschirley and Benfica 2001). FAO (2002) suggested an investigation into what was urgently needed to revive the Kenyan economy and promotion of economic activities that offer the greatest potential for better livelihoods. Barringer and Ireland (2008), Butter and Mazur (2007) and Fouracre (2001) hypothesized that entrepreneurship proxied by economic activity diversification holds the key to better livelihoods among the small scale farmers. Ellis (1999) observed that there was a tendency for rural households to engage in multiple

business occupations, but few attempts have been made to relate activity diversification to livelihood outcomes. He further argues that livelihood activity diversity is a paradox of complex interactions with poverty, income distribution, farm productivity, environmental conservation and gender relations that are not straight forward and are counter-intuitive. This has so far led to contradictory practices, study findings and policies. For example, Kenya vision 2030 advocates for value addition in agriculture for better livelihoods of farmers, while Karugia et al (2006) advise Kenyan small-scale farmers to diversify into non agricultural activities in order to improve their standard of living.

Furthermore most of the Kenya wealth creation strategies employed in the past had focused on increased commercialization of small scale farming, particularly through cultivation of tea and coffee and recently through production of horticultural products for export (FAO, 2002). In contrast, Little (2001) states that economic activity diversification is not the panacea as many policy makers assume it to be because it sometimes leads to a reduction in income and an increase in risk. Nevertheless Markides (1997) cautions against activity diversification beyond optimal limit as it can have a negative effect on profitability and the firm's market value. In addition, Torkko (2006) argues that diversification into non-agricultural businesses weakens the agricultural activities and consequently reduces the competitiveness of farmers in their core business.

Rantamaki-Lahtinen (2008) and McGrath et al (1992) argue that economic activity diversification among farmers is not a new phenomenon but a comprehensive understanding of its determinants and impact on livelihoods is what is lacking. Studies on the determinants of economic activity diversification in Kenya are limited and their effect on livelihood outcomes had not been articulated. This study attempted to narrow this knowledge gap by first analyzing the entrepreneurship determinants and finally evaluating the impact of economic activity diversification on livelihood outcomes of small-scale farmers controlling for the covariates. The study largely addressed the question of the impact of entrepreneurship on livelihood outcomes of small-scale farmers.

1.3 Research Objectives

General Objective

The general objective of the study is to investigate the effect of economic activity diversification on the livelihood outcomes of small-scale farmers in the Thika area of Kiambu and Murang'a counties of Kenya.

Specific Objectives

The specific objectives of the study are to:-

i. Determine the extent of economic activity diversification among the small-scale farmers in Thika.

ii. Analyze determinants of economic activity diversification among the small-scale farmers in Thika.

iii. Determine the impact of economic activity diversification on livelihood outcomes in the smallholder agriculture in Thika.

1.4 Justification of Study

Karanja (2009) says that Kenyan Vision 2030 advocates for an investment driven economy with various economic sectors moving up the production value chain. The Kenyan population is about 38 million people of which 80% is involved in farming and the majority is in small scale farming (FAO, 2002). It is therefore justifiable to investigate the economic activities of the small scale farmers as farming contributes 40% to the Kenyan GDP and is the main foreign exchange earner. Sound national economy presupposes a vibrant agricultural sector which should provide food for urban dwellers, investment and public revenue, skilled labour for other sectors, higher real wages due to cheap food, foreign exchange, jobs and income for all those involved in the general, technical and professional services in agriculture.

The viability of the rural economy depends on entrepreneurial activities both within and outside agriculture as Schumpeter (1934) says that entrepreneurs are the prime movers of economic development. However, factors influencing most profitable entrepreneurial behaviour among the small-scale farmers are not clear. Although Small scale farmers are

the majority in the Kenyan rural economy where they are engaged in agricultural and non-agricultural businesses, there are disparities in their standard of living (Alila and Atieno, 2006). Therefore, there is need to understand the influence of their economic activities on their livelihood outcomes in order to come up with viable policies that can bring meaningful development as envisaged in Kenya vision 2030. This study brings a paradigm shift in the concept of entrepreneurship by sensitizing scholars to think broadly about entrepreneurship among the small scale farmers. Research methods used by the previous scholars are silent on how to measure effects of entrepreneurship on the livelihood outcomes. This study uses the LPM and logit models to measure this effect.

1.5 Structure of the Thesis

This thesis comprises seven chapters. Chapter one is the introduction to the thesis; it briefly describes the entrepreneurship in smallholder agriculture, defines related concepts of economic activity diversification, livelihood, agro-entrepreneurship and small scale farming in Thika, the statement of the problem, study objectives, and justifications of the study. Chapter two presents the theoretical and empirical literature that guides the investigation. Theoretical foundations of entrepreneurship based on economic, psychological, sociological, cultural, and integrative views are given. The literature review is summarized using a multidimensional entrepreneurship model which illustrates the many disciplinary perspectives of entrepreneurship. The conceptual framework and the major hypotheses are given in this chapter.

Chapter three presents the logical positivism paradigm as the guiding philosophy of the study. The research design, the measurement of the variables used and the structural model followed in data analysis are presented. Chapter four presents descriptive findings of the study from both qualitative and quantitative perspectives of the study area. Chapter five presents estimation results together with their interpretations. A discussion of the results is conducted in relation to the literature on entrepreneurship. Chapter six summarizes the study findings, presents the conclusions, and discusses implications of study findings to entrepreneurship theories, and the policies designed to improve livelihoods of farmers in smallholder agriculture.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter gives a theoretical foundation of entrepreneurship in different perspectives; followed by theories on economic activity diversification and livelihood outcomes of small scale farmers. Literature is then summarized in a form of multidimensional framework. A brief analysis of empirical studies done on diversification in the Kenyan context is given and gaps in knowledge in this area identified. Finally, based on the literature, a conceptual framework of economic activity diversification and livelihood outcomes is presented.

2.2 Theoretical Foundations of Entrepreneurship

Entrepreneurship is a complex phenomenon, as it can be viewed from economic, psychological, sociological cultural and integrative perspectives. These different view points lead to varying definitions of entrepreneurship. Mintzberg (1980) refers to entrepreneurship as a management practice that initiates change and adaption to the existing environment. Barnett (1993) studied more than 70 viewpoints of scholars on entrepreneurs and entrepreneurship and found out that, it is not easy to come up with a consensus definition from the literature because entrepreneurship scholars look at entrepreneurship from different perspectives. Kilby (1971) refers to entrepreneurs as complex individuals because no one has been able to precisely describe or define what they are. He further states that the current ideas in the entrepreneurship schools of thought are not original in the strict sense but are derived from the classical scholars of entrepreneurship and/or a hybrid of the various definitions. Jennings (1994) for that matter, does not find it necessary to define entrepreneurship because the concept has multiple perspectives. His argument is that the field of entrepreneurship needs multiple paradigms that are different because research in entrepreneurship serves a variety of purposes. Kapp (2003) suggests that a multidimensional perspective should be used when analyzing entrepreneurship because it is not easy to comprehend the concept from one perspective as it is a multidimensional phenomenon which can manifest itself in various ways.

2.2.1 Economic Perspective

Economic view indicates that entrepreneurs are motivated by profit maximization in their commercial activities and are out for monetary gain in whatever strategy they undertake. According to Hisrich et al (2008), Richard Cantillon developed one of the earliest theories of entrepreneurship, from the economic point of view as an exchange for profit while Adam Smith refers to entrepreneurship as a process of wealth creation. He is regarded by many scholars as the founder of the term entrepreneurship. He viewed an entrepreneur as a risk taker who buys at a certain price to sell at an uncertain price and in the process he either makes a profit or a loss. Marshall (1930), Say (1971) and Kilby (1971) widened the concept of entrepreneurship to include not only the bearing of risks, but also the planning, supervising, organizing, and even owning the factors of production. Knight (1971) says that the entrepreneur is the one who bears the responsibility and consequences of making decisions under conditions of uncertainty. Schumpeter (1934) looked at an entrepreneur as a prime mover of economic development and initiates the development by being innovative and by carrying out new combinations in the factors of production. Drucker (1994) described an entrepreneur as an individual who searches for change, responds to it, and exploits it when an opportunity is available. He viewed entrepreneurship as an action-oriented management style, which takes innovation and change as the main focus of thinking and behaviour.

Kirzner (1985) sees entrepreneurs as individuals in the economy who are alert to discover and exploit profit opportunities in any given environment. Birley (1997) says that one is a bona fide entrepreneur if one has the ability to identify and exploit business concept from his environment. According to Schultz (1980), entrepreneurship is the ability to deal with disequilibria, that is, being able to deal with what is largely unknown to many people and exploits the situation of imperfect markets. He further states that education plays a major role in this context as it informs the entrepreneur in advance. Information gives an entrepreneur a competitive edge over the non-entrepreneurs. Macke and Markley (2003) say that entrepreneurs create and manage new enterprises for the betterment of their livelihoods. The new businesses are created for reasons like self-sufficiency, lifestyle

necessity and desire for wealth creation. Ultimately, they all have one thing in common to turn ideas into new business ventures for better livelihoods.

Babu (2003) came up with entrepreneurship models describing four different types of economic motivations of entrepreneurial behaviour as follows:- a) Consultant Model likens entrepreneurs to the academicians and specialists in various professions, who are well known with long working experience for large corporations, and find it convenient and lucrative to branch off from their employers to start their own consultancies. Many corporate executives take the consulting route, by taking on directors' roles of different companies as their means of livelihood. b) Moonlighting Model describes entrepreneurs as those individuals who take part time business ventures and do not take risks associated with full-time entrepreneurial activities. For example, university lecturers, doctors and high school teachers take part-time work outside their official working hours to supplement their incomes; c) Brilliant Idea Model describes entrepreneurs as those professionals and employees working in the corporate world with brilliant entrepreneurial ideas. They come up with brilliant business ideas that can be exploited to make a lot of money for the company, but when the brilliant idea is rejected by the top management, the entrepreneurs implement the idea for their own benefit; and d) Franchise Model describes entrepreneurs as those individuals who had served in the corporate world before but later on decide to start their own enterprises called franchises with links to well established corporations such as Safaricom, for the brand name and marketing support.

2.2.2 Psychological and Personality Perspectives

Psychological view attempts to understand the mindset of the entrepreneurs, while the personality perspective examines the characteristics of the entrepreneurs. Entrepreneurial behaviour can be motivated by the psychological dispensation of an individual on his personality (Kapp 2003). This is an internal viewpoint of an individual such as, internal locus of control, calculated risk taking, high need for achievement, problem solving, innovation and creativity perception. While external viewpoint examines things like, culture, role models, work experiences, education and environment. McClelland (1961) says that entrepreneurs are persons who have a high need for achievement. He goes on to explain that, individuals with a high need to achieve will exhibit entrepreneurial

behaviour. Kets De Vries (1985) argues that family background and work experiences were significant in forming an entrepreneurial personality, he says that individuals who have gone through hardships in childhood escape from their harsh background through entrepreneurship. Their aggressive behaviour forces them to start their own enterprises instead of being employed by others. Rotter (1989) developed the concept of 'locus of control' based on the mindsets of individuals who believe that individuals have the potential to determine their destiny. So, success or failure in life depends on the individual, while external locus of control concept advocates that success or failure in life depends on the external forces outside the individual's sphere of influence. Individuals with a mindset of internal locus of control are more likely to become entrepreneurs, than those of external locus of control. Timmons and Spinelli (2007) describe entrepreneurial behaviour as a way of thinking, reasoning, and acting that is opportunity directed, and leadership balanced. They acknowledged that entrepreneurship personality can be acquired and/or can be inborn.

Hisrich et al (2008) compiled seven factors responsible for entrepreneurial behaviour. First is education where he states that, there is a general feeling that entrepreneurs are less educated than the general population. However, research findings show that this is not the case but instead education is essential in the upbringing of entrepreneurs by equipping them with new knowledge. Educated individuals are more likely to exploit opportunity available. The second factor is personal values, which are a set of attitudes that motivate individuals to start and manage their own enterprises, for example, opportunism, individualism and competitiveness. Third is the youthful chronological age of an individual which is full of dynamism and adventure and the entrepreneur's previous business experience. Fourth is work experience that includes previous technical and industry experience. The fifth factor is role models; these are individuals that influence others to pursue entrepreneurial career choice and style. Sixth factor is the moral-support network these are individuals who give psychological support and consolation to an entrepreneur. The final factor is professional-support network, which refers to trained individuals who professionally assist entrepreneurs in business activities.

2.2.3 Sociological and Cultural Perspectives

Sociologist and social scientist in general have underscored the influence of society and culture in the formation of entrepreneurs. They emphasized the role of cultural values and social net works in promoting or discouraging entrepreneurial activities (Djankov et al 2005, Cochran, 1971). Various dimensions of social networks may be salient, including relatives, friends or community but are very influential in entrepreneurship (Deakins and Freel, 2003). But research by Hofstede (1980) has far reaching consequences and implications of entrepreneurship. It identified four dimensions of culture that can be expected to impact on entrepreneurial behaviour of people as illustrated in table 2.1. McGrath, et al (1992) undertook a multi-country comparison which indicated significant differences between entrepreneurs and career professionals. In their analysis, the work of Hofstede was used as a base to study entrepreneurship determinants of people.

Table 2.1: Cultural Dimensions of Entrepreneurship

Cultural Dimensions of entrepreneurship	Determinants
Power Distance	People with high power distance are more likely to be entrepreneurs.
	People with low power distance are less likely to be entrepreneurs.
Individualism Vs Collectivism	People with individualistic culture are more likely to be entrepreneurs
	People with collectivist culture are less likely to be entrepreneurs
Uncertainty Avoidance	People with low levels of uncertainty avoidance are more likely to be entrepreneurs
	People with high levels of uncertainty avoidance are less likely to be entrepreneurs
Masculinity Vs Femininity	People with masculine culture are more likely to be entrepreneurs
	People with feminine culture are less likely to be entrepreneurs
Confucian Dynamism (Short-term Vs. long-term orientation)	People with long-term Confucian dynamism are more likely to be entrepreneurs.
	People with short-term Confucian dynamism are less likely to be entrepreneurs.

Source: Adopted from McGrath, McMillan and Scheinberg (1992), p. 121

The power distance dimension is the sense of inequality between people within a society. Inequality can be manifested in wealth, power, education, and basic physical and mental individual characteristics. The power distance dimension is a characteristic of social systems and organizational styles. Entrepreneurs might be expected to prefer larger power distance situations than non-entrepreneurs. People who have individualistic culture are more concerned about themselves and their nuclear families, while people collectivistic culture, feel that they belong to groups such as, families or clans or organizations. The groups look after them in exchange for loyalty and conformity. Entrepreneurs are traditionally portrayed as being even more individualistic in nature than the norm and are expected to value competition over cooperation.

Uncertainty avoidance refers to the extent to which people feel threatened by the unknown and ambiguous situations. Uncertainty avoidance can be characterized by: rule orientation, employment stability and stress, leading to the need for security and a dependence on experts. Uncertainty avoidance is negatively correlated to the high need for achievement, and this suggests that entrepreneurs would exhibit low levels of uncertainty avoidance because they do not fear to take risks. Hofstede (1980) notes that taboos, rituals and rules are used by people to avoid uncertainty, which would also suggest that entrepreneurs would exhibit low levels of uncertainty avoidance. Confucian Dynamism a dimension of uncertainty avoidance is the long or short term orientation in planning (Hofstede, 1980). This is the extent to which a society exhibits a pragmatic future oriented perspective, rather than a conventional short term view. In this case low Confucian dynamism is characterized by risk avoidance, respect for traditions, personal steadiness and stability. Non-entrepreneurs are perceived to have low confucian dynamism as they tend to live for the moment, while entrepreneurs tend to be high confucian dynamism. They are perceived to be more pragmatic, innovative and long term planners (McClelland 1961, McGrath et al, 1992 and Schumpeter 1934).

Masculinity is understood in traditional terms of roles for the two sexes of male and female. Masculine cultures emphasize mainly on material success, competition, challenge and performance. Feminine cultures put more emphasize on the well-being of people,

consensus, quality of life, nurturance and environmental protection. Individuals characterized with masculine culture tend to be entrepreneurial, while those with feminine culture tend to be less entrepreneurial. The general finding that there are differences between entrepreneurs and non-entrepreneurs which can be classified as cultural dispensation is particularly relevant for policy makers to come up with pragmatic policies to change human behaviour for the better. Good governance would dictate that governments should regularly intervene in economic activities with the expressed aim of stimulating business growth and national development. An understanding of the attitudes and believes that differentiate entrepreneurs from non-entrepreneurs is important if viable interventions have to be made to the extent of influencing entrepreneurial activity. Interventions, which do not take account of these differentiating attitudes, including the differences between countries, are likely to be less successful than those that do. Further, interventions that are targeted specifically to entrepreneurial outcomes may run contrary to the attitudes and beliefs of non-entrepreneurs. Policy makers therefore might improve the efficacy of their intervention programs by balancing these differences in the design of economic development initiatives (McGrath et al, 2002).

2.2.4 Integrative Perspective

The integrative view attempts to bring a unity in diversity in the understanding of the different perspectives of entrepreneurship. Some scholars have attempted to look at entrepreneurship from an integrative perspective; Scott and Twomey (1988) analyzed the entrepreneurial aspirations of students using a regression model. Their model integrated predisposing factors such as personal characteristics, triggering factors such as economic hardship, and business idea as functions of entrepreneurship. McCormick (1996) revised Scott and Twomey's regression model by stating that total supply of entrepreneurial events depends on predisposing, triggering and constraining factors such as legal constraints.

Macke and Markley (2003) identified six readiness entrepreneurship factors that can lead to successful development programmes in a community. The readiness factors are willingness to invest, leadership team, viable business idea, entrepreneurial programmes, openness to entrepreneurship and going beyond the town borders. Based on the literature,

integrative perspective can be summarized in the predictor model for entrepreneurial behaviour, which can be expressed as a function of entrepreneurship readiness factors, motivating factors and de-motivating factors.

$$Y = f(X_1, X_2, X_3)$$

$$Y = \alpha_0 + \alpha_1 X_1 + \alpha_2 X_2 + \alpha_3 X_3 + \epsilon$$

Where Y = Entrepreneurial behaviour, X_1 = Readiness entrepreneurship factors, X_2 = Entrepreneurship motivating factors, X_3 = Entrepreneurship de-motivating factors and ϵ = Error term.

Readiness entrepreneurship factors (X_1) are elements that predispose and prepare a person to think or to have business ideas. McCormick (1996) and Scott and Twomey (1988) used the term predisposing factors in their entrepreneurship models. They defined predisposing factors as personal background, personality traits, and business perceptions that develop over several years. They include an individual's role model, education, work experiences, one's self image, entrepreneurial personalities and discernment of various types of organizations. Macke and Markley (2003), refer to predisposing factors as readiness factors which are prerequisites for entrepreneurship. Schultz (1980) says that education plays a big role in entrepreneurship as it enables the entrepreneur to deal with the disequilibria.

According to Global Entrepreneurship Monitor (GEM) report of 2007, low level of education in South Africa contributed to lack of mind set and skills of entrepreneurship. Work experience is a very important ingredient in entrepreneurship as Scott and Twomey (1988) discovered that students with work experience were three times more likely to have a business viable idea than those who have no business experience. Research study revealed that most small-scale business owners had gained business experience before they started their own businesses (McCormick, 1996 & Khauka, 2012). Family background is very important in the formation of entrepreneurial personality as individuals tend to take on their parents' traits - 'like father, like son' (Hisrich et al, 2008;

Kuratto & Hodgetts, 2007; and Kets De Vries 1985). Scott and Twomey (1988) found out that children of entrepreneurs were more likely to have a business idea than those whose parents were not entrepreneurs. McClelland's (1961) identified personal traits such as determination, perseverance, high need for achievement, and desire for independence as key entrepreneurial characteristics. Empirical research shows that certain entrepreneurial traits in young people are highly correlated with possession of business ideas (Scott and Twomey 1988). Traits like a high need for achievement, the capacity to take risks, ability to innovate and ability to identify profit opportunities are highly associated with having business ideas (Rwigema, 2011; Saleemi, 2011; McClelland, 1961; Casson 1982 and Hisrich 2008).

Entrepreneurship motivating factors (X_2) are those elements that precipitate entrepreneurial activities. The motivation may come as a result of frustration or opportunity identification. When entrepreneurs identify opportunities in the environment, they come up with bright ideas to exploit the opportunity and make profit. When individuals are frustrated in one way or the other, they tend to come up with business ideas to solve the problem. The triggering factors can either push or pull individuals into entrepreneurship (Zimmerer et al 2008; Drucker, 1994; and McCormick 1996). Individuals who are pushed into entrepreneurship are reluctant entrepreneurs while those pulled into entrepreneurship are willing entrepreneurs. For example, Bill Gates willingly dropped out of University to start a business, while Hong Kong Billionaire Li Ka-Sing was forced into entrepreneurship when he lost his father at an early age. People in either situation can be successful entrepreneurs and entrepreneurial traits are presupposed (Saleemi, 2011; and Giddens & Griffiths, 2006).

Entrepreneurship de-motivating factors (X_3) are those factors that discourage economic activities and hence reduce entrepreneurial activities in any given economy. According to McCormick (1996) and Zimmerer et al (2008) lack of financial resources, information, and appropriate education, some cultural practices, legal systems that fail to protect innovations, small weak markets, and excessive stringent regulations, are some of the factors that frustrate the implementation of business ideas into reality. Casson (1982) and

Saleemi (2011) point out that limited financial resources was a major constraint to entrepreneurial activity. The problem is very much experienced in nascent enterprises when the business ideas are new and untested. According to Eggleston, et al (2002) lack of information and communication technologies (ICTs) is a constraint to economic development. Information can empower rural communities to become entrepreneurial by enabling them to participate actively in decision-making and to exchange ideas with others who are miles far apart. They empowered the poor to use their own knowledge and strengths to improve their livelihoods. These technologies also have an influence on the quality of economic activities, employment and accessibility to credit (McQuaid, 2002). Low rural income can be largely attributed to lack of information and knowledge that could improve earnings potential (Kenny 2002). The Kenyan government has realized that Kenya lies on the unfavorable side of the digital divide and has made it a priority for the public and the private sector to have easy access to the ICTs (GoK 2002). Litondo (2010) established that the use of mobile phones in business enables the MSEs to realize more sales over and above those who do not use this technology. She went on to say that use of mobile phone in business is the most important ICT component for MSEs' performance in the informal sector.

Khauka (2012) and Deakins & Feel (2003) argue that education provides the necessary foundation of entrepreneurial ideas on which the personal and professional development of entrepreneurship is based. They further go on to say that education is not the only determinant of entrepreneurship. Schultz (1980) put it very clearly that education enables individuals to deal with the disequilibrium. The Kenyan government has given due consideration to education in her vision 2030. The education sector is charged with ensuring that every child is enrolled in school. It should be noted that low quality education can lead to low levels of creativity and innovation (Minniti, 2007).

Lack of quality education is responsible for the low levels of creativity and innovation as Minniti (2007) argues that quality education empowers individuals with sound knowledge to perceive opportunities in the environment. Schultz (1980) acknowledges that education level enables an entrepreneur to deal with the disequilibrium. Lack or little

education constrains individuals from dealing with complex life optimally for wealth creation (McCormick, 1996). On other hand Weber (1930) in his academic treatise on the relationship between the "protestant ethic" and capitalism discovered that the cultural issues for European countries influence entrepreneurial behavior of the business people. Protestant ethic and capitalism encourage entrepreneurship while communism or socialism constrains entrepreneurship. In the same context of culture, Ndemo (2005) discovered that Maasai community was resistant to livelihood activity diversification due to strong attachment to their culture and limited level of education.

According to Byrd & Megginson (2009) and McCormick (1996) legal systems that do not provide enabling business environment discourage entrepreneurship. She suggests the enactment of laws that protect intellectual property as a fundamental incentive for entrepreneur to innovate. Nevertheless, too many bureaucracies and too many regulations are likely to influence entrepreneurship negatively (Djankov et al., 2005). Allen (2010), McCormick (1996) and Macke & Markley (2003) noted that small weak markets are also an obstacle to entrepreneurial activities because of the limited business opportunities. Nee and Young (1991), suggest that the government and other regulating bodies should protect local entrepreneurial farmers with serious challenges that could ruin their enterprises. They go on to say that entrepreneurship environment ought to play an important role to improve the livelihoods of an agrarian economy.

Khauka (2012) and North (1991) explained that institutions are supposed to provide the incentive framework within which entrepreneurs operate and that as the framework evolves, it shapes the direction of entrepreneurship. Nee and Young (1991) argue that the government has the duty of establishing legal institutions that can promote entrepreneurship. It is the obligation of the government to make sure that governance, justice, law and order are safeguarded for any meaningful economic development.

2.3 Livelihoods of Small Scale Farmers

Livelihood of farming is basically the process of producing primary agricultural products while livelihood outcomes are the assets acquired as a result of participating in the

economic activities of farming. Furthermore, livelihood is an economic life composed of capabilities, assets and activities required for a means of living. DFID, (1999) describes livelihood to be sustainable when it can cope with stresses & shocks from the environment and also be able to maintain its capabilities and assets without undermining the natural resources. According to Chambers and Conway (1991) sustainable rural livelihoods is centered on people and focuses on improving their livelihood in terms of satisfying the cultural, social, economic and environmental needs and aspirations of present generations without undermining the ability of future generations. Fouracre (2001) used a sustainable livelihood framework to explain the key components which can be used in analyzing the livelihoods of individuals and their communities identified capital assets, vulnerability context, the transforming structures & processes, livelihood strategies and livelihood outcomes as the key elements.

The capital assets are classified as: a) Natural Capital: The natural resource stocks from which resources for livelihoods are derived (including land, water, wildlife, biodiversity, environmental resource); b) Social Capital: These are connections that individuals establish for support in pursuit of livelihoods (i.e. networks, membership of groups, relationships of trust, access to wider institutions of society). c) Human Capital: The skills, knowledge, ability to work and good health are important for livelihood strategies; d) Physical Capital: The basic infrastructure (e.g. transport, shelter, water, energy and communications) and the production equipment are means which enable people to pursue their livelihoods; e) Financial Capital: These are resources which are available to people in form of savings, supplies of credit, regular remittances and pensions, that provide different livelihood options.

The vulnerability context is particularly important as it indicates the nature of trends, shocks and culture, and the ability of the poor to withstand the impact of all these forces. In addition, the structures and processes define people's livelihood options. They are critical in determining who gains access to the various assets, and in influencing the effective value of each asset. The livelihood strategies which individuals adopt show their strategic choices in utilizing their assets, thereby gaining more from a livelihood for

example increased agricultural production or diversification into non-agricultural business activities, or to seek a livelihood in employment. These combinations of activities give rise to a livelihood strategy known as 'livelihood portfolio'. A portfolio will be diversified over time, and between households, communities, gender and generations. The composition of livelihood strategies is a dynamic element of sustainable livelihoods, and as such requires a historical analytical approach.

The agricultural sector is associated largely with improvements in physical capital, social capital, natural capital and human capital. However, diversification into non-agricultural activities such as transport business, shop keeping and micro-financing is integral and contributory to the development of all the capital assets; hence entrepreneurial small-scale farmers have a significant role to play in understanding and supporting sustainable rural livelihoods. Chapman and Tripp (2004) argue that the rural economy is not based solely on agriculture but rather on a diverse range of activities and enterprises, it is therefore important that all the stakeholders play an active role in the implementation and maintenance of sustainable rural livelihood approach to economic life. The key issue for the agricultural sector is what sort of contribution it can make towards the promotion of sustainable rural livelihood.

This study borrows a lot from the sustainable livelihood framework to explain the relationship between economic activity diversification and livelihood outcomes of small-scale farmers. The farmers diversify their livelihood activities to improve their standard of living. The government policies on environmental conditions can lead to activity diversification. The policy can be on high cost of farming, retrenchment or retirement from which only entrepreneurial farmers can withstand the shock or exploit opportunities available in the environment. Faced with vulnerabilities and incentives, farmers can diversify their economic activities and improve their living conditions. On the other hand, when farmers are facilitated by supportive infrastructure such as electricity, running water, markets, tarmac roads and financial institutions and they can diversify their livelihood activities. The infrastructural variables can also influence policy, for example, similarity of businesses in the neighborhood can cause competition which can lead to

unemployment. It is hypothesized that when small-scale farmers diversify their livelihood activities, they improve their livelihood outcomes, which is measured by the physical assets, human capital and social capital. In the long run, livelihood outcomes re-engineer entrepreneurial activities of small-scale farmers. For example; an increase in income can enable a small farmer to improve his/her education level.

2.4 Diversification among Small Scale Farmers

Diversification is the process of the small-scale farmers participating actively in diverse businesses in order to improve their livelihood outcomes (Ellis, 1998). Carter (2001) defines economic activity diversification as a multiple ownership of businesses characterized by mono active farming, structural diversification or portfolio business ownership. Mono active farming is the process of adding value to the primary product such as processing, packaging and branding while structural diversification is mixed farming whereby a farmer grows different types of cash crops and/or keeps a variety of animals for commercial purposes. Portfolio business ownership is whereby a farmer is engaged in non agricultural businesses, for example, running a shop, being in transport business or teaching. Rantamaki-Lahtinen (2008) observed that small-scale farmers who have diversified their activities are well endowed with general resources to run their non-agricultural businesses. She went on to say that many joint tangible resources play a big role in the livelihoods of farmers. However, intangible resources like social network, linkages, clusters and technical know-how are also very useful in the success of small-scale farmers.

According to Carter (1999) portfolio entrepreneurship has been recognized as an important growth strategy particularly in sectors where the economies of scale can be achieved at relatively low levels. He also says that rising farm production is a driver of the rural non-farm economy with linkages both from production (processing and agro-industries) and consumption (increased demand for manufactured products and inputs). The poorest farmers are most reliant on agriculture while those farmers who are less reliant on agriculture tend to diversify into non-farm income generating activities (Ellis and Mdoe, 2003). Chapman & Tripp (2004) acknowledged that a study of 11 countries in

Latin America indicates that non-farm income constitutes approximately 40% of rural incomes. In Brazil for example, the share of rural non-farm income in rural incomes is 39%. The highest income levels were found in areas where agriculture was successful, such as the coffee and sugar areas of the southern region of Brazil. Bryceson (2000) classified economic diversification in Africa into three main types as local services, trade and transfer payments (remittances and pensions from family members in the Diaspora).

The impact of diversification on income levels indicates that agriculture alone is not enough to get the people out of poverty in many areas (Chapman and Tripp, 2004). Income levels are likely to influence livelihood strategies particularly the number of options that are available to different income levels (Ellis, 1999). In Latin America, intensified economic diversification is common among the wealthiest people. Richer households with big farm and high education level are able to employ someone to engage in an off-farm employment for a better pay or wage. They also have better access to the infrastructure needed to establish non-agricultural business. On the other hand, the poorest farmers are limited to low productivity farming and low pay farm labour due to low education level and small farm (Chapman and Tripp, 2004).

Barret et al, (2001) discovered that in rural Africa, small-scale farmers holding small pieces of land and with limited capital are less capable to invest in non-farm activities than the rich large scale farmers. Ndemo (2005) found out that even though the land available to the Maasai community of Kenya is decreasing in size due to the sub-division going on the locals may no longer be able to own large herds of livestock. Even if the economic situation may demand livelihood diversification, many people from this community are resistant to diversify their livelihood due to their cultures. Furthermore, those who have diversified still have a divided mind between their livestock and their non-agricultural enterprises. Given a choice, they would rather retain their traditional economic system instead of diversifying into other economic activities.

Chapman and Tripp (2004) argue that the type of economic diversification where the small-scale farmers look for work on other farms or participate in non-farm activities can

result in a decline in the effective management of the farms. This is because the necessary labour is no longer available on the farm when needed. Bryceson (2000) observed that farmers with small-land holdings have resorted to renting or selling their land to larger-scale farmers and look for employment elsewhere for their livelihoods. Chapman and Tripp (2004) argue that in the situation where men look for employment away from their own farms, women tend to take on a wide range of farm work in order to maintain the food production for survival. Moreover, economic activity diversification opportunities that are exploited by women for extra income lead to economic empowerment of women and improvement in the standard of living of the family (Ellis, 1999). Rantamaki-Lahtinen (2008) notes that rural areas have many resources from which farmers can exploit business opportunities for example, a recent review of several field studies on rural household income diversification in Africa shows that off-farm earnings in rural homesteads are very important in uplifting the standard of living of the people and that portfolio diversification had a big impact on rural household income (Reardon, 1997).

Haggblade and Hazell (1989) observed that rural non- agricultural activities across Africa account for about 14 percent of full time employment and between 25% and 30% of the total income of the farmers. Statistics show that employment opportunities in the Kenyan public sector are declining and the informal sector is growing slowly, as small and microenterprises (SMEs) account for over 50% of employment outside agriculture. The informal sector has an annual employment growth rate of over 10% (Ministry of Agriculture, Livestock Development and Marketing, 1996). Horticulture, especially fruit and vegetables, maize and dairy commodities were the subsectors identified by government and development agencies as areas with the greatest potential for improving income and promoting SMEs and microenterprises (Ministry of Agriculture, Livestock Development and Marketing, 1996; TechnoServe, 1997). Most SMEs operate in towns, but it is becoming widely recognized that rural SMEs are gaining considerable importance across much of Africa as sources of employment and incomes (Jaffee and Morton, 1994) and that they have the potential of generating a variety of linkages and social networks for the small-scale farmers in the rural areas.

It is estimated that 60% of rural household income in Kenya is gained from non-agricultural sources (World Bank, 1994); the report goes on to clarify that the major sources include off-farm wage employment in rural areas, such as working in agro processing enterprises, and profits from small-scale enterprises in the off-farm informal sector. Evidence from past studies suggests that promotion of farm/off-farm linkages, especially those focusing on commercialization of farming, has enormous potential to create employment and to further diversify sources of income. Many small scale farmers are becoming increasingly commercialized by growing high-value non-traditional crops such as fruits and vegetables for the fresh export and processing markets. Vegetable production is currently the most important commercial horticultural enterprise among small scale farmers, especially those with very small farms of less than or equal to 2 acres (World Bank, 1994; Kimenye, 1995).

About 80% of fresh export vegetables are grown by small scale farmers, who sell them to middlemen or brokers (Kimenye, 1995). She further says that some of the vegetables are processed and sold in domestic or export markets. Besides providing income directly to farm households that cultivate the crops, commercialization of farming has the potential to generate farm employment and consequently ripple effect of greater rural none agricultural economic activities (Haggblade and Hazell, 1989). Kenyan policy makers should as a matter of concern for the economy be informed about the nature of linkages coming from or towards entrepreneurial small scale farmers, such as agro processing, and about ways in which such linkages could be used to improve rural livelihoods (FAO 2002).

2.5 Small-scale Farming in Thika

Thika district development plan (2008-2010) indicates that the district has high agricultural potential and farming is the main economic activity. The agricultural sector comprises of crop farming, forestry, livestock, wild life and fisheries. Most of the residents are low income small scale farmers, with farm sizes ranging from a fraction of an acre to ten acres. The farmers are involved in crop and animal farming regardless of the scale. Horticulture (pineapple, mangoes, avocados, passion, and flowers), tea and coffee are among the many crops grown on the farms. Coffee, tea, pineapples and

macadamia are the main cash crops grown in the district while the main food crops are maize, beans, Irish-potatoes and pigeon peas (GoK, 2009).

Rurigi (2007) observes that dairy cattle, goats, sheep, rabbits, pigs and poultry are some of the main animals on the farms in Thika district. Nevertheless, the fish farming industry is growing steadily in the district with a very great potential to improve the lives of many people, however it is still largely underutilized. The Kenyan government is actively promoting aquaculture by introducing small scale fish farming in Thika district like in many other districts for the purpose of food security and increase income diversification among the small scale farmers (GoK, 2009). The intensive agricultural economic activities have affected the Thika River catchment areas by diminishing the forest cover at a very high rate. This is a matter that deserves attention as far as sustainable livelihood is concerned because activities that undermine the natural resources go against the tenets of sustainable livelihood as stipulated by DFID (1999). Kagira (2007) recommends planting of trees and agro-forestry to increase the forest cover of the water catchment areas.

Nduguti (2007) advises that small scale farmers should go for professional training on poultry keeping, form and register common interest groups in order to affiliate themselves to national bodies like Kenya Poultry Farmers Association (KEPOFA), Kenya National Federation of agricultural Producers (KENFAP) and SACCOs. He goes on to say that the government should improve infrastructure to enhance accessibility in delivery of inputs and reduce losses due to breakage of eggs during transportation. She should also build and equip a diagnostic laboratory in Thika town, establish and enforce maintenance of high quality standards of poultry feed as well as other inputs. Rurigi (2007) observed that small-scale coffee farmers have abandoned their farms due the mismanagement of Kenya Plantations and Planters Co-operative Union (KPCU) which was supposed to give them technical farming advice. Nduguti (2007) suggested that financial and insurance institutions should accept micro and small poultry enterprises as legitimate and credible businesses in order to come up with appropriate and affordable lending rates and insurance products for them.

2.6 Small-scale Farming and Entrepreneurship

In summary, literature tells us that the majority of small scale farmers in developing countries are vulnerable since they practice rain-based agriculture which is susceptible to erratic climatic conditions. In view of this challenge, entrepreneurship is provided as one of the solutions to mitigate the vulnerability of the small scale farmers. The farmers are encouraged to diversify structurally (mixed farming) vertically (value addition) or diversification into nonagricultural enterprises (portfolio) to guard themselves against climatic shock (MDGs 2015; Kenya Vision 2030; Ellis and Mdoe, 2003). To improve the livelihood outcomes of the farmers, the concept of entrepreneurship proxied by economic activity diversification has been viewed by scholars from different dimensions namely, psychological, sociological, personality traits, cultural, economic, political, legal, technological and geographical.

Literature tells us that all the above mentioned dimensions of diversifications and their respective determinants have an influence on livelihood outcomes. If entrepreneurship determinants are adequately provided to the farmers, they will diversify their economic activities which will consequently lead to better livelihood outcomes. However, literature is largely silent on the extent of influence of entrepreneurship on the livelihood outcomes. Nevertheless, informed by the existing literature a multi-dimensional entrepreneurship model has been developed showing entrepreneurship dimensions and their respective determinants as summarized in the table 2.2.

Table 2.2 Multi-Dimensional Entrepreneurship Model

Multiple Dimensions of Entrepreneurship	
Multidisciplinary Dimensions of entrepreneurship	**Determinants**
Psychological	Attitude, perception, desire for achievement, internal locus of control, and social status
Sociological	Social networks, clusters, linkages, social norms, role models friends and relatives
Personality	Intelligence, creativity, innovative, hard work, persistence, commitment, perseverance, risk taking and internal locus of control
Cultural	Education, religion, beliefs & customs, philosophy, gender, age and socialization
Economic	Infrastructure, economic performance, financial institutions, loan facilities, fiscal & monitory policies, interest rates, and food security.
Political	Political stability, democracy, liberty and political system
Legal	Legal frame work, rules & regulations and business laws
Technological	Use, access & possession of ICTs, level of science and technology
Geographical	Physical environment, demography, ecology, natural resources and weather conditions

Source: Own classification.

Psychological factors are those elements like attitude, perception and value system that play a very important role in forming a mindset of an entrepreneur. Sociological factors are variables like social networks, clusters, relatives and friends that play a big role in promoting entrepreneurial activities. Personal Traits are internal human elements types like innovativeness, risk taking, internal locus of control, high need for achievement that prepare individuals to entrepreneurial activities. They create an entrepreneurial urge in an individual. Cultural factors are those progressive way of life like the 'protestant ethic', timeliness, capitalism and individualism that facilitate entrepreneurial activities. Economical factors are the vibrant activities like improvement of the infrastructure, growth of national income, sound monetary and fiscal policies that provide an enabling

environment for the success of entrepreneurs. In fast growing economies, there are many business opportunities to exploit.

Political factors are pragmatic political dispensations that play a very important role in providing conducive environment for entrepreneurial activities to take place for example democratic dispensation leads to political stability which is essential for economic development. Legal factors are the elements of law that affects the enterprises in one way or another. Technological factors are technical issues like technical skills, knowledge and capabilities that enable individual to harness science to the benefit of man. For example, the use of ICTs in business promotes economic development. New technologies have a direct impact on entrepreneurial activities. Geographical factors are physical environment variables or natural capital that is provided by Mother Nature such as fertile agricultural land, lakes, rivers, and good weather. These factors play a very crucial role in providing a favorable environment for entrepreneurial activities. If the natural capital is not adversely affected by pollutant entrepreneurial activities, sustainable livelihood can be realized. This will consequently result in sustainable economic growth and development. Chance factors are those variables that are beyond the explanation of man that seem to play a part in business success. These elements referred to simply as luck or an invisible hand in the success of entrepreneurs or God's presence.

2.7 Critical Review of Empirical Studies on Diversification

Little (2001) carried out a study on the income diversification among the East African pastoralists and found out that portfolio diversification was on an increase. He discovered that rich pastoralists diversify in order to improve their livelihood outcomes, while poor pastoralists diversify in order to survive. This implies that entrepreneurship is applicable to rich pastoralists as they are the ones portrayed to aspire for economic growth. Diversification among the poor is said to be for survival therefore it does not amount to entrepreneurship according to Schumpeterian school of thought. Nevertheless, Little (2001) only investigated portfolio diversification which is a limited aspect of diversification. A broader aspect is needed in order to give comprehensive and concise policies on diversification which can improve livelihoods of individuals. He identified the determinants of economic activity diversification as gender, proximity to towns and

settlements, but he did not show how he controlled for the other independent variables which are hypothesized to influence diversification.

Ndemo (2005) established that many Maasai pastoralists are resistant to portfolio diversification which is one aspect of diversification. Therefore he investigated one perspective of diversification. He went on to say that the reasons for their resistance to diversification are limited education and culture. He does not show how he controlled for the other explanatory variables assumed to influence diversification. It is generally understood that the Maasai are pastoralists and very passionate to their culture. He failed to establish the actual effect of culture on diversification. His study does not tell us the extent to which lack of education among the Maasai is contributing to the resistance of diversification. Karugia et al (2006) suggest that diversification into non-agricultural activities among small-scale farmers is very crucial in reducing poverty among the farmers. They are only concerned with portfolio diversification which is a limited way of looking at diversification. It would be more beneficial to look at diversification from a broad perspective in order to comprehensively advise farmers on what to do to improve their livelihoods. The study is silent on the determinants of diversification.

Dose (2007) discovered that diversification among the small-scale farmers in Kakamega district did not lead to better livelihood outcomes. She only investigated structural diversification which is one perspective of diversification and this does not amount to all aspects of diversification. She said that diversification did not contribute to better livelihood because farmers had limited education, poor infrastructure and limited access to finance. Education and infrastructure including roads and electricity has tremendously been enhanced in Kenya, and therefore, a study carried out five years later could yield different results. She does not show how she controlled the other explanatory variables of livelihood outcomes. Michuki (2008) discovered that diversification into non-agricultural activities is either survival led or opportunity led. He only investigated portfolio diversification which is a limited aspect of economic activity diversification among small-scale farmers. Furthermore the elements of survival led or opportunity led is an

internal element of a person which is hard to measure. It is not clear how these variables were measured.

Rantamaki-Lahtinen (2008) says that diversification into non-agricultural activities is on an increase in Norway, Finland, France and UK. She only investigated portfolio diversification among the large scale farmers which is one aspect of diversification. She only investigated farm resources as the determinants of economic activity diversification. She does not show how she controlled for the other covariates. The economic pillar of Kenya Vision 2030 advocates for value addition in agriculture, livestock and fisheries. The vision overlooks the other aspects of economic activity diversification which ought to be investigated because of possible economic avenues they provide to the farmers. The first MDGs 2015 specifically, elimination of extreme poverty and hunger, advocates value addition in agriculture. However, value addition is not the only way in which poverty and hunger can be fought in the rural areas.

2.8 Summary of Empirical Studies

Table 3.3 gives a brief critical analysis of the previous studies done on economic activity diversification and livelihood outcomes in developing countries.

Table 2.3 Summary of Empirical Studies

Author	Study title	Findings	Type of diversification and determinants studied
Little P. D. (2001)	Income diversification among East African Pastoralists: (Northern Kenya and Southern Ethiopia)	• Non-pastoral income activities are on the increase among the livestock herders in Northern Kenya and Southern Ethiopia. • Rich pastoralists diversify to promote economic growth while the poor diversify to survive.	• Portfolio diversification - Determinants are gender and proximity to towns and settlements

Ndemo B. (2005)	Diversification among the Maasai pastoralists	• Many Maasai pastoralists are resistant to diversification because of their culture and little education. • Given a choice Maasai would prefer livestock to anything else.	• Portfolio diversification - Determinants are education, culture and land size
Karugia et al. (2006)	Income diversification and poverty reduction in rural Kenya	• Diversification into non-agricultural activities may be much more important in reducing vulnerability to poverty.	• Portfolio diversification. - Determinants not indicated
Dose, H. (2007)	Economic activity diversifications among the small-scale farmers in Kakamega district, Western province, Kenya.	• Diversification in agricultural production is not sufficient for securing rural livelihood in Kakamega district. • A sufficient income diversification depends heavily on factors like access to education, infrastructure and capital which is simply lacking among the small-scale farmers.	• Structural diversification - Determinants are education, infrastructure and access to finance
Michuki G. (2008)	Rural livelihood in Kakamega District of Kenya with a focus on non-agricultural activities	• Diversification into non-agricultural activities is either survival-led or opportunity-led economic activities. • Opportunity-led diversification would increase inequality and have a minor effect on livelihood outcomes while survival-led diversification would decrease inequality by increasing the livelihood outcomes.	• Portfolio diversification - Determinants are land size, survival led and opportunity led motivation.

Rantamaki-Lahtinen (2008)	Farm diversification in Norway, Finland, France and UK s	• Diversification into non-agricultural activities using farm resources	• Portfolio diversification - Determinants are resources of the farm
Republic of Kenya (2007)	Kenya Vision 2030 (e.g. Economic Vision and Strategy).	Increasing value in agriculture for better livelihoods	• Advocates for value addition in agriculture, livestock and fisheries - Determinants not indicated
Republic of Kenya (2005)	MDGs 2015 (e.g. Socio-economic Development).	Elimination of extreme poverty and hunger	• Advocates for value addition in agriculture - Determinants not indicated

Source: Own classification.

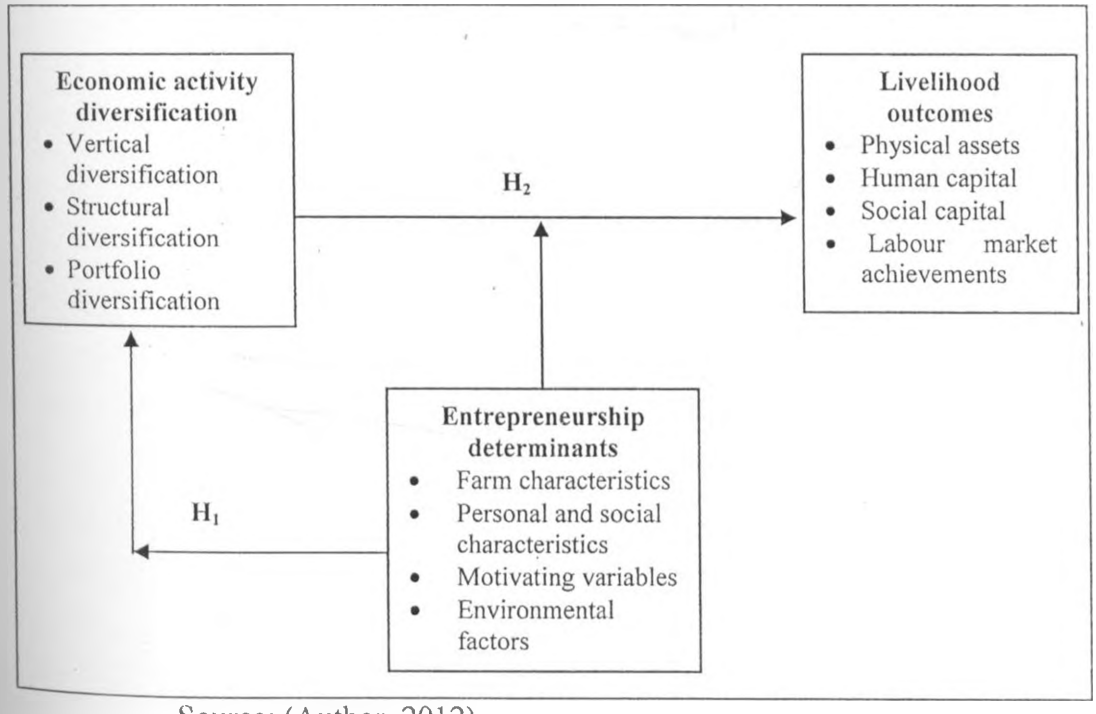
The studies and policies so far reviewed on economic activity diversification have limited perspective of the farmers' livelihood diversification. They are also silent on the impact of entrepreneurship determinants on economic activity diversification. This study attempted to narrow this knowledge gap by exploring the determinants of diversification under the three categories of economic activity diversification, namely, vertical diversification (value addition), structural diversification (mixed farming) and portfolio diversification (non-agricultural businesses). Literature suggests that the impact of economic activity diversification on the livelihood outcomes of the farmers is moderated by entrepreneurship determinants. The previous empirical studies did not analyze determinants of economic activity diversification from a multidimensional view point neither did they indicate the impact of economic activity diversification on livelihood outcomes.. This study investigated the determinants of economic activity diversification

from an integrative perspective and also indicated the influence of economic activity diversification on livelihood outcomes using econometric models.

2.9 Conceptual Framework

The conceptual framework illustrates that entrepreneurship determinants influence economic activity diversification, and subsequently economic activity diversification influences the livelihood outcomes of the small-scale farmers. The framework shows that entrepreneurship proxied by economic activity diversification is dependent on entrepreneurship determinants. Secondly, the set of livelihood outcomes is dependent on economic activity diversification. Fundamentally, the conceptual framework indicates that entrepreneurship determinants, namely, farm characteristics, personal and social characteristics of farmers, motivating and environmental factors moderate the influence of economic activity diversification on the livelihood outcomes. Secondly, diversification could also be viewed as a function of livelihood outcomes. For example, when a small-scale farmer diversifies his/her economic activity, the livelihood outcomes are expected to improve and there may be a feedback from outcomes to diversification.

Figure 2.1 Influence of Economic Activity Diversification on Livelihood outcomes



Source: (Author, 2012).

2.10 Research Hypotheses

The assumption of this study is that economic activity diversification has a significant effect on livelihood outcomes. Evidence on this issue can inform policy makers on course of action that could be taken to improve the livelihood outcomes of small scale farmers. This study tests the following specific hypotheses:

H_i There is no relationship between economic activity diversification and entrepreneurship determinants

H_2 Economic activity diversification has no effect on the livelihood outcomes in small holder agriculture.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

The study is based on the philosophy of logical positivism, survey research design and small-scale farmers as the population of interest. A multistage and transect sampling techniques were used to identify the respondents, while questionnaires were used as data collection instruments. The structural model in this chapter illustrates the data analysis procedure followed. The measurements of the variables used in the analysis plus LPM, Logit and Probit models are also indicated.

3.2 Research Philosophy

The research is based on the philosophy of logical positivism which is described as an organized study which combines deductive logic with empirical observations of individual behaviour in order to unravel and establish a set of causal laws which can be used to predict general patterns of human activity (Neuman, 2000). In other words, logical positivism implies that laws of behaviour can be discovered scientifically by observing and analyzing empirical events. Positivist social scientists in particular uphold a deterministic view which considers behaviour to be a function of antecedents; therefore, the change of antecedents will lead to the change in the consequences (Brodbeck, 1968). For this study economic activity diversification is the entrepreneurial behaviour which is empirically investigated with a focus on its effect on livelihood outcomes. In particular, if diversification determinants can be manipulated then the entrepreneurial behaviour can be controlled to lead to desirable livelihood outcomes.

3.3 Research Design

A descriptive survey research was part of the study design because the information sought was of personal nature, i.e., views, opinions, attitudes, perception and behavior of small-scale farmers about entrepreneurial activities. Very little is known about the relationship between entrepreneurship proxied by livelihood activity diversification and livelihood outcomes among the small-scale farmers in Kenya. Sproull (1995) recommends survey research design as the most appropriate for social scientists

interested in collecting primary data of attitudes, ideas, behaviour and intentions of a target population. Experimental research design therefore was not appropriate for this kind of study as it was difficult to have control and treatment groups among the farmers. Specifically, a cross-sectional survey design was applied to collect quantitative data on entrepreneurship and the respondents were interviewed once.

3.4 Population of the Study

The population under study comprised of small-scale farmers in the larger Thika District with an average of 1.8 acres of land holding, given that small scale farmers form the backbone of the Kenyan agrarian economy (Kimenye, 1995). It was a suitable population of interest because of the critical place it holds in the Kenyan economy. The study focused on the farmers whose major cash crops included coffee, tea, macadamia nuts, cereals and horticulture. Small scale farmers who kept animals like; graded cattle, goats and sheep as well as poultry for their livelihoods, were also targeted for this study. It should be noted that the study area is based on the old administrative framework that was in place during the investigation period. The current structures do not have districts, divisions and locations but instead, are based on counties.

3.5 Sampling and Sample Sizes

According to the original plan of this research, a sample of 392 small-scale farmers was to be drawn from the larger Thika District, currently found in the Murang'a and Kiambu counties of Central Province of Kenya. The District was chosen for the study because it is considered microcosmic to the rural livelihoods in Kenya (Kinyanjui 2007). At the pretest stage, the larger Thika district was divided into five divisions, namely, Gatanga, Kakuzi, Thika municipality, Ruiru and Githurai. There were 13 divisions, 33 locations and 85 sub-locations. Since the population of small-scale farmers in Thika was not known, the following formula was used as suggested by Webster (1995) to estimate the sample size of this kind of population.

$$n = \frac{z^2 \pi (1 - \pi)}{(error)^2}$$

Where π is taken to be 50% of small-scale farmers who have diversified their livelihoods. At the 95% desired level of confidence and margin error of 5% the sample size (n) was calculated as:

$$n = \frac{(1.96)^2(0.5)^2}{(0.05)^2} \approx 384 \text{ Farmers}$$

The larger Thika district is made of Gatanga, Thika East, Thika West and Ruiru districts. Gatanga district is composed of five divisions namely Samuru, Gatanga, Kariara, Kigoro, and Kihumbuini. Out of the fifteen locations found in Gatanga district, five locations were picked for the study: Kigio, Kiria-ini, Kariara, Kihumbuin and Mukarara. However, the data was collected from: Ithangarari, Gakurari, Thare, Gathanji, Gatura, Kihumbuini, Nyaga, Mukarara and Kagongo sub-locations. Thika East district is composed of 4 divisions namely Gatuanyaga, Kakuzi, Ngoliba, and Mutumbiri. However, out of the 7 locations in the district Ithanga, Kakuzi, Ngelelya and Mutumbiri were earmarked for the study and data were collected from Kaguku, Gituamba, Kwamukundi and Thuthua sub-locations. Thika West district is composed of Thika Municipality and Juja divisions. Out of the five locations in the district Makongeni, Biashara, Juja and Kalimoni locations were selected for the study. The research was carried out in Komu, Kariminu, Kioara, and Kalimoni sub-locations. Ruiru district is made of Ruiru and Githurai divisions. Out of the 6 locations in the district Mugutha and Gikumari locations were earmarked for the study and research was carried out in Mugutha and Gatongora sub-locations (see appendix III).

Multistage sampling method was used in selecting the districts under study in the first stage, divisions in the second stage, locations in the third stage and sub-locations in the fourth stage. This sampling technique was utilized to ensure that the different livelihoods found in the Larger Thika district were fairly represented for the study. The selection of the appropriate locations and the sub-locations was guided by the Kenya Food Security Steering Group (KFSSG), (2008) classification of livelihoods as Agro-pastoral livelihoods, marginal agricultural livelihoods, high potential (mixed farming) livelihood, and urban (casual labour/trading) livelihood. Based on the given information, Thika

District Agricultural Officers assisted in identifying the 15 sub-locations (see appendix III).

Transect random sampling technique was used to pick 28 households of respondents for interview in each of the selected sub-locations. Litondo (2010) used transect sampling to select MSEs in the informal sector. A road was followed from the sub-chief's camp and every 3rd farmer along the chosen road was interviewed. A coin was tossed to decide either the right or left hand side of the road to start picking the households for interviews. This kind of random sampling technique was to ensure that there was a variety of samples as Southerland (2000) advises. Data collected from the different locations of the district served as a control measure to ensure that there was a variability in the determinants of entrepreneurship, economic activity diversification & livelihood outcomes and that the proximity of small-scale farmers in the sub-locations were not to bias the research outcome.

3.6 Data Collection Instruments

Data was collected using the questionnaire as the main data collection tool. The questionnaire was the most appropriate because the instrument enabled the researcher to collect large amounts of data over a very short period of time from the primary source. The questions in the questionnaire were subdivided into sections to obtain logical responses suitable for the study. The types of questions used include multiple choice questions and fill-in questions. The respondents were required to tick against the suitable responses. Basically, the questionnaire was prepared in consultation with the entrepreneurship scholars for the purpose of content validity and reliability to capture the required information on entrepreneurship determinants, economic activity diversification and livelihood outcomes of small scale farmers.

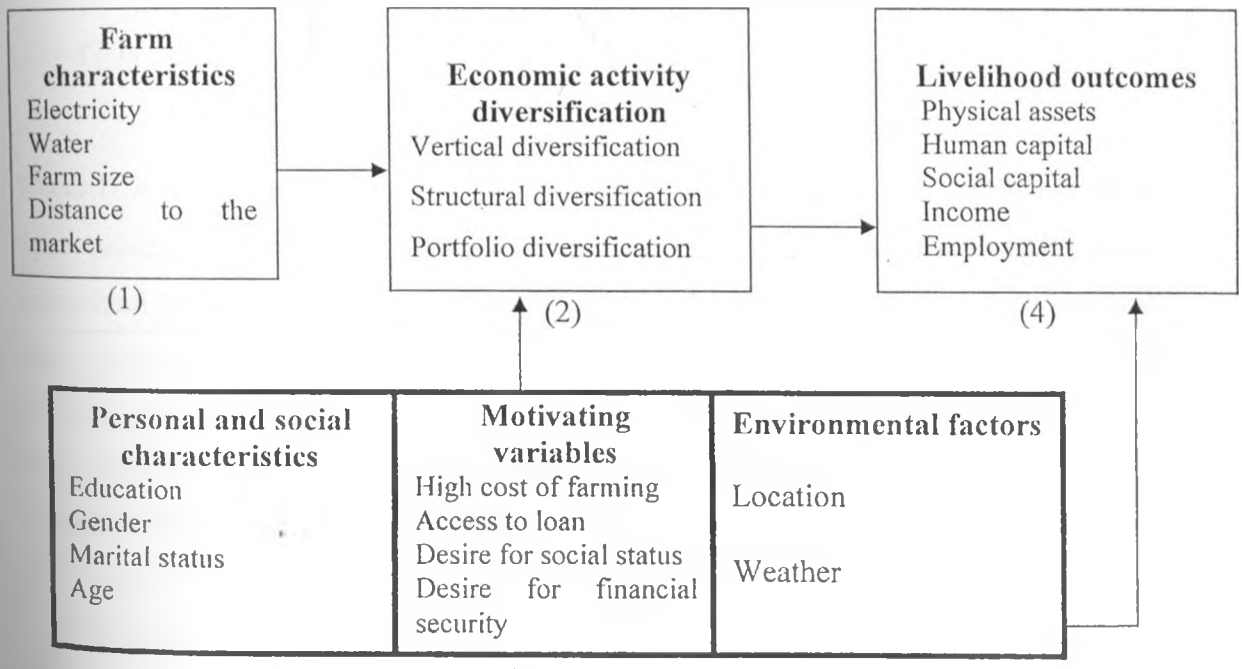
The instrument was validated through content analysis whereby each variable in the instrument was carefully examined to ensure that it was suitable for the study. The instrument reliability was enhanced by the researcher training the research assistants. The research assistants were government agricultural officers stationed at the sub-locations of the districts. So, collecting data by the qualified government personnel ensured credibility

and hence reliability of the instrument. The researcher in the company of research assistants and informants administered the questionnaires to the respondents. It is important to note that a pilot study had been done first to pre-test the research instrument. The questionnaire was moderated for simplicity and clarity of ideas before it was administered to the respondents.

3.7 Empirical Framework and Data Analysis

The data which was collected from the field survey was cleaned, classified, coded, and tabulated before analysis. The survey managed to net 388 households in the larger Thika district composed of Gatanga, Thika East, Thika west and Ruiru districts. The STATA computer statistical package was used in the analysis of quantitative data. The analysis was based on the information obtained from the questionnaire. The empirical model as illustrated in figure 4.1 states that entrepreneurship determinants lead to economic activity diversification, which in turn leads to livelihood outcomes.

Figure 3.1 Framework for Empirical Analysis



Source: Own compilation.

It should be noted that in the empirical analysis, farm characteristics in panel (1) are the excluded instrumental variables used to predict activity diversification and these are to be contrasted with excluded instruments in panel (3). Economic activity diversification in panel (2) is the key driving force behind livelihood outcomes while personal & social characteristics, motivation variables and environmental factors in panel (3) are the control variables assumed to influence both economic activity diversification and livelihood outcomes in panel (4). Economic activity diversification is assumed to influence livelihood outcome of the small-scale farmers and hence the study attempted to explore the relationship between the two sets of variables. The empirical theory shows that livelihood outcome is the dependent variable while economic activity diversification is the independent variable of policy interest. Thus, a livelihood outcome is a function of economic activity diversification, and control variables that are in panel (3) so that the full structural model can be specified as:

$$D = f(M, PS, E, F) \qquad \text{(i)}$$

$$LO = f(\hat{D}, M, PS, E) \qquad \text{(ii)}$$

Where D is livelihood activity diversification ($\hat{D}$ is its predicted value) and is of three types, namely, vertical (value addition), structural (mixed farming) and portfolio (non-agricultural businesses). LO is a vector of livelihood outcomes represented by physical assets (permanent house, vehicles and land), human capital (years of schooling and health), and social capital (social networks). M is a set of motivating factors for example, cost of farming and desire for financial security; PS is a set of personal and social characteristics such as years of schooling, gender, and age; E is set of environmental factors such as location and weather; and F is a set of farm characteristics namely: running water, electricity, distance to the market and farm size, which are used as the excluded instruments. It should be noted that for identification purpose, F is excluded from LO equation (equation ii)

3.7.1. Measurement of Variables

The variables appearing in the empirical model were measured as indicated in the table below.

Table 4.1 Measurement of Variables

Variables	Measurement units
1. Economic activity diversification is the proximate representation of entrepreneurship a. Vertical diversification (value addition) b. Structural diversification (mixed farming) c. Portfolio diversification (Non-agricultural businesses)	Dummy variable is used to measure economic activity diversification, i.e., value of one is used as an indication of diversification and a value of zero otherwise.
• Farm characteristics a. Electricity b. Running water c. Farm size d. Distance to the market	Dummy variable is used to measure farm characteristics, i.e., value of one is used if a farmer has electricity and running water; farm size is measured in acres, and distance to the market is in kilometres.
• Personal and social characteristics a. Education level b. Gender c. Marital status	• A value of zero if no formal education, value of two for primary education, value of three for secondary education, and a value of 4 for post secondary education. • A value of one is used if a farmer is a man and a value of zero for woman. • A value of one if the farmer is married and a value of zero if not.

Variables	Measurement units
2. Entrepreneurship determinants • Motivating factors a. Desire for food security b. Desire for financial security c. Desire for achievement d. Desire for independence e. Desire for social status	Dummy variable is used to measure the motivating variables, i.e., value of one is used if the farmer is motivated by the named variable, and a value of zero if motivation by named variable is not indicated.
• Environmental factor	A value of one is used if farmer is motivated by weather conditions to diversify and a value of zero otherwise.
3. Livelihood outcomes i) Physical assets a. Land b. Permanent house c. Motor vehicle	Dummy variable is used to measure livelihood outcomes: Physical assets, i.e., value of one if a farmer owns the mentioned asset and a value of zero otherwise.
ii) Social capital a. Membership to associations like churches, SACCOs or table banking.	Social capital takes a value one if a farmer is an active member of a social group and a value of zero otherwise.
iii) Human capital a. Education b. Health	Human capital takes a value of one if a farmer could afford healthcare and education services for family members and a value of zero otherwise.
iv) Labour market achievements a. Labour income of a farmer b. Employment	Income is measured in Ksh per month Employment is measured by number of employees on the farm

Source: Own classification.

3.7.2 Achieving the Study Objectives

The objectives of the study were achieved by first, analyzing the extent of economic activity diversification. This was done by the use of descriptive statistics which were used to show the proportions of small-scale farmers who had diversified vertically, structurally, and portfolio-wise. Correlation bivariate analysis was used to show the association between diversification and selected entrepreneurship determinants.

Secondly, LPM, probit, and logit models were used to analyze the determinants of entrepreneurship and to measure the effect of diversification on livelihood outcomes. In previous studies, Litondo (2010) used the LPM, probit and logit models to analyze the determinants of the possession of mobile phones in the informal sector. Finally the logit model was used to estimate the impact of mobile phone usage on the performance of MSEs in the informal sector, while McKenzie and Sakho (2007) used the Logit model to estimate the impact of tax registration on firm profitability. Cameron (2005) says that predictor models are widely used in estimating marginal effects of the explanatory variables. The working assumption of the thesis is that, an entrepreneurial farmer is rational, and therefore, diversified his/her livelihood activities depending on the benefits he/she had perceived in diversification. Specifically, an entrepreneurial small-scale farmer's decision to diversify his economic activities for the purpose of improving livelihood outcomes was analyzed using the models shown below. The same models were also used as necessary to analyze the effects of diversification on livelihood outcomes.

Probit model

$$P_i = \frac{1}{\sqrt{2\pi}} \int_{-\infty}^{Z} e^{-\frac{1}{2}Z^2} dZ \qquad (1a)$$

Logit model

$$P_i = \frac{1}{1 + e^{-Z^*}} \qquad (1b)$$

Linear Probability Model (LPM)

$$P_i = bX + u_i \qquad (1c)$$

Where P_i is the probability of farmer i diversifying his or her livelihood activities, e is a natural number (≈ 2.718), π is a mathematical constant (≈ 3.141), Z_i is the logit or probit index of farmer i; the logit or probit index Z_i is the measure of benefits that a farmer i perceives in an activity diversification. As Z_i becomes infinitely large ($+\infty$), the more the probability that a farmer i will diversify his/her livelihood activities. The logit and probit indices of a farmer i can be expressed in linear form as:

$$Z_i = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + \varepsilon \qquad (2)$$

Where: X_1 is a set of motivation factors such as loan, agricultural extension services and cost of farming, X_2 is a set of personal characteristics such as education level and work experience, X_3 is a set of environmental factors such as location, distance to the tarmac road, X_4 is a set of farm characteristics like electricity, running water and farm size, and ε is the error term. The parameters b_0, b_1, b_2, b_3 and b_4 were estimated using the maximum likelihood methods by the following likelihood function.

$$L = \prod_{i=1}^{N}\prod_{i=1}^{k} P_i^{Q_{ik}} \qquad (3)$$

Where: L = Likelihood function, N = observations, k = alternatives (k = 1, 2); Q_{ik} = A dummy variable which takes a value of 1 for a diversification status or livelihood status.

The linear probability model (LPM) parameters, b_0, b_1, b_2, b_3 and b_4 were estimated using OLS.

Where: $$b = \frac{n\sum XY - \sum X \sum Y}{n\sum X^2 - (\sum X)^2} \qquad (4)$$

X and Y are independent and dependant variables respectively.

CHAPTER FOUR: DESCRIPTION OF THE STUDY AREA

4.1 Introduction

This chapter gives a qualitative and quantitative description of larger Thika district. The perception of the study area which is composed of Thika East, Thika West, Ruiru and Gatanga districts is described. Descriptive statistics of Thika with a bearing of economic activity diversification, entrepreneurship determinants and livelihood outcomes of small-scale farmers in Thika are given.

4.2 General Perceptions of the Study Site

The agricultural sector of the study area, formerly referred to as Thika district, but now part of Kiambu and Murang'a counties, comprises of food and cash crop farming, forestry, livestock, wild life and fisheries. However as observed by the researcher, there are many non-agricultural activities taking place in the area such as trading in various merchandises, operations of Jua kali artisans and Boda boda riders (motor cycle taxis). As a matter of livelihood concern, some of the economic activities are polluting the environment. For example, welding of metallic doors and windows, intensive use of chemicals and fertilizers on agricultural farms, and littering of polythene papers at trading centres.

The district has a number of large manufacturing industries including factories like textile for cotton, food processing for pineapples, macadamia nuts and wheat. There are also factories for tannery, and cigarette manufacturing which rely on the smallholder agriculture for the supply of primary products. Other factories belong to tea and coffee growers' co-operative societies, and are found in different parts of the district. The research was carried out in the larger Thika district which was made up of four districts namely Thika East, Thika West, Ruiru and Gatanga (see appendix III).

4.2.1 Thika East District

Thika East District is located in the dry area of the larger Thika district, referred to as ecological zone 4 (see appendix IV). One of the most outstanding features is Kilimambogo game reserve which is at the boundary of Thika East and Matunguru district. It is a tourist attraction site which has given employment opportunities to residents. The locations which were investigated were Ithanga, Ngelelya, Mutumbiri and Kakuzi (see appendix III).

Ithanga location has three sub-locations and the sub-location that was investigated was Kaguku. Small-scale farmers in this sub-location grow mangos, citrus fruits, maize, beans and pigeon peas. The majority of people live in small timber and stone houses. The reason for stone houses could be because there are many quarries around. The infrastructure is generally good as there are murrum roads, electricity and clean piped water which can enhance entrepreneurship.

Ngelelya Location has three sub-locations of which Kwamukundi sub-location was investigated (see appendix III). The area is dry and the farms seem to be larger than those in other sub-location. Small scale farmers grow Maize, beans and cassava and keep mostly indigenous cattle, goats and sheep, and local poultry. The road network is generally good as there are all weather roads, therefore, farmers can easily transport their agriculture products to the market. Most of the visited homes did not have running water and some harvest rain water and kept it in safety water tanks.

Mutumbiri location is composed of two Sub-Locations of which Thuthua sub-location was selected for the study. The terrain is generally flat apart from the river valleys with black cotton soil which is only good for crops like soya beans and cotton. Elevated areas have red soil which is good for a variety of crops like Maize, beans, vegetables, and water melon. Many farmers keep dairy and local cattle for an extra source of income. Although there is sufficient supply of electricity, the farmers who were investigated were not utilizing it for agro-industry activities. Del Monte international farming company occupies a very big area of the sub- location and the company employs many residents

including some small scale farmers. The road network is good as there are many murrum roads which make it possible for the small scale farmers to transport their agricultural products to the market.

Kakuzi location is composed of two sub-locations of which Gituamba Sub-location was chosen for the study. Del Monte International farm occupies many acres of land in Gituamba Sub-location. The area has red soil which is good for agriculture and small-scale farmers grow a variety of crops including mangoes, citrus, vegetables, french beans, tomatoes, maize, beans and cassava.

4.2.2 Thika West District

Thika West District is made of Thika Municipality and Juja divisions. There are many agricultural and non-agricultural economic activities taking place in the district. Thika and Juja towns are found in the district which offers residents with plenty of business opportunities. Jomo Kenyatta University of Agriculture and Technology, Mount Kenya University and Greca University are among the many education institutions found in the district offering employment opportunities to the residents. The district is composed of 5 locations of which, Biashara, Makongeni, Juja and Kalimoni were investigated (see appendix III).

Biashara location has four sub-locations of which Kariminu Sub-location was chosen for the study. The sub-location is slightly hilly with quite a number of economic activities taking place ranging from growing maize and beans to keeping poultry and dairy. Many houses visited had electricity and some farmers were using it for viewing television and listening to the radio. However, none of the farmers visited were using this resource to add value to their agricultural produce.

Makongeni location is composed of three sub-locations of which Komu sub-location was the focus of study. People are generally poor as many are living in plots of less than ¼ acre, however, most of them have permanent houses, and this could be attributed to the quarry available in the area. The area was originally a sisal estate which was sub-divided

including some small scale farmers. The road network is good as there are many murrum roads which make it possible for the small scale farmers to transport their agricultural products to the market.

Kakuzi location is composed of two sub-locations of which Gituamba Sub-location was chosen for the study. Del Monte International farm occupies many acres of land in Gituamba Sub-location. The area has red soil which is good for agriculture and small-scale farmers grow a variety of crops including mangoes, citrus, vegetables, french beans, tomatoes, maize, beans and cassava.

4.2.2 Thika West District

Thika West District is made of Thika Municipality and Juja divisions. There are many agricultural and non-agricultural economic activities taking place in the district. Thika and Juja towns are found in the district which offers residents with plenty of business opportunities. Jomo Kenyatta University of Agriculture and Technology, Mount Kenya University and Greca University are among the many education institutions found in the district offering employment opportunities to the residents. The district is composed of 5 locations of which, Biashara, Makongeni, Juja and Kalimoni were investigated (see appendix III).

Biashara location has four sub-locations of which Kariminu Sub-location was chosen for the study. The sub-location is slightly hilly with quite a number of economic activities taking place ranging from growing maize and beans to keeping poultry and dairy. Many houses visited had electricity and some farmers were using it for viewing television and listening to the radio. However, none of the farmers visited were using this resource to add value to their agricultural produce.

Makongeni location is composed of three sub-locations of which Komu sub-location was the focus of study. People are generally poor as many are living in plots of less than ¼ acre, however, most of them have permanent houses, and this could be attributed to the quarry available in the area. The area was originally a sisal estate which was sub-divided

into ¼ acre residential plots. Many residents are urban farmers having vegetable gardens and keeping local poultry and zero grazing. Electricity and piped water are available to the residents but they seem not to use the resources for commercial purposes. Some of the farmers are involved in hawking green vegetables and eggs as their means of livelihood. Many residents are also engaged in non-agricultural activities such as mining stones from quarries and selling them for their livelihood.

Juja location is composed of Kiaora and Mirimaini sub-locations of which the study was carried out in the former sub-location. Kiaora sub-location occupies a relatively small geographical area as compared to other sub-locations. Many houses are permanent with stone walls, this could be because of the many quarry mining business found in the sub-locations. Many homes visited did not have running water and residents said that they depended on Ndarugu and Thiririka rivers as their source of water. Quite a number of farmers are growing horticulture crops like tomatoes, kales and cabbages. Many of the roads in the area are murrum roads and farmers are able to transport their agricultural produce to the market without difficulties.

Kalimoni location is made up of one sub-location also known as Kalimoni. The residents grow maize and beans which they sale as primary agricultural produce. The area used to be a sisal farm and beef cattle farm for the white settlers but now the farm land has been sub-divided into plots of ¾ acres. Many residents are involved in mining of building stones which are available in the area as a source of income.

4.2.3 Ruiru District

Ruiru district borders Nairobi to the south, Thika west district to the North east, Gatundu to the North, Githunguri district to the West and Machakos to the East (see appendix V). Ruiru town is the biggest commercial centre and industrial area in Ruiru district. The locations under investigations were Mugutha and Gikumari in which Mugutha and Gatongora sub-locations were visited respectively. Ruiru is an urban district, with limited agricultural activities and many non-agricultural businesses the main means of livelihoods for the residents. For example, quarry mining, motorcycle (boda boda)

operators and kiosks. Large coffee estates in this district are being converted into residential estates and that is providing employment to the residents.

Gikumari location is composed of two sub-locations of which Gatongora Sub-location was chosen for the study. The Road network is very good with mostly murrum roads and good communication network which is conducive to business. The area is densely populated and land has been sub-divided into very small residential plots which have compromised agricultural production. Semi-zero grazing and zero grazing are commonly practiced in the area. Many residents depend on bore holes and wells as their main source of water. Electricity is accessible but few people have it in their homes. There are some social groups in the area that are in agro-industry, for example, Jirani Pamoja Self-help group which is composed of farmers who have come together to process their primary agricultural products like oranges and pawpaw into jam, potatoes into potato crisps and tomatoes into tomato sauce. They also preserve vegetables by drying and packaging them. However, none of the farmers visited were members of these groups, the only value which they were adding to their produce was storage, as a few granaries could be seen in some homesteads.

Mugutha location is made up of two sub-locations of which Mugutha sub-location was selected for the study. People grow maize and beans for subsistence. Electricity is available but very few people have it in their homes. It should be noted that some entrepreneurs have taken advantage of scenic beauty of Theta River which passes through the sub-location for eco-tourism. For example, Courtesy beach where people go for recreation and weddings. This has provided employment to the residents and a market for their agricultural produce. Fish farming is also practiced along the Theta River. This is a government initiative meant for economic stimulation programme. Some small-scale farmers have formed clusters to add value to their agricultural produce, for example, Sauki Youth group which grows and packages mushrooms for export. There is also another social group which is involved in yogurt making, vegetable drying, sweet potatoes and cassava crisps. However, none of the respondents in this area were processing primary agricultural products.

4.2.4 Gatanga District

Gatanga district is the largest, most fertile and more rural as compared to other districts in Thika. It has five divisions namely Gatanga, Samuru, Kihumbu-ini, Kariara and Kigoro with 15 locations and 44 sub-locations (see Appendix III). The district is characterized by ridges, rivers and green ecological environment which provide a lot of opportunities for eco-tourism. Some entrepreneurial farmers have dams which are used to irrigate their farms. Rural electrification has taken root in some areas which avails electricity to farmers. Some small-scale farmers in the district have flower, tea and coffee farms which seem to lead to better livelihoods in this district as compared to other districts in the Larger Thika district.

Kirwara and Gatura open markets are some of the most outstanding economic features found in the district. These markets provide an opportunity for farmers to sale their agricultural produce. Gatanga water supply scheme is a development program that is expected to provide water to the people; however farmers complained that the water supply is not regular. Kigio, Kiriaini, Kariara, Kihumbuini and Muka rara locations were selected for the study.

Kigio location has 3 sub-locations and the study was carried out in Ithangarari and Gakurari sub-locations. Ithangarari sub-location is full of ridges and valleys with very green vegetation which is ideal for eco-tourism because of its scenic beauty. However, none of the respondents were exploiting this opportunity. The farmers grow coffee and tea which they sell to the factories of co-operative societies. Gakurari sub-location is a coffee growing area similar to Ithangarari sub-location. This sub-location also has millers for processing cereals from small-scale farmers.

Kiriaini location has 4 sub-locations and the study was carried out in Thare and Gathanji sub-locations. Thare sub-location is a tea and coffee growing area which is referred to as transitional zone is an ideal area for both animal and crop farming. Gathanji sub-location is a coffee growing area; however, some farmers in the sub-location grow a variety of crops and keep dairy animals. Most of the residents cultivate horticultural crops in the stream valleys.

Kihumbuini location is composed of 4 sub-locations and the data was collected from Kihumbuini, Nyaga and Kaganjo sub-locations. Kihumbuini sub-location is good for agriculture because of the good weather and soil fertility. This sub-location appears to be the most densely populated sub-location in the location and there is a big market where farmers sell their produce. Residents said that the area used to be a concentration camp for Africans displaced by white settlers during the colonial period and this could be the reason for the high population in the sub-location. The standard of living of the people seems to be slightly lower than that in the other sub-locations of the district. African Harvest is an NGO in the sub-location that is helping farmers to market their bananas, whereas Gatanga Avocado farmers Association, helps small-scale farmers to market avocados abroad. These social entrepreneurship undertakings are expected to help the small-scale farmers to improve their livelihoods.

Nyaga sub-location has good weather which is ideal for farming. Although there are no tarmac roads, the murrum roads in the sub-location are in good condition and people are able to do business without problem of transportation. Though the area beyond the north eastern part of the sub-location is a tea growing area, Nyaga sub-location is a coffee growing area and is ideal for agriculture. Many farmers in the sub-location grow a variety of crops. Kiganjo sub-location is a hilly place just like the rest of the sub-locations in Gatanga district. It is a tea growing area and horticulture crops are grown in the valleys. The farmers also keep dairy animals and grow Arabian flowers for export. Wattle trees which are scattered on various farms are also source of income. Small-scale farmers in this location are engaged in mixed farming, however, none of the farmers visited were adding value to their primary agricultural produce. The standard of living of the farmers seems to be slightly higher than the other parts of the district.

Mukarara location is made up of four sub-locations and the study was done in Mukarara sub-location which is a fertile ground for agriculture. Residents grow coffee, avocado, wattle trees among many other crops. Value addition to the primary agricultural produce is only limited to storage as granaries could be seen in some homesteads. Most of the houses are permanent houses with stone walls irrespective of the sizes and the standard of living of the people seems to be slightly above average.

4.3 Sample Statistics

Descriptive statistics summarize quantitatively the aspects of the study area that have a bearing on economic diversification and livelihoods of farmers.

4.3.1 Farm Features

Farm features are very important in understanding the livelihoods of farmers and the study established that farms varied in terms of sizes and what was grown on them. The study shows that 32% of the farmers had less than 1 acre of land while only 9% of the respondents had farms with sizes ranging from 5 acres to 10 acres. It was discovered that small-scale farmers have an average of 1.77 acres of land. This is very close to Aina (2007) findings that small farm sizes in Africa are approximately 1.8 acres. There was an average distance of 5 km from the observed farms to the nearest market place, ranging from 0.02 km to 20 km. 70% of the farms had no supply of electricity and 46% of the farmers had no running water while 50% of the houses on the farms are permanent with stone walls. Farms had an average of one worker with the number of employees ranging from no worker to 10 workers. It was also discovered that there is an average of 7 km from the tarmac road to the farms, ranging from less that 1 km to 28 km.

Electricity supply varies from location to location, e.g., in Biashara and Gikumari locations, 74% of the respondents had electricity supply, while in Mukarara location only 9% of households had electricity, Kalimoni location was found to have no electricity in the households of respondents. Water supply also varies from location to location, for example, 78% of the respondents had supply of water in Kiriaini location, and 35% of the respondents had running water in Juja location. It should be noted that Biashara location is more of a rural town than Gikumari location which is about 10 km from Ruiru town.

Ownership of permanent houses on the farms varies from one location to another for example Ngelelya, Kakuzi and Ithanga locations 21% of the households had permanent houses and in Kariara 15% of the households interviewed had permanent houses. In contrast Kihumbuini 83% of the respondents had permanent houses, Mugutha 89% had permanent houses Gikumani location 81% had permanent houses. This is an indication of

differences in the livelihoods of the people found in different locations of larger Thika district. This concurs with Alila and Atieno (2006) and Michuki (2008) study findings that there are disparities in the standard of living of rural livelihoods. The reason why Mugutha and Gikumari locations have permanent houses could be because of the many quarries in the area and therefore stones are readily available. It should also be noted that Kihumbuini is in a fertile ecological zone which is an added advantage to their means of livelihood.

4.3.2 Farmer Characteristics

The study found out that the average education level of the respondents was 8 years, ranging from no education at all to 22 years of schooling. About 12% of the respondents had more than 12 years of secondary education while 6% had no education at all while 22% of those in portfolio diversification had post secondary education. However, only 11% of those who had post secondary education, had diversified.

Table 4.1: Descriptive Statistics

Variable	Number of Observation	Mean	Std. Dev.	Min	Max
Size of the farm (in acres)	388	1.770619	.60699	<= 1	10
Number of employees	388	1.146907	1.351262	0	10
Housing (1 = Permanent house)	388	.5025773	.5006389	0	1
Water supply (1 = having tap water) .	388	.5360825	.4993403	0	1
Electricity supply (1 = connected to electricity)	388	.2938144	.4560961	0	1
Education level (in years)	388	8.489691	4.049104	0	22
Gender (1 = male)	388	.4948454	.500619	0	1
Marital status (1 = married)	388	.9201031	.2714836	0	1
Age of respondent (in years)	388	49.41237	13.27993	20	90
Portfolio diversification (1 = farmer doing non-agricultural business)	388	.3762887	.4850793	0	1
Vertical diversification (1 = farmer adding value to farm produce)	388	.0618557	.2412043	0	1

Variable	Number of Observation	Mean	Std. Dev.	Min	Max
Structural diversification (1 = farmer practicing mixed farming)	388	.8762887	.3296771	0	1
Desire for food security (1 = farmer diversifying for food security)	388	.9458763	.2265538	0	1
Financial security (1 = farmer diversifying for financial security)	388	.935567	.2458397	0	1
Competition (1 = farmer diversifying for competition)	388	.5592784	.4971147	0	1
High cost of farming (1 = farmer diversifying for cost of farming)	388	.5902062	.4924305	0	1
Agricultural extension services (1 = farmer diversifying through motivation from agricultural extension officers)	388	.4896907	.5005391	0	1
Land acquisition (1 = Purchased land through economic diversification)	388	.2474227	.4320716	0	1
Permanent house (1 = Built permanent house through economic diversification)	388	.3685567	.4830362	0	1
Livestock (1 = Purchased livestock through economic diversification)	388	.7293814	.444853	0	1
Television set (1 = Purchased TV set through economic diversification)	388	.3505155	.4777475	0	1
Possession of motor vehicle (1 = Purchased motor vehicle through economic diversification)	388	.1056701	.3078118	0	1
Sacco membership (1 = became Sacco member through economic diversification)	388	.5309278	.4996869	0	1
Church membership (1 = became church member through economic diversification)	388	.7474227	.4350515	0	1
Table banking (Ngumbato) (1 = became table banking member through economic diversification)	388	.4819588	.5003196	0	1
Education of dependants (1 = educated dependants through economic diversification)	388	.8530928	.3544705	0	1
Health care (1 = pay medical bills through economic diversification)	388	.9329897	.2503627	0	1
Entertainment (1 = meet entertainment expenses through economic diversification)	388	.8530928	.3544705	0	1

Variable	Number of Observation	Mean	Std. Dev.	Min	Max
Income (average income earned in a month through economic diversification)	388	9942.268	13139.15	500	100000
Identification of business opportunity (1 = if identification of business opportunity motivated economic activities diversification)	388	.6391753	.4808598	0	1
Desire for independence (1 = farmer diversifying due to desire for independence)	388	.8221649	.3828675	0	1
Need for achievement (1 = farmer diversifying due to need for achievement	388	.7963918	.4032009	0	1
Government initiatives (1 = farmer motivated by government initiative to diversify)	388	.2989691	.4583974	0	1
NGO (1 = farmer motivated by NGO to diversify)	388	.056701	.2315691	0	1
CBO (1 = farmer motivated by CBO to diversify)	388	.0438144	.2049463	0	1
Weather conditions (1 = weather conditions motivated diversification)	388	.8994845	.3010743	0	1
Animal and crop disease (1 = animal and crop disease motivated farmers to diversify)	388	.5798969	.4942125	0	1
Competition (1 = competition motivated diversification)	388	.5592784	.4971147	0	1
Cost of farming (1 = cost of farming motivated diversification)	388	.5902062	.4924305	0	1
Other environmental factors (1 = other environmental factors motivated diversification)	388	.0592784	.2364498	0	1
Unfavourable government regulation (1 = legal regulations motivated diversification)	388	.5231959	.5001065	0	1
Insurance (1 = insurance motivated diversification)	388	.3453608	.4760997	0	1

Source: Own compilation.

92% of those with post secondary education were practicing mixed farming while 83% of those with no education were practicing mixed farming. It was noted that none of the respondents who had never gone to school was adding value to agricultural produce. However, 12% of those with no education were in portfolio diversification that is, running non-agricultural businesses. The average age of the respondents was 49 years,

which ranged from 20 years to 90 years. It was found that 3% of the farmers were below the age of 25 years while 18% of the respondents below the age of 25 years were doing non-agricultural businesses and none of them was adding value to his/her agricultural products, 73% of the respondents in this category were practicing mixed farming. .

The results show that 29% of the respondents above the average age of 49 years were found to be in non-agricultural businesses, 6% are adding value while 88% are practicing mixed farming. A 10% of those in this category had post secondary education while there were no respondents below the age of 25 years who had post secondary education. This could mean that young people who had attained post secondary education were employed elsewhere. A 92% of the respondents were married, 44% of those interviewed had other professions and 79% of those with other professions had post secondary education level, 72% were in service industry which included teachers, nurses, salonists and clinical officers, 4% were technicians such as carpenters and Jua kali artisans. 51% of the respondents were women out whom 9% had post secondary education while 15% of the male respondents had attained post secondary education. Among those with no education at all 67% were women while 33% were male. However, it should be noted that only 6% of the respondents had no education. It was discovered that less than 13% of the respondents in Mukarara, Ithanga, Kakuzi, Ngelelya, Mutumbiri, Makongeni, Juja and Gikumari locations had post secondary education. 19% of the respondents in Kihumbuini, had post secondary education while in Mugutha 26% had post secondary education. The rest of locations had no respondent with post secondary education.

4.3.3 Financial Services

It was discovered that financial services are available to the farmers and that 65% of the respondents use banking services, 31% use M-Pesa services (mobile banking services) to either pay or receive money, 60% of the respondents acknowledged that they had savings with either their SACCOs or banks. There is an average of 9 km from the farmers' households to the nearest financial institution, ranging from less than 1 km to 40 km. It was established that 65% of the respondents had bank and SACCO accounts and that they

were using the banks to get loans, save and effect payments. Farmers who did not have bank accounts said that high charges of banking services discouraged them from opening bank accounts. Banking services offered to the farmers were found to be ATM services, banker's cheques, and money transfer services. It was observed that banks also trained farmers in record keeping. The use of mobile phone which is a predominant technology most commonly used by the poor (Litondo, 2010) was not investigated to show its effect on economic activity diversification and livelihood outcomes of small-scale farmers.

4.3.4 Economic Activity Diversification

Economic activity diversification is a key coping strategy to meet the daily obligations of farmers (Carter, 1999). The initial assumption of the study was that some farmers had diversified their economic activities and others had not; however, field investigation revealed that all the small-scale farmers in the study area appear to be entrepreneurs as they had diversified their livelihoods. This finding concurs with that of Michuki (2008) that on the surface, farmers appear to be in one economic activity, but further scrutiny shows that farmers are involved in various economic activities. Furthermore, Ellis (1999) observed that farmers are involved in multiple businesses. The study therefore concentrated on the classifications of activity diversification namely, structural diversification (mixed farming), vertical diversification (value addition) and portfolio diversification (non-agricultural businesses) and their impact on livelihood outcomes. Approximately 88% of the small-scale farmers were found to be in structural diversification, 6% of the farmers diversified vertically while, 38% of farmers were involved in non-agricultural activities.

Structural diversification is practiced by many farmers as evidenced above; however, in Makongeni location only 22% of the respondents practiced mixed farming. Makongeni location is largely occupied by residential estates and this could be the reason why few farmers are into mixed farming. The area has many factories such as Metal Box, Del Monte and BAT which is employing quite a number of people from this location. The study established that farmers in the Larger Thika district were producing variety of crops and keep variety of animals on their farms. 64% of the farmers produce horticulture products, 10% are involved in tea farming, 20% grow coffee, 32% produce tuber crops

while 14% produce other crops like pigeon peas. 49% of the farmers keep graded cattle, 28% keep local cattle, 48% keep poultry, 34% keep goats and sheep and 9% keep other animals like pigs and rabbits.

More than 70% of the respondents in Kigio, Kihumbuini, Juja, Kalimoni, Gikumari, and Biashara locations grow cereals. While in the rest of the locations, less than 30% of the respondents grow cereals. More than 52% of the respondents in most of the locations said that they are in horticultural farming. However, less than 10% of the small-scale farmers in Biashara, Kalimoni and Juja locations participated in horticulture farming. Tea is only grown in Kiriaini location where 67% of the respondents said that they grow it. Coffee is widely grown in Kiriani (81%), Mukarara (74%), Kigio (52%), Kihumbuini (52%) and Kariara (35%), while the respondents in the other locations do not grow coffee. More than 44% of the respondents in Mugutha, Makongeni, Kuhumbuini, Kiriaini, Gikumari, Biashara, Mukarara, Kariara and Kigio locations had graded cattle.

Vertical diversification is an economic activity whereby the farmer adds value to the primary agricultural produce by processing, packaging and storing. Vision 2030 and MDGs 2015 advocate for vertical diversification as a strategy for improving livelihoods of farmers (Republic of Kenya, 2005 and 2007). The study findings indicate that 6% of the farmers were adding value by storing their products in granaries, 2% of them were also processing and another 2% were packaging their products. Granaries are taken to be a value addition venture because they protect agricultural produce from deterioration and post harvest losses. Farmers can also preserve their produce in granaries when the prices are low and sell at their convenience when the prices are good. According to Hoogland and Holen (2005) granaries increase food security of households; they also make it possible for those who grow more than what they need for consumption to sell the extra grain at higher prices in later periods. Furthermore, granaries decrease the negative effects of dependence on self produced foods. Processing of agricultural products requires technology and electricity which many of the farms did not have access to. Only 29% of the respondents had electricity on their farms.

The study established that none of the respondents in Gikumari, Juja, Kakuzi, Kalimoni, Mukarara, Mutumbiri and Ngelelya locations add value to their agricultural produce. These findings show that small-scale farmers in these locations are omitted from the value supply chain. This justifies the concern of Ochango (2007) that small-scale farmers are unable to perform commercially. In contrast, 61% of the respondents in Biashara location are adding value but mainly in storage of their products in granaries. In Mugutha location 18% of the respondents add value while the rest of locations had less than 1% of the respondents who added value.

Portfolio diversification is where farmers are involved in non-agricultural businesses and the study findings show that 38% of the respondents are doing non-agricultural businesses. This confirms Rantamaki-Lahtinen's (2008) and Cater, (1999) observations that farmers' involvement in non agricultural business is not a new phenomenon. Approximately 24% of the respondents in portfolio diversification said that they were in trading and 12% were service providers like teaching, nursing among others while 6% were involved in technical work like mechanics. In Mugutha and Makongeni locations, 100% of the respondents diversified into non-agricultural businesses. Surprisingly, in Kalimoni and Juja locations which are semi-arid areas, the respondents were not involved in non-agricultural businesses. This shows disparities in the livelihoods of small-scale farmers in different locations in Thika. In Kihumbuini, 52% of the respondents have diversified into non-agricultural businesses, while 50% of the respondents practiced non-agricultural businesses in Kakuzi location.

Generally, the study established that Thika farmers are doing same businesses as 88% of the respondents were found to do similar economic activities as their neighbours. This could be interpreted to be a cultural issue as McGrath et al (1992) put it that the society which exhibits a conventional way of doing things for example similar economic activities among farmers may be taken to indicate a collectivistic culture whereby people feel and behave in such a way that they belong to a society which expects them to be uniform with others. This culture inhibits creativity and innovation as society influences everybody to conform to the normal way of doing things (McGrath et al 1992).

4.3.5 Motivations for Diversification

When asked what motivated farmers to diversify their livelihood activities, 80% of the respondents said desire for achievement; 95% desire for food security, 82% desire for independence; 30% cited government initiatives; 6% non-Governmental Organizations (NGOs), 4% cited help from Community Based Organizations (CBOs) and 64% identified business opportunities. 90% of the farmers said that weather conditions motivated them to diversify; 58% said that crop diseases forced them to diversify; 56% said that competition was responsible for their diversification; 59% were forced to diversify because of the increased cost of farming, while 5% of the respondents gave other environmental reasons for their diversification like wild animals and pests. Some farmers also mentioned governmental policies as having influenced them to diversify their livelihoods. 57% indicated that price control was responsible for their diversification, 91% attributed their diversification to input cost regulation. 49% said that agricultural extension officers helped them to think of alternative economic activities. One of the motivations to diversify was insurance of their assets and 34% of the respondents had taken the initiative to insure their economic risks. It is not clear from the findings whether farmers were aware of the benefits that accrue from insurance covers. 6% of the respondents gave other government policy issues that motivated them to diversify like taxation.

The study findings clearly indicate the relevance of Nee and Young (1991) findings that the government has a role to play in the provision of facilities that can help farmers in their core businesses. Nevertheless, only 6% of the farmers felt that the government had done enough to help them improve their livelihoods. According to Alila and Atieno (2006) the government had initiated a number of training and development programmes to improve the means of livelihoods of farmers in Kenya. However, it is yet to be established the effect of such initiatives such as, Kenya Agricultural Productivity Programme (KAPP), Arid and Semi-Arid Lands (ASALs) and Micro, Small and Medium Enterprises (MSME) competitiveness.

On the other side Nee and Young (1991) advocate for the promotion of a market oriented economic policy which is in line with the country's economic policy of development and growth Minniti (2004) stipulates that government policy plays an important role in the provision of entrepreneurial framework. A case in point is that of the USA government which has provided a sound environment for entrepreneurship (GEM, 2007). The Kenyan government has also tried to facilitate entrepreneurial legal framework within which entrepreneurs can flourish. Unfortunately, some policies are counterproductive to entrepreneurship among the small scale farmers, for example the policies on control of animal and crop diseases, bad weather. The study shows that 90% of the respondents were forced to diversify because of the dangers posed by unpredictable weather, 60% cited crop and animal diseases as the main cause of their diversification.

The study established that 94% of the respondents felt that the government was not doing enough to assist in farming activities. Little (2001) in his study observed that farmers are encouraged by policy makers to diversify their farming livelihood. Further study could be carried out on the awareness of insurance services among the farmers. 56% of farmers said government regulations influenced their diversification. This concurs with McCormick (1996) who said that stringent laws can serve as a barrier to entrepreneurship. Nee and Young (1991) agree with the sentiments of the farmers that they need the government intervention through regulations. However, government intervention is a double sword weapon which can inhibit or promote entrepreneurship. For example Djankov et al (2005) say that too much bureaucracy and too many regulations are not good for entrepreneurship. Nee and Young (1991) say that too much bureaucracy affects entrepreneurship negatively regardless the opportunities available in the market, while McCormick (1996) said that the government needs to intervene in the environment to protect innovations through patents and copyrights. Unscrupulous entrepreneurs need to be controlled by government regulations and international standards requirements to protect patents and copy rights and unfair competition in order to ensure quality products and to avoid dumping.

56% of the respondents said that price control affected livelihood diversification and 91% indicated that input cost affects diversification. 16% of the respondents cited other policy motivating factors which effected their diversification. Equity bank programs of empowering the rural farmers, financial institutions like Faulu Kenya, Women groups, and Msamaria Mwema were role models in their midst coupled with their work experience.

4.3.6 Livelihood Outcomes

The livelihood outcomes of the farmers were classified under physical assets, social capital, human capital and income. Physical assets are items that yield returns to farmers over a period of time. When asked what physical assets were acquired via diversification, they responded as follows: 25% of the respondents said that they were able to purchase more land for farming. 73% were able to buy livestock for their households. 35% were able to purchase television sets, only 11% managed to buy themselves motor vehicles for their personal transport and transportation of their produce. 10% cited other assets like water pumps, and irrigation facilities for their farms. 36% said they were able to build themselves permanent houses, out of which 48% said that they managed to build permanent houses from portfolio diversification. 91% through structural diversification while 9% through vertical diversification.

Social capital is a set of intangible assets in the form of social networks, and connections. The farmers claimed that through livelihood diversification they were able to be members of social institutions. 53% of the respondents said that diversification enabled them to join co-operative societies. There are some mutual benefits to members of Savings and Credit Co-operative Societies (SACCOs) like accessibility to loans and government subsidized farm inputs. Diversification has enabled 75% of the farmers to be active members of their churches while 48% of the farmers are members of table banking. Table banking is an informal institution whereby money is put on the table to advance to the members at an agreed interest rate. The residents of Kiambu and Murang'a counties refer to this kind of social group as '*Ngumbato*', literary meaning *'holding'*. This form of social network enables members to get loans easily from fellow members without going through strenuous processes, like those of established financial institutions. 80% of the

farmers are members of merry-go-round, which is also a social network where members help to raise money for individual members in turns till each member has received a contribution, and then start again.

Human capital is a set of cognitive and non-cognitive capabilities that individual can use to improve their standard of living. 85% of the respondents said that they were able to raise school fees for their dependants through economic activity diversification, 93% of the respondents acknowledged that they were able to meet their medical bills through diversification and 85% said that they were able to meet their entertainment expenses with the money raised from their livelihood activities. The study did not investigate the type of entertainment the farmers were engaged in.

The study established that farmers earn an average income of about Ksh. 10,000 per month from their labour, which ranges from Ksh. 500 to Ksh. 100,000 per month. However, only 8% of the respondents were earning Ksh.30, 000 and above. This shows a very big disparity in the incomes of farmers as the gap between the lowest earners to the highest earners is very big. This concurs with Michuki's (2008) observation that there is a big disparity in the standard of living among the farmers. Nevertheless, the researcher felt that farmers did not make full disclosure of their real monthly incomes because the value of some of the assets did not warrant the incomes they were purporting to earn monthly. It should be noted that income from remittances which could also contribute to their acquisition of assets was not investigated. 13% of those in the high income bracket (Ksh.30,000 – 100,000 per month) are in vertical diversification of which 90% are also doing non-agricultural businesses while 94% are into mixed farming. 60% of those earning above average income of Ksh.10,000 are involved in non-agricultural businesses of which 95% are in mixed farming, while 13% are from vertical diversification. It should be noted that some farmers have diversified in all the forms. They are in vertical, portfolio and structural diversifications.

4.3.7 Correlation of Vertical Diversification with Selected Variables

The correlation coefficients given in this section are prima facie evidence that there is a relationship between vertical diversification and the variables indicated in table 5.2. Correlations are used as guidelines in formulating models for estimating the effect of entrepreneurship on livelihood outcomes. The study correlates vertical diversification with selected variables. Table 4.2 shows the correlation coefficients (r) of vertical diversification with selected farm attributes, personal & social characteristics, motivation and environmental factors.

The results show that a 10% increase in the proportion of farmers having electricity in their farms is associated with 16.35% increase in the probability of vertical diversification among framers. Similarly, a 10% increase in vertical diversification is associated with 16.35% increase in the probability of farmers having electricity. A 2.3% increase in vertical diversification is associated with 1% increase in the probability of a farmer buying an extra acre of land. In other words, 1% increase in probability of a farmer purchasing an extra acre of land is associated with a 2.3% increase in the probability of vertical diversification. Results also show that a 1% increase in vertical diversification is associated with a 1.32% increase in the probability of a farmer buying an extra livestock. A 1% increase in vertical diversification among the farmers is associated with 1.55% increase in the probability of farmers buying motor vehicles. Similarly, 10% increase in the proportion of farmers buying motor vehicles is associated with 1.55% increase in the chance of farmers diversifying vertically. 13.2% increase in the farmers income is associated with a 10% increase in the probability of farmers diversifying vertically. On the other hand, a 13.2% increase in vertical diversification is associated with the probability of income rising by 10%. While a 10% increase in the proportion of men is associated with 4.54% increase in the probability of a farmer adding value to their primary agricultural products.

Table 4.2 Correlations of Vertical Diversification with Selected Variables

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
1. Vertical diversification	1.0000													
2. Farm size (in acres)	-0.0087	1.0000												
3. Running water	0.0672	-0.0110	1.0000											
4. Electricity	0.1632	-0.0079	0.2597	1.0000										
5. Education level (in yrs)	0.0880	-0.1508	0.1587	0.2563	1.0000									
6. Gender (1 = male)	0.0454	0.1194	0.1145	0.1085	0.1644	1.0000								
7. Marital status (1=married)	-0.0033	0.0453	0.0309	0.0023	0.0615	0.1205	1.0000							
8. Age (in yrs)	-0.0499	0.2422	0.0901	-0.0017	-0.3346	0.2176	-0.0460	1.0000						
9. Land	0.2247	0.0101	0.2460	0.3382	0.1890	0.0895	0.0148	0.0232	1.0000					
10. Permanent house	0.0921	0.0511	0.1322	0.2109	0.1321	0.0773	-0.0310	0.0733	0.3915	1.0000				
11. Livestock	0.1323	0.0183	0.1081	0.1000	0.0967	-0.0353	0.0559	0.0421	0.2552	0.2850	1.0000			
12. Television set	0.0804	0.1265	-0.0207	0.2732	0.1314	-0.0681	-0.0027	-0.0929	0.1922	0.1778	0.3502	1.0000		
13. Motor vehicle	0.1554	-0.0912	0.2357	0.2752	0.2548	0.0119	0.0085	-0.0758	0.3663	0.2588	0.1339	0.0989	1.0000	
14. Income (in Kes)	0.1320	-0.0917	0.2175	0.3066	0.4780	0.0941	0.0074	-0.1280	0.4160	0.2478	0.2063	0.1409	0.5928	1.0000

Source: Own compilation.

Similarly, a 10% increase in vertical diversification among farmers is associated with 4.55% increase in the proportion of male farmers. 10% increase in vertical diversification is associated with 9.2% increase in the probability of a farmer building a permanent house. Likewise 10% increase in the proportion of farmers building permanent houses is associated with 9.2% increase in the probability of vertical diversification. 10% increase in vertical diversification is associated with 8.04% increase in the proportion of farmers buying T.V. sets or 10% increase in the purchase of T.V. sets is associated with 8.04% increase in the probability of vertical diversification. 10% increase in vertical diversification is associated with 0.4% decrease in the probability of a one year decrease in the average age of farmers or 0.4% decrease in vertical diversification is associated with 10% increase in the average probability of one year increase in age of farmers.

4.3.8 Correlation of Portfolio Diversification with Selected Variables

Table 4.3 shows the correlation coefficients of portfolio diversification with selected farm attributes, personal & social characteristics, motivating and environmental factors. The results show that a 10% increase in the proportion of farmers having water on the farm is associated with 2.64% increase in the probability of portfolio diversification. While a 10% increase in portfolio diversification is associated with 2.64% increase in the probability of farmers having running water on their farms.

A 10% increase in the proportion of farmers having electricity on their farms is associated with 2.35% increase in the probability of farmers doing non-agricultural businesses or 2.35% increase in the proportion of farmers having electricity on the farms is associated with 10% increase in the probability of portfolio diversification. 10% increase in the average education level of farmers is associated with 3.77% increase in the probability of portfolio diversification. Similarly, 10% increase in portfolio diversification is associated with 3.77% increase in the probability of one year increase in the average level of education. 10% increase in the proportion of men is associated with 15.7% increase in the probability of portfolio diversification or 10% increase in the portfolio diversification is associated with 15.7% increase in the proportion of men.

A 10% increase in portfolio diversification is associated with 2.5% increase in the probability of farmers purchasing one more acre of land. Similarly, 2.5% increase in the purchase of land acreage is associated with 10% increase in the probability of portfolio diversification. 10% increase in portfolio diversification is associated with 16.75% increase in the probability of farmers building more permanent houses. Similarly, 10% increase in the proportion of farmers building permanent houses is associated with 16.75% increase in the probability of portfolio diversification. 10% increase in portfolio diversification is associated with 28.68% increase in the probability of farmers buying more motor vehicles. On other hand, 10% increase in the proportion of farmers buying motor vehicles is associated with 28.68% increase in the probability of portfolio diversification. 10% increase in the incomes of farmers is associated with 36.46% increase in the probability of portfolio diversification. Similarly, 10% increase in portfolio diversification is associated with 36.46% increase in the average income of farmers.

Table 4.3 Correlations of Portfolio Diversification with Selected Variables

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
1. Portfolio diversification	1.0000													
2. Farm size (in acres)	-0.2151	1.0000												
3. Running water	0.2638	-0.0110	1.0000											
4. Electricity	0.2348	-0.0079	0.2597	1.0000										
5. Education level (in yrs)	0.3769	-0.1508	0.1587	0.2563	1.0000									
6. Gender (1 = male)	0.1570	0.1194	0.1145	0.1085	0.1644	1.0000								
7. Marital status(1=married)	-0.0066	0.0453	0.0309	0.0023	0.0615	0.1205	1.0000							
8. Age (in yrs)	-0.1597	0.2422	0.0901	-0.0017	-0.3346	0.2176	-0.0460	1.0000						
9. Land	0.2451	0.0101	0.2460	0.3382	0.1890	0.0895	0.0148	0.0232	1.0000					
10. Permanent house	0.1675	0.0511	0.1322	0.2109	0.1321	0.0773	-0.0310	0.0733	0.3915	1.0000				
11. Livestock	0.0420	0.0183	0.1081	0.1000	0.0967	-0.0353	0.0559	0.0421	0.2552	0.2850	1.0000			
12. Television set	0.0203	0.1265	-0.0207	0.2732	0.1314	-0.0681	-0.0027	-0.0929	0.1922	0.1778	0.3502	1.0000		
13. Motor vehicle	0.2868	-0.0912	0.2357	0.2752	0.2548	0.0119	0.0085	-0.0758	0.3663	0.2588	0.1339	0.0989	1.0000	
14. Income (in Kes)	0.3646	-0.0917	0.2175	0.3066	0.4780	0.0941	0.0074	-0.1280	0.4160	0.2478	0.2063	0.1409	0.5928	1.0000

Source: Own compilation.

4.3.9 Correlations of Structural Diversification with Selected Variables

Table 4.4 shows the correlation coefficients of structural diversification with the selected farm attributes, personal & social characteristics, motivating and environmental factors. The results show that 10% increase in structural diversification is associated with 2.3% increase in the probability of farmers having more than average acreage of land. Similarly, 10% increase in the farm acreage is associated with 2.32% increase in the probability of structural diversification. 10% increase in the proportion of farmers with electricity on their farmers is associated with 10.49% increase in the probability of structural diversification.

The results indicate that 10% increase in the average level of education is associated with 5.9% increase in the probability of structural diversification. Similarly, 10% increase in structural diversification is associated with 5.9% increase in the probability that a farmer will have 1 year more than the average education level. 10% increase in the proportion of women farmers is associated with 3.52% increase in the probability of structural diversification. 10% increase in the structural diversification is associated with 7.61% increase in probability of farmers building more permanent houses. Similarly, 10% increase in the proportion of farmers building permanent houses is associated with 7.61% increase in the probability of structural diversification.

A 10% increase in structural diversification is associated with 12.35% increase in the probability of proportion of farmers buying livestock while a 10% increase in structural diversification is associated with 7.82% increase in the probability of proportion of farmers buying motor vehicles. On the other hand, a 10% increase in the proportion of farmers buying motor vehicles is associated with 7.82% increase in the probability of structural diversification. 10% increase in the farmers' average income is associated with 8.45% increase in the probability of structural diversification. Similarly, 10% increase in structural diversification is associated with 8.45% increase in the average income of farmers.

Table 4.4 Correlations of Structural Diversification with Selected Variables

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
1. Structural diversification	1.0000													
2. Farm size (in acres)	0.2323	1.0000												
3. Running water	-0.1141	-0.0110	1.0000											
4. Electricity	0.1049	-0.0079	0.2597	1.0000										
5. Education level (in yrs)	0.0590	-0.1508	0.1587	0.2563	1.0000									
6. Gender (1 = male)	-0.0352	0.1194	0.1145	0.1085	0.1644	1.0000								
7. Marital status (1=married)	0.1202	0.0453	0.0309	0.0023	0.0615	0.1205	1.0000							
8. Age (in yrs)	0.0548	0.2422	0.0901	-0.0017	-0.3346	0.2176	-0.0460	1.0000						
9. Land	0.1429	0.0101	0.2460	0.3382	0.1890	0.0895	0.0148	0.0232	1.0000					
10. Permanent house	0.0761	0.0511	0.1322	0.2109	0.1321	0.0773	-0.0310	0.0733	0.3915	1.0000				
11. Livestock	0.1235	0.0183	0.1081	0.1000	0.0967	-0.0353	0.0559	0.0421	0.2552	0.2850	1.0000			
12. Television set	0.0463	0.1265	-0.0207	0.2732	0.1314	-0.0681	-0.0027	-0.0929	0.1922	0.1778	0.3502	1.0000		
13. Motor vehicle	0.0782	-0.0912	0.2357	0.2752	0.2548	0.0119	0.0085	-0.0758	0.3663	0.2588	0.1339	0.0989	1.0000	
14. Income (in Kes)	0.0845	-0.0917	0.2175	0.3066	0.4780	0.0941	0.0074	-0.1280	0.4160	0.2478	0.2063	0.1409	0.5928	1.0000

Source: Own compilation.

CHAPTER FIVE: ESTIMATION RESULTS AND DISCUSSION

5.1 Introduction

This chapter presents empirical results on the determinants of entrepreneurship which is proxied by economic activity diversification, and the influence of livelihood diversification on the livelihood outcomes of small-scale farmers. Economic diversification is classified into vertical diversification which is value addition; structural diversification representing mixed farming; and portfolio diversification which, stands for farmers engaging in non-agricultural economic activities. The Linear Probability Model (LPM), the logit and the probit models are used to analyze determinants of entrepreneurship, while the logit model is used to estimate the effects of diversification (entrepreneurship) on livelihood outcomes.

5.2 Determinants of Entrepreneurship

This section identifies the factors that influence entrepreneurship as proxied by economic activity diversification. Kenyan vision 2030 emphasizes the need for farmers to diversify their means of livelihoods in order to improve their standard of living (Republic of Kenya, 2007). Therefore, it is important to know the determinants of economic activity diversification so that effective economic strategies can be formulated. Furthermore, Fouracre (2001) states that entrepreneurial activities among the small scale farmers increase agricultural production which leads to better livelihoods. However, McGrath et al (1992) and Rantamaki-Lahtinen (2008) argued that a detailed understanding of the determinants of economic activity diversification that can lead to better livelihoods was lacking.

Literature tells us that economic activity diversification is a function of farm characteristics (Orr, 2002); personal and social characteristics (Minniti, 2004; Ndemo, 2005; McCormick, 1996; and Schultz, 1980) motivating factors (McClelland, 1961; Scott and Twomey 1988); and environmental factors (Dose, 2007; Macke and Markley, 2003). The estimating model for the determinants of diversification is a follows:

$$D = f(F, PS, M)$$

$$D_i = \beta_0 + \beta_1 F + \beta_2 PS + \beta_3 M + \varepsilon \quad (1a)$$

$$Z_i = \beta_0 + \beta_1 F + \beta_2 PS + \beta_3 M + \varepsilon \quad (1b)$$

Where: F is a set of farm characteristics such as size of the farm, electricity and running water; PS is a set of personal and social characteristics such as age and gender; M is a set of motivating factors such as access to loan and desire for social status; and e is the error term. In the linear probability model D_i, is a dummy variable that takes a value of one if a farmer i diversified his/her economic activity and a value of zero if otherwise. In the logit and probit models, Z_i^* is the index of perceived benefits if a farmer i diversified his means of livelihoods. Linear probability model (LPM), logit and probit models are used to estimate the relationship between livelihood and entrepreneurship. LPM is estimated with ordinary least squares (OLS) method and logit & probit models are estimated with maximum likelihood (ML) method. The three models are used together for the purpose of testing the robustness of the estimated model parameters. The coefficient of determination or goodness of fit is denoted by R^2 in LPM and pseudo R^2 in logit and probit models. The results of the estimates of determinants of diversification are shown in tables 5.1, 5.2 and 5.3.

5.2.1 Determinants of Vertical Diversification

According to the marginal effects of the models in table 5.1, distance to market is the major determinant of vertical diversification among farmers. The OLS results (LPM model parameter estimates) show that a one km increase in the distance to the market increases vertical diversification by 1.49% ($t = 5.73$), while in the logit model a one kilometer increase in the distance to the market increases the chance of a farmer adding value to farm produce by 0.69% ($t = 4.18$) and in the probit model by 0.8% ($z = 4.81$). This could be an implication that the further the farmers are from the market, the more likely they are to have granaries for their agricultural produce. Most farmers in vertical diversification have granaries as the main form of value addition. The results for LPM indicate that having electricity increases the probability of vertical diversification by 7.4% ($t = 2.79$). Similarly, the marginal effect for the logit is 4.79% ($z = 1.84$) while the marginal effect for the probit is 54.3% ($z = 2.3$). These results are as expected since electricity is needed for value addition such as refrigeration and processing; however, it should be noted that very few farmers (6%) were in vertical diversification. The size of farm has no significant effect on vertical diversification in all the three models. The size of farm is inconsequential when it comes to vertical diversification. For example, processing of horticultural products such as fruit juice has very little to do with the size of farm. The coefficient of determination, R^2 0.0949 which means that 9.5% of the

variations in the probability of vertical diversification is explained by instrumental variables that is electricity, running water , size of the farm and distance to the market. The *p*-value for *F*-statistic and χ^2 –statistics is zero and therefore the null hypothesis that farm characteristics jointly have no effect on vertical diversification among farmers is rejected

After controlling for the other covariates, only one instrumental variable, namely, distance to the market has a statistically significant coefficient. However, a one year increase in the average age of a farmer decreases the chance of vertical diversification by 0.02% ($t = 2.03$) in the LPM and 0.07% ($z = 1.77$) in the probit model and 0.01% ($z = 2.12$) in the logit model. These results indicate that young adults tend to be more innovative than old people. This supports Hisrich (2008) and Casson (1982) assertion that age is an indicator of entrepreneurship. The results of all the models show that having access to a loan increases the probability of a farmer diversifying vertically by 10.49% ($t = 3.84$) in the OLS, and 4.57% ($z = 4.26$) in the logit model, while in the probit model the chance increases by 4.99% ($z = 3.06$). Taking a loan is a risky venture and according to Cantillon (1931), and Casson (1982) risk taking is an indicator of entrepreneurship.

R^2 in the LPM is 0.1815 meaning that 18.15% of the variation in the probability of vertical diversification among farmers is explained by all the variables in the model. In the logit model, the pseudo R^2 is 0.4207 this means that 42.07% of the variations are explained by the explanatory variables jointly, while probit model has a pseudo R^2 of 0.4268 meaning that 42.68% of the variations are explained by all the independent variables together. The *p*-values of the *F*-statistic and χ^2 statistics for all the models is zero, therefore, the null hypothesis that all the variables in the model, namely, farm characteristics, personal and social characteristics, and motivation factors jointly have no effect on vertical diversification is rejected.

Table 5.1: Determinants of Vertical Diversification
(Absolute *t* Statistics in parentheses)

Variables	Model parameter estimates (marginal effects)					
	LPM		Logit		Probit	
Farm Characteristics						
Electricity (1 = available)	.0741 (2.79)	.0369 (1.33)	.0479 (1.84)	.0003 (0.04)	.0509 (2.30)	.0013 (0.19)
Running water (1 = available)	.0444 (1.79)	.0169 (0.64)	.0318 (1.74)	.0023 (0.29)	.0414 (2.00)	.0040 (0.48)
Farm size (in acres)	-.0014 (0.08)	.0056 (0.28)	-.0060 (0.44)	-.0036 (0.62)	-.0107 (0.69)	-.0044 (0.70)
Distance to the market (in km)	.0149 (5.73)	.0162 (5.81)	.0069 (4.18)	.0022 (1.73)	.0082 (4.81)	.0026 (3.95)
Personal and social characteristics						
Years of schooling		-.0050 (1.49)		-.0013 (1.21)		-.0016 (1.66)
Gender (1 = male)		.0239 (0.99)		.0050 (0.73)		.0071 (1.03)
Age		-.0020 (2.03)		-.0005 (1.09)		-.0007 (1.77)
Motivating factors (dummies)						
Desire for financial security		.0254 (0.45)				
Desire for food security		-.0900 (1.60)		-.0317 (0.70)		-.0320 (1.10)
Cost of farming		.0242 (0.90)		.0071 (0.84)		.0062 (0.75)
Unfavourable government Regulations		.0088 (0.32)		-.0020 (0.26)		-.0028 (0.34)
Access to loan		.1049 (3.84)		.0457 (1.82)		.0499 (3.06)
Insurance availability		.0666 (2.33)		.0104 (0.99)		.0128 (1.41)
Existence of business opportunity		.0402 (1.34)		.0194 (1.58)		.0171 (1.55)
Desire for independence		.0549 (1.64)		.0087 (1.11)		.0100 (1.28)
Desire for achievement		-.0787 (1.90)		-.0527 (0.78)		-.0728 (1.66)
Desire for social status		.0404 (1.35)		.0079 (0.81)		.0069 (0.67)
Weather conditions		.0411 (1.00)		.0037 (0.35)		.0056 (0.53)
Constant	-.0579 (1.39)	-.0101 (0.12)				
R^2	0.0949	0.1815				
Pseudo R^2			0.1904	0.4207	0.1951	0.4268
F-Statistics (*p*-value)	11.15 (0.0000)	5.77 (0.0000)				
χ^2-Statistics (*p*-value)			34.29 (0.0000)	74.36 (0.0000)	35.14 (0.0000)	75.44 (0.0000)
Observations	388	388	388	363	388	363

Source: Own estimates.

5.2.2 Determinants of Structural Diversification

The models in table 5.2 indicate that the major determinants for structural diversification among farmers are electricity, running water and farm size. OLS results show that a 1 acre increase in the farm size increases the probability of structural diversification by 12.6% (t = 4.74) while the marginal effect for logit model is 11.1% (z = 4.93) and that of the probit model is 12.6% (z = 4.74). These results make sense because mixed farming requires a lot of land to accommodate a variety of farming activities. Availability of running water reduces the chance of a farmer practicing mixed farming by 10.4% (t = 3.04) in the OLS and in the logit and probit models by 8.2% (z = 2.85) and by 9.02% (z = 2.92) respectively. One would have expected running water to be used extensively in mixed farming. However, one of the reasons could be that smallholder agriculture in Kenya is rain fed, or farmers are not allowed to use running water for irrigation, instead use other sources of water such as boreholes, dams, rivers and harvested water. The OLS results indicate that having the supply of electricity on the farm increases the probability of structural diversification by 10.7% (t = 2.91) while the marginal effect for the logit model is 7.8% (z = 3.13) and that for probit model is 8.6% (z = 2.79). All the instrumental variables jointly explain 7.79% of the variations of structural diversification as R^2 = 0.0778. The p-values of F-statistics and the χ^2 statistics are zero; therefore, the hypothesis that running water, electricity farm size, and distance to the market together have no effect on structural diversification is rejected.

After controlling for other variables, farm size is still a strong determinant of structural diversification. In the LPM a one acre increase in the farm size increases the probability of structural diversification by 11.70% (t = 4.12) and in the logit model by 10.3% (z = 4.50), and in the probit model by 11.97% (z = 4.25). This justifies the above results that the size of the farm is important determinant of mixed farming. According to the FAO (2002) report, partition of land reduces food production. The R^2 of the LPM is 0.0778 meaning that all the independent variables jointly explain 7.79% of the variations in structural diversification. The p-values of F-statistics and the χ^2 statistics are zero; therefore, the hypothesis that running water, electricity, farm size, and distance to the market together have no effect on structural diversification is rejected.

5.2.2 Determinants of Structural Diversification

The models in table 5.2 indicate that the major determinants for structural diversification among farmers are electricity, running water and farm size. OLS results show that a 1 acre increase in the farm size increases the probability of structural diversification by 12.6% (t = 4.74) while the marginal effect for logit model is 11.1% (z = 4.93) and that of the probit model is 12.6% (z = 4.74). These results make sense because mixed farming requires a lot of land to accommodate a variety of farming activities. Availability of running water reduces the chance of a farmer practicing mixed farming by 10.4% (t = 3.04) in the OLS and in the logit and probit models by 8.2% (z = 2.85) and by 9.02% (z = 2.92) respectively. One would have expected running water to be used extensively in mixed farming. However, one of the reasons could be that smallholder agriculture in Kenya is rain fed, or farmers are not allowed to use running water for irrigation, instead use other sources of water such as boreholes, dams, rivers and harvested water. The OLS results indicate that having the supply of electricity on the farm increases the probability of structural diversification by 10.7% (t = 2.91) while the marginal effect for the logit model is 7.8% (z = 3.13) and that for probit model is 8.6% (z = 2.79). All the instrumental variables jointly explain 7.79% of the variations of structural diversification as R^2 = 0.0778. The p-values of F-statistics and the χ^2 statistics are zero; therefore, the hypothesis that running water, electricity farm size, and distance to the market together have no effect on structural diversification is rejected.

After controlling for other variables, farm size is still a strong determinant of structural diversification. In the LPM a one acre increase in the farm size increases the probability of structural diversification by 11.70% (t = 4.12) and in the logit model by 10.3% (z = 4.50), and in the probit model by 11.97% (z = 4.25). This justifies the above results that the size of the farm is important determinant of mixed farming. According to the FAO (2002) report, partition of land reduces food production. The R^2 of the LPM is 0.0778 meaning that all the independent variables jointly explain 7.79% of the variations in structural diversification. The p-values of F-statistics and the χ^2 statistics are zero; therefore, the hypothesis that running water, electricity, farm size, and distance to the market together have no effect on structural diversification is rejected.

Table 5.2: Determinants of Structural Diversification
(Absolute *t* Statistics in parentheses)

Variables	Model parameter estimates (marginal effects)					
	LPM		Logit		Probit	
Farm Characteristics						
Electricity (1 = available)	.1066 (2.91)	.0652 (1.65)	.0781 (3.13)	.0422 (1.60)	.0863 (2.79)	.0478 (1.46)
Running water (1 = available)	-.1040 (3.04)	-.1180 (3.18)	-.0823 (2.85)	-.0862 (2.94)	-.0902 (2.92)	-.0903 (2.90)
Farm size (in acres)	.1257 (4.74)	.1168 (4.12)	.1111 (4.93)	.1030 (4.50)	.1240 (4.58)	.1197 (4.25)
Distance to the market (in km)	-.0026 (0.72)	-.0044 (1.11)	-.0030 (0.96)	-.0034 (1.04)	-.0029 (0.87)	-.0036 (0.99)
Personal and social characteristics						
Years of schooling		.0077 (1.61)		.0064 (1.74)		.0061 (1.50)
Gender (1 = male)		-.0740 (2.16)		-.0591 (2.18)		-.0713 (2.33)
Age		.0017 (1.19)		.0010 (1.00)		.0011 (0.93)
Motivating factors (dummies)						
Desire for financial security		.1967 (2.48)		.1301 (1.25)		.1470 (1.77)
Desire for food security		.1486 (1.86)		.0944 (1.04)		.1105 (1.40)
Cost of farming		.0110 (0.29)		.0098 (0.32)		.0022 (0.06)
Unfavourable government Regulations		-.0413 (1.07)		-.0444 (1.38)		-.0517 (1.44)
Access to loan		.0315 (0.81)		.0240 (0.87)		.0274 (0.86)
Insurance availability		.0127 (0.31)		.0093 (0.31)		.0149 (0.44)
Existence of business opportunity		.0254 (0.60)		.0162 (0.47)		.0178 (0.48)
Desire for independence		.0344 (0.72)		.0173 (0.48)		.0077 (0.20)
Desire for achievement		-.0004 (0.01)		.0076 (0.17)		.0114 (0.23)
Desire for social status		.0044 (0.10)		.0112 (0.35)		.0165 (0.46)
Weather conditions		-.0470 (0.81)		-.0364 (1.27)		-.0411 (0.97)
Constant	.6914 (11.99)	.2936 (2.36)				
R^2	0.0778	0.1153				
Pseudo R^2			0.1254	0.2088	0.1287	0.2055
F-Statistics (*p*-value)	9.17 (0.0000)	3.80 (0.0000)				
χ^2-Statistics (*p*-value)			36.43 (0.0000)	60.63 (0.0000)	37.36 (0.0000)	59.69 (0.0000)
Observations	388	388	388	388	388	388

Source: Own estimates.

After controlling for the other variables, running water and the size of the farm remain significant determinants of structural diversification. The OLS estimates show that being a woman increases the probability of structural diversification by 7.4% (t = 2.16), in the logit model by 5.90% (z = 2.18) while in the probit model by 7.12% (z = 2.33). This could be a case of feminization of agriculture as observed by Chapman and Tripp (2004) that when men look for employment away from their own farms, women tend to participate in a wide range of farm activities for survival and desire for food security. Desire for financial security also comes out an indicator of mixed farming in the LPM and probit model. The OLS estimates show that the desire for financial security increases the probability of mixed farming by 19.67% (t = 2.48). McClelland (1961) argues that desire for financial security is one of the motivating factors for high need for achievement which is an element of entrepreneurship.

The R^2 of the LPM is 0.115% meaning that 11.5% of the variations of structural diversification are explained by variations in the independent variables. The Pseudo R^2 of the logit and probit models are 20.88% and 20.55% respectively. The p-values of F - statistic and χ^2- statistic are equal to zero. This shows that the joint effect of the independent variables is not equal to zero, therefore the null hypothesis that farm characteristics, personal & social characteristics, and motivating factors have no effect on structural diversification is rejected.

5.2.3 Determinants of Portfolio Diversification

The models in table 5.3 show that the key determinants for portfolio diversification among farmers are electricity, running water and farm size. OLS results show that a farmer having electricity increases the probability of portfolio diversification by 19.26% (t = 3.70), while the marginal effect for logit model is 21.14% (z =3.59) and that of the probit model is 20.95% (z = 3.53). LPM indicates that having running water on the farm increases the chance of a farmer doing non-agricultural businesses by 19.39% (t = 3.99), in the logit and probit models by 21.22% (z = 4.11) and by 20.65% (z = 3.89) respectively. The respondents doing non-agricultural business were mainly in the service industry such as hair salons, and trading, and therefore, it is understandable that electricity and water are strong determinants of portfolio diversification. However, a one acre increase in the size of the farm decreases the probability of portfolio diversification by 16.95% (t = 4.5) in the LPM and by19.49% (z = 4.37) in logit model while by 18.67% (z = 4.34) in the probit model. This could mean

that those farmers with very small pieces of land tend to engage in non-agricultural business for their livelihoods.

Karugia et al (2006) advise farmers with small farms to diversify into non-agricultural businesses in order to improve their livelihoods. This is supported by Orr (2002) and Michuki (2008) who advise the small scale farmers to participate actively in non-agricultural businesses. Macke and Mackley (2003) say that doing non-agricultural businesses is an indication of entrepreneurship as the farmers desire to be self-sufficient and grow economically. R^2 of the LPM is 13.96% meaning that the variations in the independent variables can be explained by 13.9% of the variations of portfolio diversification. The pseudo R^2 of the logit model is 11.95% while that of the probit is 11.33%. The *p*-values in all the models are zero; therefore the null hypothesis that electricity, running water, size of the farm and distance to the market put together, have no effect on portfolio diversification is rejected.

When controlled for other independent variables, running water, the size of the farm and distance to the market are strong determinants of portfolio diversification. The OLS estimates indicate that having running water on the farm increases the probability of portfolio diversification by 10.9% ($t = 2.28$). In the logit and the probit models, the chance increases by 16.72% ($z = 2.73$) and 16.24% ($z = 2.67$) respectively. A one kilometer increase in the distance to the market reduces the probability of portfolio diversification by 0.86% ($t = 1.69$) in the OLS and 1.54% ($z = 2.10$) in the logit model and 1.54% ($z = 2.15$) in the probit model. The level of education is another important indicator for portfolio diversification. These results suggest that the farmers who are near markets are more likely to be involved in non-agricultural activities.

The LPM shows that a one year increase in the average education level increases the probability of portfolio diversification by 2.20% ($t = 3.62$) while the marginal effects of the logit and probit models are 3.34% ($z = 3.66$) and 3.13 % ($z = 3.58$) respectively. This is in support of Scott and Twomey (1988), McCormick (1996) and Minniti (2004) arguments that education predisposes and prepares entrepreneurs for viable business ideas. Babu's brilliant idea model of entrepreneurship presupposes good educational background in order to come up with viable concepts (Babu, 2003).

Table 5.3: Determinants of Portfolio Diversification
(Absolute *t* Statistics in parentheses)

Variables	Model parameter estimates (marginal effects)					
	LPM		Logit		Probit	
Farm Characteristics						
Electricity (1 = available)	.1926 (3.70)	.0494 (0.98)	.2114 (3.59)	.0686 (0.91)	.2057 (3.53)	.0786 (1.10)
Running water (1 = available)	.1939 (3.99)	.1085 (2.28)	.2122 (4.11)	.1436 (2.22)	.2065 (3.89)	.1298 (2.02)
Farm size (in acres)	-.1696 (4.50)	-.1219 (3.36)	-.1949 (4.37)	-.1892 (3.47)	-.1867 (4.34)	-.1914 (3.70)
Distance to the market (in km)	-.0073 (1.43)	-.0086 (1.69)	-.0086 (1.41)	-.0154 (2.10)	-.0086 (1.48)	-.0150 (2.15)
Personal and social characteristics						
Years of schooling		.0220 (3.62)		.0334 (3.66)		.0313 (3.58)
Gender (1 = male)		.1036 (2.36)		.1507 (2.43)		.1446 (2.36)
Age		-.0026 (1.39)		-.0044 (1.63)		-.0039 (1.49)
Motivating factors (dummies)						
Desire for financial security		-.1314 (1.29)		-.1853 (1.11)		-.1710 (1.13)
Desire for food security		-.2625 (2.57)		-.4621 (3.36)		-.4379 (2.63)
Cost of farming		.1352 (2.77)		.1860 (2.90)		.1715 (2.65)
Unfavourable government Regulations		-.0346 (0.70)		-.0640 (0.89)		-.0515 (0.76)
Access to loan		.1609 (3.24)		.2317 (3.22)		.2252 (3.23)
Insurance availability		.0787 (1.51)		.1130 (1.51)		.1169 (1.64)
Existence of business opportunity		.1156 (2.11)		.1536 (2.15)		.1439 (1.98)
Desire for independence		.0588 (0.97)		.1262 (1.61)		.1116 (1.31)
Desire for achievement		-.0760 (1.01)		-.1538 (1.33)		-.1366 (1.26)
Desire for social status		.1996 (3.65)		.2733 (4.22)		.2841 (3.83)
Weather conditions		.0782 (1.05)		.1227 (1.44)		.1147 (1.18)
Constant	.5536 (6.75)	.4112 (2.58)				
R^2	0.1396	0.3305				
Pseudo R^2			0.1195	0.3350	0.1176	0.3350
F-Statistics (p-value)	16.69 (0.0000)	11.61 (0.0000)				
χ^2-Statistics (p-value)			61.42 (0.0000)	172.16 (0.0000)	60.46 (0.0000)	172.17 (0.0000)
Observations	388	388	388	388	388	388

Source: Own estimates.

LPM, logit and probit models indicate that being a man increases the probability of portfolio diversification among farmers by 10.36% (t = 2.36), 15.06% (z = 2.43) and 14.46% (z = 2.36) respectively. This concurs with Casson (1982) assertion that men tend to be more entrepreneurial than women. Ellis (1999) and Little (2001) said that the type of diversification depends on gender and that men tend to have different options of diversification from those for women. Chapman and Tripp (2004) observed that men are increasingly participating in non-farm activities leaving farming for their wives. The models indicate that high cost of farming is statistically significant for portfolio diversification as the marginal effects of LPM is 13.52% (t = 2.77), logit and probit are 18.6% (z = 2.90) and 17.15% (z = 2.65) respectively. Waikwa (1998) supports this study finding when he argues that the high cost of farming in smallholder agriculture is prohibitive and a burden to the stakeholders. This therefore, is not a surprising discovery that small-scale farmers diversify into non-agricultural businesses. The models in table 6.3 show that accessibility to a loan is statistically significant to portfolio diversification as LPM, logit and probit marginal effects are 16.09% (t = 3.24), 23.17% (z = 3.22) and 22.52% (z = 3.23) respectively. This study finding agrees with McCormick (1996) and Cassons (1982) that accessibility to finance is a major factor in entrepreneurship. This could be one of the reasons why the Kenyan government has taken the initiative to empower women and youth financially through Women Development Fund (WDF) and Youth Enterprise Fund (YEF).

In the LPM, the logit and the probit models the R^2 and the Pseudo R^2 are 0.3350 which is interpreted to mean that all the independent variables combined can predict 33.5% of the variations of portfolio diversification among farmers. The p-values of F - statistic and χ^2-statistic are equal to zero. This implies that we reject the hypothesis that the independent variables combined do not have an effect on portfolio diversification among farmers.

5.3 Impact of Diversification on Livelihood Outcomes

In this section the focus is on the impact of economic activity diversification on the livelihood outcomes of farmers. The economic activity diversification is studied under vertical diversification (value addition), structural diversification (mixed farming) and portfolio diversification (farmers engaged in non-agricultural businesses) while physical assets, social capital, human capital and income represent the livelihood outcomes. The logit

model is used to estimate the impact of economic activity diversification on the livelihood outcomes of the small scale farmers. As already noted the probability of economic activity diversification of a farmer predicting a livelihood outcome can be presented by the following logistic model.

$$P_{(i)} = \frac{1}{1+e^{-z_i}}$$

Where $P_{(i)}$ is the probability of having a livelihood outcome on condition that a farmer has diversified his/her economic activities while z_i is the logit index which measures the benefits of a farmer, perceives in a livelihood outcome. The parameters of the logit models are estimated by Maximum Likelihood Estimates (MLE), while Ordinary Least Squares (OLS) and Two Stage Least Squares (2SLS) estimate the coefficients of income and employment predictor models. Literature tells us that economic activity diversification has an effect on livelihood outcomes, but in different measures and dexterities. For example, Dose (2007), Ndemo (2005), Karugia et al (2006), Kenya Vision 2030, Rantamaki-Lahtinen (2008) and Michuki (2008) look at economic activity diversification and livelihood outcomes from different perspectives. Livelihood outcome in this study is classified as (i) physical assets, (ii) social capital, (iii) human capital and labour market achievement. Bori (2005) says that theory of livelihood is about maintaining and improving people's possessions as a requirement for survival. She further says Sustainable Livelihood Approach (SLA) theory puts a lot of importance on the possession of and access to assets or capitals that can improve the livelihoods. This study integrated the different viewpoints and came up with a predictor model for livelihood outcome as a function of economic activity diversification, personal and social characteristics, and motivating factors, which can be expressed as:

$$Z^* = f(D, PS, M)$$

$$Z_i^* = \alpha_0 + \alpha_1 D + \alpha_2 PS_i + \alpha_3 M_i + \varepsilon_i \qquad (2)$$

Where Z^*_i is a logit index indicating the benefit a farmer i perceives in physical asset, social capital, and human capital. D_i is a dummy for economic activity diversification or predicted diversification where a farmer i diversifies vertically, structurally or into non-agricultural businesses. PS_i is a set of personal and social characteristics and M_i is a set of motivating factors as already explain in eq. (1), while ε_i is the error term assumed to follow a logistic

distribution. The tables 5.4a, 5.4b, 5.5a, 5.5b, 5.6a and 5.6b indicate the MLE of the logit models and table 5.7 and 5.8 show the OLS and 2SLS estimates, while tables 5.4a (i), 5.4b (i), 5.5a(i), 5.5b(i), 5.6a(i) and 5.6b(i) in the appendix II present the coefficient of determination pseudo R^2, and the p – values of χ^2 – statistics of the logit models. Observed diversifications are endogenous variables meaning that they are affected by other factors taken care of by the error term, while predicted diversifications are exogenous variables which denote variables that are not affected by the error term of the model. The LPM is used to establish the exogenous diversifications. In this section the predicted diversifications are used for estimations since better results are presented as compared to those of observed diversification, Cameron (2005) says that exogenous variables are preferred to endogenous as the later tend to overestimate or underestimate the results. For comparative purposes both endogenous and exogenous diversifications are given in this study.

5.3.1 Diversification and Physical Assets

This section estimates the probability of a farmer owning physical assets given that a farmer is in vertical diversification and/or portfolio diversification as compared to structural diversification. The results are summarized in the table 5.4a and 5.4b which show the logit model marginal effects of vertical and portfolio diversifications on land, permanent house and vehicles as compared to structural diversification. The estimating equation is as follows:

$$Z^*_{ii} = \lambda_0 + \lambda_1 VD_i + \lambda_2 PD_i + \lambda_3 PS_i + \lambda_4 M_i + \varepsilon_i \qquad (3)$$

Z^*_{ii} *is* a logit index for the benefits a farmer i perceives in physical asset, VD is vertical diversification where a farmer i adds value to agricultural produce and PD is portfolio diversification where a farmer i is engaged in non-agricultural business, PS_i, M_i, *and* ε_i are as explained in equation (2). An overview comparison of the results in table 6a and 6b indicate that the coefficients of predicted (exogenous) diversification are better estimated than those of the endogenous diversification. The results indicate that portfolio diversification among farmers improves livelihood outcomes better than structural and vertical diversifications do.

Table 5.4a: Endogenous Diversification and Physical Assets, ML Estimates (Absolute z - Statistics in parentheses)

Variables	Livelihood Outcomes					
	Land		Permanent House		Vehicles	
	Logit	Marginal effects	Logit	Marginal effects	Logit	Marginal effects
Type of Diversification						
Observed vertical diversification	.3667 (3.38)	.1827 (1.58)	.1515 (1.41)	.0574 (0.50)	.1159 (1.54)	-.0010 (0.04)
Observed portfolio diversification	.2047 (4.31)	.0866 (1.63)	.1595 (3.11)	.0919 (1.42)	.1712 (4.75)	.0451 (1.52)
Personal and social characteristics						
Years of schooling		.0080 (1.33)		.0090 (1.16)		.0054 (1.86)
Gender (1 = male)		.0025 (0.06)		.0022 (0.04)		-.0200 (1.06)
Age		.0034 (1.80)		.0046 (1.95)		.0005 (0.59)
Motivating factors (dummies)						
Desire for financial security		.0109 (0.08)		-.0925 (0.65)		
Desire for food security		.0357 (0.32)		.1038 (0.94)		-.0768 (0.72)
Cost of farming		.0540 (1.19)		-.1400 (2.31)		-.0024 (0.11)
Unfavourable government Regulations		.0304 (0.63)		.1146 (1.85)		.0314 (1.40)
Access to loan		.1383 (2.56)		.1761 (2.77)		.0766 (2.21)
Insurance availability		-.0167 (0.35)		-.1426 (2.34)		.0435 (1.62)
Existence of business opportunity		.0199 (0.37)		.1102 (1.67)		.0535 (2.18)
Desire for independence		.0500 (0.86)		.2307 (3.81)		.0114 (0.42)
Desire for achievement		.0023 (0.03)		-.0700 (0.71)		-.1200 (1.25)
Desire for social status		.1062 (2.09)		.1200 (1.77)		.0020 (0.06)
Weather conditions (1=weather)		.1813 (4.52)		-.0821 (0.82)		-.0147 (0.36)
Observations	388	388	388	388	388	388

Source: Own estimates.

Table 5.4b Exogenous Diversification and Physical Assets, ML Estimates (Absolute z - Statistics in parentheses)

Variables	Livelihood Outcome					
	Land		Permanent House		Vehicles	
	Logit Marginal effects		Logit Marginal effects		Logit Marginal effects	
Type of Diversification						
Predicted Vertical diversification (x 10)	.08445 (4.00)	.12190 (3.68)	.08541 (3.29)	.12392 (2.88)	.01528 (1.78)	.01378 (1.19)
Predicted Portfolio diversification (x 10)	.03067 (3.64)	.07511 (3.24)	.01384 (1.39)	.03258 (1.12)	.02111 (4.89)	.02802 (2.63)
Personal and social characteristics						
Years of schooling		-.00062 (0.75)		.00077 (0.72)		-.00010 (0.27)
Gender (1 = male)		-.00752 (1.52)		-.00407 (0.64)		-.00435 (1.93)
Age		.00072 (3.22)		.00068 (2.45)		.00018 (1.77)
Motivating factors (dummies)						
Desire for financial security		.00527 (0.48)		-.01062 (0.73)		
Desire for food security		.01739 (4.39)		.02349 (2.61)		.00311 (1.81)
Cost of farming		-.01402 (1.82)		-.02607 (2.98)		-.00666 (1.60)
Unfavourable government Regulations		.00345 (0.70)		.00932 (1.44)		.00359 (1.59)
Access to loan		-.01143 (1.59)		-.00188 (0.18)		-.00045 (0.14)
Insurance availability		-.01105 (2.28)		-.02096 (3.22)		.00088 (0.39)
Existence of business opportunity		-.01061 (1.46)		.00439 (0.54)		.00225 (0.78)
Desire for independence		-.00542 (0.66)		.01752 (2.34)		-.00150 (0.38)
Desire for achievement		.01368 (2.27)		.00279 (0.25)		-.00177 (0.36)
Desire for social status		-.00860 (0.94)		.00359 (0.36)		-.00756 (1.13)
Weather conditions (1 = weather)		.01415 (2.54)		-.01210 (1.13)		-.00691 (0.96)
Observations	388	388	388	388	388	388

Source: Own estimates.

The marginal effects in table 5.4b indicate that a 10% increase in vertical diversification among farmers increases the probability of purchasing land by 8.45% ($z = 4.0$) as compared to structural diversification; while a 10% increase in portfolio diversification is associated with 3.07% ($z = 3.64$) increase in the chance of farmers purchasing land. The pseudo R^2 of the model is 0.1414 which means that 14.14% in the variations in the probability of buying land are explained by the model. The p-value of the χ^2 – statistics is zero indicating that the hypothesis that vertical diversification and portfolio diversification jointly have no effect in the buying of land is rejected (Appendix II, table 5.4b (i)).

However, after controlling for effects of covariates, vertical and portfolio diversifications among farmers show that a 10% increase in the proportion of farmers in vertical diversification increases the probability of purchasing land by 12.2% ($z = 3.68$) while a 10% increase raises the chance of purchasing land by 7.5% ($z = 3.24$) as compared to structural diversification. It should be noted that the correlation coefficients of vertical and portfolio diversifications with income are higher than those of structural diversification this is an indication that the farmers in the two diversifications make more money from their businesses that would enable them to buy land. A 10% increase in the desire for achievement and food security among farmers increases the probability of buying land by 1.37% ($z = 2.27$) and 1.74% ($z = 4.39$), respectively. The pseudo R^2 of 0.1995 means that, 19.95% of the variations in the probability of buying land are explained by the independent variables in model collectively. The p-value of the χ^2 – statistics is zero indicating that the hypothesis that the explanatory variables jointly have no effect in the buying of land is rejected (Appendix II, table 5.4b(i)). These results are as expected because the desire for achievement and food security motivate farmers to buy land. Owning land is an achievement farmers are proud of; on the other hand land assures a farmer of food security. Good weather conditions can also motivate a farmer to purchase more land for production as indicated Table 6.5b (i) in the appendix II

Table 5.4b shows that a 10% increase in vertical diversification increases the chance of a farmer building a permanent house by 8.54% ($z = 3.29$) while in portfolio diversification by 1.38 ($z = 1.39$) as compared to structural diversification. The pseudo R^2 of 0.0477 means that, 4.77% of the variations in the probability of building permanent houses are explained by vertical and portfolio diversifications collectively. The p-value of the χ^2 – statistics is zero

indicating that the hypothesis that the explanatory variables jointly have no effect in the building of permanent houses is rejected (Appendix II, table 5.4b (i)). After controlling for other independent variables, vertical diversification remains a strong determinant of farmers building permanent houses by 12.39% ($z = 2.88$), however, portfolio diversification does not come out as a strong determinant. A 10% increase in the desire for independence among the farmers increases the chance of a farmer building a permanent house by 1.75% ($z = 2.34$).

In reality desire for independence motivates people to build permanent houses so that they can be self-reliant and secure unlike those in temporary houses. Table 5.4b (i) in the appendix shows that the pseudo R^2 is 0.1372 which means that 13.72% of the variations in the probability of a farmer building a permanent house is explained by all explanatory variables in the model. The p-value of the χ^2 – statistics is zero indicating that the hypothesis that the independent variables jointly have no effect on the farmers building permanent houses is rejected (Appendix II, table 5.4b (i)).

Marginal effects in table 5.4b show that a 10% increase in vertical and portfolio diversifications increase the probability of farmers buying vehicles by 1.53% ($z = 1.78$) and 2.11% ($z = 4.89$), respectively. Table 5.4b (i) in appendix II indicates that the pseudo R^2 of 0.2514 means that 25.14% of the variations in the proportions of farmers buying vehicles is explained by vertical and portfolio diversification. The p-value of the χ^2 – statistics of the model is zero indicating that the hypothesis that the independent variables jointly have no effect on the farmers buying vehicles is rejected (Appendix II, table 5.4b (i)). After controlling for the covariates, portfolio diversification and desire for food security come out as strong determinants of farmers buying vehicles. A 10% increase in portfolio diversification increases the proportion of farmers buying vehicles by 2.8% ($z = 2.63$), while a 10% increase in the desire for food security increases the proportion of farmers buying vehicles by 0.31% ($z = 1.81$). The pseudo R^2 *of* 0.3210 means that 32.1% of the variations in the proportion of farmers buying vehicles is explained by the independent variables. The p-value of the χ^2 – statistics for the model is zero meaning that we reject the hypothesis that buying of vehicles has no relationship with vertical and portfolio diversifications, personal and social characteristics, and motivating factors (see table 5.4b (i) in the appendix II).

5.3.2 Diversification and Social Capital

This section attempts to estimate the probability of a farmer being a member of a social network or linkage or cluster given that he/she is adding value to the farm produce. The results are summarized in the table 5.5a and 5.5b which show the logit marginal effects of vertical and portfolio diversifications on social capital as compared to structural diversification. The estimating equation is as follows:

$$Z^*_{2i} = \phi_0 + \phi_1 VD + \phi_2 PD + \phi_3 PS_i + \phi_4 M_i + \varepsilon_i \quad (4)$$

Where, Z^*_{2i} *is* a logit index for the benefits a farmer *i* perceives in social capital, *VD*, *PD*, PS_i, M_i, *and* ε_i are as explained in equation (3). The marginal effects in table 6.5b show that a 10% increase in vertical diversification among farmers increases the chance of SACCO membership by 16.4% (z = 5.18) as compared to structural diversification, however, portfolio diversification among farmers has no significant influence on SACCO membership. It should be noted that these SACCOs are for agricultural activities rather than non-agricultural businesses. Table 5.5b (i) in the appendix II indicates that the pseudo R^2 of 0.0651 means that vertical diversification explains 6.51% of the variations in the probability of a farmer becoming a member of a SACCO. The *p*-value of the χ^2 – statistic for the model is zero meaning that we reject the hypothesis that vertical and portfolio diversifications jointly have no effect on SACCO membership (see table 5.4b(i) in the appendix II). Boli (2005) acknowledges that the concept of social capital was made popular by Robert Putnam whereby social organizations, networks, norms and trust are very important ingredients of better livelihood outcomes.

After controlling for the other independent variables in the model, vertical diversification remains a strong predictor of SACCO membership. The results show that a 10% increase in vertical diversification among farmers increases the chance of SACCO membership by 13.55% (z = 2.66), desire for financial security by 3.9% (z = 3.81) and access to loan by2.72% (z = 2.44). These findings make sense because some farmers join SACCOs because they are advanced with some credit to meet their financial needs in case the proceeds from farm produce delay. Table 5.5b(i) in the appendix II shows the pseudo R^2 of 0.2541 means that independent variables jointly explain 25.41% of the variations in the proportion of farmers becoming SACCO members. The *p*-value of the χ^2 – statistics for the model is zero

meaning that we reject the hypothesis that vertical and portfolio diversifications, personal and social characteristics and motivating factors jointly have no effect on SACCO membership.

Table 5.5b indicates that a 10% increase in vertical diversification among farmers increases the chance of table banking membership by 10.2% (z = 3.56) as compared to structural diversification, however, portfolio diversification among farmers has very little influence on table banking membership. The pseudo R^2 of 0.0491 means that, 4.91% of the variations in the proportion of table banking membership is explained by vertical and portfolio diversifications. The p-value of the χ^2 – statistics for the model is zero meaning that we reject the hypothesis that vertical and portfolio diversifications have no effect on Table banking membership(see table 5.4b(i) in the appendix II).

After controlling for the other independent variables, vertical and portfolio diversifications cease to be important determinants of the proportions of farmers in table banking membership. Nevertheless, a 10% increase in the proportion of women farmers increases the probability of table banking by 1.45% (z = 2.06), and unfavourable government regulations increase the probability by 1.77% (z = 2.62). The pseudo R^2 of 0.1783 means that, 17.8% of the variations in the proportion of farmers in table banking is explained by the independent variables. The p-value of the χ^2 – statistics for the model is zero meaning that we reject the hypothesis that vertical and portfolio diversifications, personal and social characteristics, and motivating factors jointly have no effect on Table banking membership (see table 5.4b(i) in the appendix II).

Table 5.5b indicates that a 10% increase in portfolio diversification reduces the chance of farmers becoming church members by 4.5% (z = 5.05). The pseudo R^2 of 0.0617 means that 6.17% of the variations in church membership are jointly explained by vertical and portfolio diversifications (see table 5.4b(i) in the appendix II). After controlling for explanatory variables, the marginal effects of portfolio diversification among farmers indicate that a 10% increase in portfolio diversification reduces the probability of church membership by 0.50% (z = 2.28). Furthermore, the desire for financial security among farmers increases the probability of church membership by 2.82% (z = 1.87) and the desire for social status increases the probability by 2.78% (z = 2.76). The pseudo R^2 is 0.2498 which means that 24.98% of the variations in the probability of church membership is explained by the

independent variables. The *p*-value of χ^2 – statistics of the church membership predictor model is zero meaning that the hypothesis that Church membership has no relationship with vertical and portfolio diversifications, personal and social characteristics, and motivating factors is rejected (see table 5.4b(i) in the appendix II).

Table 5.5a: Endogenous Diversification and Social Capital, ML Estimates (Absolute *z* - Statistics in parentheses)

Variables	Livelihood Outcome					
	SACCO Membership		Table Banking		Church Membership	
	Logit Marginal effects		Logit Marginal effects		Logit Marginal effects	
Type of Diversification						
Observed vertical diversification	.3211 (3.96)	.1872 (1.48)	.4606 (7.25)	.4264 (4.61)	-.0451 (0.48)	-.0321 (0.36)
Observed portfolio diversification	.0101 (0.19)	-.0841 (1.09)	.0390 (0.72)	-.0812 (1.12)	-.1745 (3.69)	-.0859 (1.61)
Personal and social characteristics						
Years of schooling		.0075 (0.82)		.0090 (1.03)		-.0217 (3.43)
Gender (1 = male)		.0677 (1.04)		-.1209 (1.90)		-.0132 (0.31)
Age		.0085 (3.11)		-.0006 (0.23)		.0002 (0.11)
Motivating factors (dummies)						
Desire for financial security		.4148 (4.46)		-.0049 (0.03)		.3711 (2.53)
Desire for food security		-.1564 (1.13)		.1970 (1.30)		-.0082 (0.09)
Cost of farming		.2185 (3.32)		.2165 (3.49)		-.1343 (3.09)
Unfavourable government Regulations		.1254 (1.72)		.1694 (2.55)		.2058 (4.03)
Access to loan		.3968 (6.48)		.2186 (3.27)		.0093 (0.19)
Insurance availability		-.0818 (1.04)		.0441 (0.60)		.0443 (0.92)
Existence of business opportunity		-.0021 (0.03)		.0698 (0.94)		-.1686 (3.42)
Desire for independence		-.1663 (2.00)		-.2648 (3.50)		-.1909 (5.62)
Desire for achievement		-.1322 (1.32)		.0068 (0.06)		-.0656 (1.06)
Desire for social status		-.2491 (3.42)		.0076 (0.10)		.1573 (2.30)
Weather conditions (1 = weather)		.0012 (0.01)		.0651 (0.59)		.2068 (2.08)
Observations	388	388	388	388	388	388

Source: Own estimates.

Table 5.5b: Exogenous Diversification and Social Capital, ML Estimates (Absolute z - Statistics in parentheses)

Variables	Livelihood Outcome					
	SACCO Membership		Table Banking		Church Membership	
	Logit Marginal effects		Logit Marginal effects		Logit Marginal effects	
Type of Diversification						
Predicted Vertical diversification (x 10)	.16398 (5.18)	.13549 (2.66)	.10205 (3.56)	.04483 (0.94)	.04283 (1.84)	-.01034 (0.34)
Predicted Portfolio diversification (x 10)	-.01535 (1.43)	-.00464 (0.14)	.01236 (1.17)	.01960 (0.61)	-.04500 (5.05)	-.04978 (2.28)
Personal and social characteristics						
Years of schooling		.00113 (0.87)		.00024 (0.20)		-.00110 (1.35)
Gender (1 = male)		.00458 (0.62)		-.01454 (2.06)		.00229 (0.49)
Age		.00099 (3.17)		.00005 (0.18)		-.00015 (0.70)
Motivating factors (dummies)						
Desire for financial security		.03907 (3.81)		.00399 (0.25)		.02815 (1.87)
Desire for food security		-.00346 (0.17)		.02425 (1.51)		-.01012 (1.58)
Cost of farming		.01408 (1.43)		.01603 (1.75)		-.00660 (1.09)
Unfavourable government Regulations		.00956 (1.26)		.01768 (2.62)		.01842 (3.58)
Access to loan		.02723 (2.44)		.01526 (1.32)		.00949 (1.32)
Insurance availability		-.01326 (1.49)		.00150 (0.18)		.00785 (1.54)
Existence of business opportunity		-.00540 (0.56)		.00348 (0.39)		-.01275 (2.22)
Desire for independence		-.02123 (2.43)		-.02893 (3.52)		-.01733 (4.61)
Desire for achievement		-.00759 (0.61)		.00520 (0.42)		-.01131 (1.95)
Desire for social status		-.02870 (2.82)		-.00607 (0.55)		.02784 (2.76)
Weather conditions (1 = weather)		-.00182 (0.15)		.00415 (0.36)		.02669 (2.43)
Observations	388	388	388	388	388	388

Source: Own estimates.

5.3.3 Diversification and Human Capital

This section estimates the probability of farmers being able to pay education and medical bills of their families given that they have diversified their livelihoods. According to Ellis (2000) human capital is the capability of a farmer meeting his or her health and education expenses for better livelihoods. The results are summarized in the table 5.6a and 5.6b which show the logit marginal effects of structural and portfolio diversifications on education and health as compared to vertical diversification. The estimating equation is as follows:

$$Z^*_{3i} = \mu_0 + \mu_1 PD + \mu_2 SD_i + \mu_3 PS_i + \mu_4 M_i + \varepsilon_i \qquad (5)$$

Where Z^*_{3i} *is* a logit index for the benefits the farmer i perceives in human capital accumulation SD is structural diversification where a farmer is involved in mixed farming. PD_i PS_i M_i *and* ε_i are as explained in equation (2). ML estimates shown in table 5.6b indicate that a 10% increase in structural diversification among farmers, increases the probability of educating the dependants by 2.92% (z=2.32) as compared to vertical diversification while portfolio diversification does not significantly increase the probability of educating dependants as its marginal effect is 0.87% (z = 1.40). The pseudo R^2 is 0.0191 which means that 1.91% of the variations in the probability of educating the dependants of farmers are explained by the independent variables in the model. The p-value of χ^2 – statistics of the education predictor model is 0.0451 meaning that the hypothesis that the ability to educate dependants has no relationship with structural and portfolio diversifications is rejected as the error we make by saying so is less than 10% (see table 5.6b(i) in the appendix II).

After controlling for the independent variables in the model, marginal effects indicate that a 10% increase in the proportion of farmers engaged in structural and portfolio diversifications do not significantly influence the probability of educating dependants of farmers as their effects are 1.44% (z = 0.55) and -0.082% (z = 0.34) respectively, however a 10% increase among the farmers who are motivated by the existence of business opportunities increases the chance of farmers ability to school fees for the dependants by 1.02%, (z = 1.53) and access to loan facilities by 0.84% (z = 1.56). The pseudo R^2 is 0.0950 which means that 9.5% of the variations in the probability of educating a dependant is explained by the independent variables. The p-value of χ^2 – statistics of the education predictor model is 0.0144 meaning that the hypothesis that farmers' abilities to educate dependants have no relationship with structural and portfolio diversifications, personal and social characteristics, and motivating factors is rejected (see table 5.6b(i) in the appendix II).

Table 5.6a: Endogenous Diversification and Human Capital, ML Estimates (Absolute z - Statistics in parentheses)

Variables	Livelihood Outcomes			
	Education		Health	
	Logit Marginal effects		Logit Marginal effects	
Type of Diversification				
Observed structural diversification	.0865 (1.32)	.0516 (0.89)	.0937 (1.69)	.0334 (1.01)
Observed portfolio diversification	.0474 (1.32)	.0160 (0.41)	.0691 (3.17)	.0411 (2.38)
Personal and social characteristics				
Years of schooling		-.0015 (0.31)		-.0030 (1.81)
Gender (1 = male)		-.0583 (1.68)		-.0052 (0.45)
Age		.0010 (0.75)		.0006 (1.26)
Motivating factors (dummies)				
Desire for financial security		.0211 (0.28)		-.0086 (0.54)
Desire for food security		-.0431 (0.79)		.0636 (0.95)
Cost of farming		.0183 (0.52)		-.0020 (0.17)
Unfavourable government Regulations		.0797 (2.02)		.0370 (1.92)
Access to loan		.0704 (2.00)		-.0184 (1.08)
Insurance availability		-.0205 (0.47)		.0081 (0.54)
Existence of business opportunity		.0938 (2.02)		.0795 (2.46)
Desire for independence		-.0119 (0.26)		.0185 (0.83)
Desire for achievement		-.0138 (0.30)		-.0222 (2.00)
Desire for social status		-.0259 (0.67)		-.0082 (0.68)
Weather conditions (1 = weather)		.0630 (0.96)		.0321 (1.01)
Observations	388	388	388	388

Source: Own estimates.

Table 5.6b: Exogenous Diversification and Human Capital, ML Estimates (Absolute z - Statistics in parentheses)

Variables	Livelihood Outcomes			
	Education		Health	
	Logit Marginal effects		Logit Marginal effects	
Type of Diversification				
Predicted structural diversification (x 10)	.02928 (2.32)	.01445 (0.55)	.02070 (2.78)	.01597 (1.49)
Predicted portfolio diversification (x 10)	.00873 (1.40)	-.00819 (0.34)	.00556 (1.34)	.01050 (1.14)
Personal and social characteristics				
Years of schooling		.00006 (0.07)		-.00055 (1.78)
Gender (1 = male)		-.00431 (1.14)		-.00051 (0.35)
Age		.00004 (0.28)		.00007 (1.14)
Motivating factors (dummies)				
Desire for financial security		-.00090 (0.13)		-.00214 (1.66)
Desire for food security		-.00695 (1.49)		.00517 (0.70)
Cost of farming		.00384 (0.75)		-.00086 (0.49)
Unfavourable government Regulations		.00778 (1.66)		.00582 (2.15)
Access to loan		.00838 (1.56)		-.00379 (1.10)
Insurance availability		-.00160 (0.32)		.00036 (0.17)
Existence of business opportunity		.01024 (1.53)		.00617 (1.60)
Desire for independence		-.00076 (0.14)		-.00007 (0.04)
Desire for achievement		-.00343 (0.70)		-.00235 (1.70)
Desire for social status		-.00042 (0.07)		-.00189 (0.99)
Weather conditions (1 = weather)		.00799 (1.10)		.00326 (0.93)
Observations	388	388	388	388

Source: Own estimates

ML estimates of health in table 5.6b suggest that a 10% increase in structural diversification among farmers increases the probability of being able to pay medical bills by 2.07% (z = 2.78) while portfolio diversification increases the probability by 0.56% (z = 1.34) as compared to vertical diversification. The pseudo R^2 is 0.0381 which means that 3.81% of the variations in the probability of farmers paying medical bills are explained by the independent variables. The p-value of χ^2 – statistics of the health predictor model is 0.0265 meaning that the hypothesis that the ability to pay medical bills has no relationship with structural and portfolio diversifications is rejected as the error we make by doing so is less than 10% (see table 5.6b(i) in the appendix II).

After controlling for the covariates, the marginal structural and portfolio diversifications have very little influence on farmers' ability to pay medical bills. However, a 10% increase in unfavourable government regulations for small-scale farmers and the existence of business opportunities increase the probability of farmers paying medical bills by 0.58% (z = 2.15) and 0.62% (z = 1.60) respectively. The pseudo R^2 is 0.2370 which means that 23.7% of the variations in the probability of farmers paying medical bills are explained by the independent variables. The p-value of χ^2 – statistics of the health predictor model is 0.0001 meaning that the hypothesis that the ability to pay medical bills has no relationship with all the explanatory variables is rejected as the error we make by doing so is less than 10% (see table 5.6b(i) in the appendix II).

5.3.4 Diversification and Income

This section uses OLS and 2SLS methods to predict the effects of diversification on log of labour income. The results are summarized in the table 5.7. The estimating equation is as shown below:

$$Log\_income = \gamma_0 + \gamma_1 VD + \gamma_2 PD_i + \gamma_3 PS_i + \gamma_4 M_i + \varepsilon_i \qquad (6)$$

Where Log_income is the logarithm of the amount of money earned by a farmer per month, VD, PD, PS_i, M_i, and ε_i are as explained in eq. (3). 2SLS results in table 5.7 indicate that a 10% increase in vertical diversification among farmers increases income by 17.16% (t = 3.39) while a 10% increase in portfolio diversification increases incomes of farmers by 14.18% (t = 7.24) as compared to structural diversification. R^2 of the model is 0.2348 meaning that 23.48% of the variations in the incomes of the farmers are explained by vertical and portfolio diversifications. The p-value of F – statistics of log income predictor model is

zero meaning that the hypothesis that the log income of farmers has no relationship with vertical and portfolio diversifications is rejected.

After controlling for the other independent variables, the effect of portfolio diversification on log income is 8.52% (t = 1.80). 2SLS estimates show that a 10% increase in the number of years of schooling and access to loans among farmers increase log income by 0.63% (t = 3.63) and 5.19% (t = 2.93), respectively. R^2 of the model is 0.4191 meaning that 41.91% of the variations in the incomes of the farmers are explained by vertical and portfolio diversifications. The p-value of F - statistics of log income predictor model is zero meaning that the hypothesis that the log income of farmers has no relationship with vertical and portfolio diversifications is rejected.

FAO (2002), World Bank (1994), and Haggblade & Hazel (1989) support the study findings that portfolio diversification has a significant effect on income. This is not out of ordinary as literatures tell us that owning enterprises contribute a lot to incomes of entrepreneurs. Chapman and Tripp (2004), Carter (1999), Karugia et al (2006), Rantamaki-latinen (2008), Little (2001), Ndemo (2005) and Wasserman (2008) suggested that portfolio diversification is a recommendable way of improving the livelihoods of farmers. The results also concur with the existing literature that education plays a very important role in the earnings of a farmer as it helps individuals or entrepreneurs to identify existence of business opportunities (Schultz, 1980; McCormick, 1996; Minniti, 2004; Hisrich et al, 2008).

The study finding that access to loan facilities increases the earnings of small-scale farmers is as expected as limited access to finance is a major limitation to the improvement of farmers' livelihoods (Dose, 2007). If farmers can get loans to invest in machinery for processing their agricultural produce, then they could be able to earn more. This is the reason why Kenya Vision 2030 and MDGs 2015 advocate for value addition in order for the farmers to earn more from finished products as compared to primary agricultural products.

Table 5.7: The Effect of Diversification on income, OLS and 2SLS Estimates (Absolute *t*-Statistics in parentheses)

Variables	Log income			
	OLS Estimates		2SLS Estimates	
Type of diversification				
Vertical diversification (x 10)	.06622 (3.06)	.01148 (0.60)	.17160 (3.39)	.06778 (0.97)
Portfolio diversification (x 10)	.07855 (7.31)	.03184 (2.99)	.14186 (7.24)	.08517 (1.80)
Personal and social characteristics				
Years of schooling		.00754 (5.87)		.00633 (3.63)
Gender (1 = male)		.00567 (0.62)		-.00026 (0.02)
Age		.00024 (0.63)		.00050 (1.15)
Motivating factors (dummies)				
Desire for financial security		.02356 (1.11)		.02789 (1.28)
Desire for food security		-.00312 (0.14)		.01854 (0.66)
Cost of farming		.01396 (1.42)		.00158 (0.11)
Unfavourable government Regulations		.03006 (2.92)		.03137 (2.93)
Access to loan		.06888 (6.55)		.05190 (2.93)
Insurance availability		-.00870 (0.80)		-.01535 (1.25)
Existence of business opportunity		.01402 (1.24)		.00517 (0.38)
Desire for independence		-.03111 (2.45)		-.03845 (2.72)
Desire for achievement		.02026 (1.33)		.03234 (1.77)
Desire for social status		-.00562 (0.49)		-.01947 (1.19)
Weather conditions (1 = weather)		.02945 (1.89)		.02375 (1.45)
Constant	8.2475 (124.66)	6.7974 (20.94)	7.9441 (98.88)	6.6320 (18.71)
R^2	0.1466	0.4283	0.2348	0.4195
F-Statistics (*p*-value)	34.24 (0.0000)	19.12 (0.0000)	60.38 (0.0000)	18.48 (0.0000)
Observations	388	388	388	388

Source: Own estimates.

5.3.5 Diversification and Employment

This section uses the OLS and the 2SLS methods to determine the effects of diversification on employment. The results are summarized in the table 5.14. The estimating equation is as shown below:

$$\text{Log\_}employment = \pi_0 + \pi_1 VD + \pi_2 PD + \pi_3 PS_i + \pi_4 M_i + \varepsilon_i \quad (7)$$

Log employment is the logarithm of the number of people employed on farms. *PD, VD, PS_i, M_i, and ε_i,* are as explained in equations (3). 2SLS results in table 5.8 indicate that a 10% increase in vertical diversification among farmers increases log employment by 9.95% (t = 3.37) while a 10% increase in portfolio diversification increases log employment of farmers by 3.88% (t = 3.31) as compared to structural diversification. R^2 of the model is 0.1444 meaning that 14.44% of the variations in the log employment of the farmers are explained by vertical and portfolio diversifications. The p-value of F – statistics of log employment predictor model is zero meaning that the hypothesis that employment on small farms has no relationship with vertical and portfolio diversifications is rejected.

After controlling for the covariates, vertical diversification increases log employment by 10.60% (t = 2.25), portfolio diversification by 4.23% (t = 1.23) and desire for achievement by 2.54% (t = 2.07). R^2 of the model is 0.2492 meaning that 24.92% of the variations in the log employment of farmers are explained by vertical and portfolio diversifications, personal and social characteristics and motivating factors. The p-value of F – statistics of log employment predictor model is zero meaning that the hypothesis that the employment creation on small farms has no relationship with the explanatory variables is rejected. Haggblade and Hazel (1989) estimated that 14% of the full-time employment in Africa is found in non-agricultural sector which is very close to the study findings. Ellis (1999) observed that poor farmers have small farms and that they are limited in their employment creation.

Table 5.8: Effect of Diversification on Employment, OLS and 2SLS Estimates (Absolute *t* – Statistics in parentheses)

Variables	Log employment			
	OLS Estimates		2SLS Estimates	
Type of diversification				
Vertical diversification (x 10)	.03233 (2.76)	.01140 (1.00)	.09945 (3.37)	.10599 (2.25)
Portfolio diversification (x 10)	.01028 (1.52)	-.01330 (1.78)	.03879 (3.31)	.04234 (1.23)
Personal and social characteristics				
Years of schooling		.00332 (3.78)		.00224 (1.82)
Gender (1 = male)		.00327 (0.51)		-.00475 (0.64)
Age		.00014 (0.52)		.00052 (1.63)
Motivating factors (dummies)				
Desire for financial security		-.00631 (0.42)		-.00200 (0.13)
Desire for food security		-.01266 (0.76)		.01521 (0.72)
Cost of farming		.02789 (3.80)		.01362 (1.35)
Unfavourable government Regulations		-.01340 (1.79)		-.01298 (1.67)
Access to loan		.01377 (1.93)		-.00507 (0.43)
Insurance availability		.01425 (1.75)		.00296 (0.31)
Existence of business opportunity		.02388 (2.85)		.01364 (1.36)
Desire for independence		.01202 (1.45)		.00110 (0.12)
Desire for achievement		.01338 (1.32)		.02538 (2.07)
Desire for social status		-.01057 (1.40)		-.02589 (2.26)
Weather conditions (1 = weather)		-.00715 (0.65)		-.01297 (1.12)
Constant	.2895 (6.59)	-.02515 (0.99)	.01278 (2.52)	-.04918 (1.80)
R^2	0.0332	0.2478	0.1444	0.2492
F-Statistics (*p*-value)	5.42 (0.0049)	6.31 (0.0000)	22.77 (0.0000)	6.35 (0.0000)
Observations	388	388	388	388

Source: Own estimates.

5.4 Summary of the Results

The study established that distance to the market and access to loan facilities are strong determinants of value addition on farms. It was also discovered that mixed farming is determined by the size of the farm, electricity supply, and the desire for financial security. The study further shows that running water, size of the farm, access to the loans, years of schooling, distance to the market, the desire for food security, gender, high cost of farming, the existence of business opportunities, insurance availability and desire for social security are the determinants of farmers diversifying into non-agricultural businesses. The hypothesis that farm characteristics (electricity, running water, distance to market, and the size of the farm) jointly have no effect on economic activity diversification is rejected. Similarly, the null hypothesis that farm characteristics, personal & social characteristics, motivating factors jointly have no effect on activity diversification is rejected.

Portfolio and vertical diversifications among farmers have a significant influence on the purchasing of land relative to the effects of structural diversifications. Portfolio diversification has a significant effect on the purchasing of vehicles, while vertical diversification has an effect on the building of permanent houses. The hypothesis that vertical and portfolio diversifications have no effect on physical assets (land, permanent house and a vehicle) is rejected. Vertical diversification has a significant effect on farmers becoming members of SACCOs. However, portfolio diversification reduces the probability of farmers becoming church members as compared to structural diversification. The hypothesis that vertical and portfolio. diversification, personal and social characteristics and motivating factors jointly have no effect on social capital is rejected. Structural diversification among farmers has a relatively strong effect on health as compared to portfolio and vertical diversifications. The hypothesis that human capital has no relationship with structural and portfolio diversifications, personal and social characteristics, and motivating factors together is rejected. Vertical diversification has a strong effect on employment creation on small farms relative to structural and portfolio diversifications. The hypothesis that vertical and portfolio diversifications, personal and social characteristics and motivating factors jointly have no relationship with employment creation is rejected. Portfolio diversification among farmers has a significant effect on labour incomes of farmers relative to structural and vertical diversifications.

CHAPTER SIX: SUMMARY, CONCLUSIONS AND RECOMENDATIONS

6.1 Introduction

This chapter gives a summary of the study findings and its entrepreneurship implications, conclusion, recommendations, limitations of the study, and suggestion for further research.

6.2 Summary of the Findings

The larger Thika district is part of Kiambu and Murang'a counties put together. The upper zone of Thika has a cool climate with rich volcanic soils that are well suited to coffee growing, tea planting and pineapple fields. The lower part of Thika has little rainfall and many people live on subsistence farming. Small-scale farmers in the district have an average farm size of 1.77 acres and each farm has at least one employee. It is estimated that 50% of the farmers have permanent houses with stone walls and 54% of the farms have access to running water, while 29% of the farms have electricity. The farmers have an average education level of eight of years of schooling. The average age of the farmers is 49 years and 92% of them are married. It was estimated that 44% of the farmers are in other professions, like teaching, nursing and hair dressing, while 88% of farmers are practicing mixed farming where they grow crops like cereals, tea, horticulture, coffee, bananas and macadamia nuts among others. They also keep livestock like graded cattle, goats, sheep, poultry rearing, and fish farming. The study also found out that 38% of the farmers are in portfolio diversification, where they are involved in non-agricultural activities like trading, and metal fabrication. It further established that 6% of the respondents are in vertical diversification, where they mostly add value by storing their agricultural produce in granaries. The research established that portfolio diversification is highly correlated with education and income, while structural diversification is highly correlated with the size of the farm and the possession of livestock. Vertical diversification is positively associated with the supply of electricity on the farm and the size of the land.

Approximately 37% of the respondents said that they were able to build themselves permanent homes through diversification, while 25% were able to buy more land and 73% bought livestock through diversification. The study also shows that economic activity diversification enabled small-scale farmers to have access to social and human capital.

Approximately, 53% of the respondents were SACCO members while 85% educated their dependants and 75% were active members of their churches through livelihood diversification. The farmers' average income is Ksh. 10,000 per month ranging from Ksh.500 – 100,000. It was estimated that 77% of the respondents were motivated to diversify their means of livelihoods because of the desire for achievement while 64% diversified because of the availability of business opportunities. Furthermore, 59% of the respondents were forced to diversify their means of livelihoods because of the high cost of farming while 58% diversified due to crop and animal diseases.

LPM, logit and probit models indicate that distance to the market is the major determinant of vertical diversification however the models also show that access to loan facilities motivates value addition in agricultural products. The supply of electricity, the size of the farm, and running water are strong indicators of structural diversification. The study further revealed that desire for financial security motivates farmers to practice mixed farming. The research indicates that female farmers are more likely to practice mixed farming than their male counterparts. Running water, farm size, and distance to the market are significant indicators of portfolio diversification. It was also revealed that desire for food security, cost of farming, existence of a business opportunities, access to loan facilities, insurance availability and the desire for social status are strong determinants of portfolio diversification.

The logit model was used to estimate the effects of economic activity diversification on accumulation of physical assets, social capital, and human capital, while OLS and 2SLS methods estimated effects of economic activity diversification on income and employment. The models show that vertical diversification has a strong impact on probabilities of buying land and building permanent houses, while portfolio diversification has a significant influence on farmers buying motor vehicles. It is further revealed that desire for achievement and weather conditions motivate farmers to buy land. On the other hand, desire for food security and independence motivate farmers to build permanent houses.

Marginal effects of the logit model show that SACCO membership is strongly influenced by vertical diversification. The results also indicate that the age of the farmer, the desire for financial security and access to loan facilities motivates farmers to join SACCOs. It is

revealed that women farmers tend to be members of table banking associations. The study establishes that desire for financial security, unfavourable government regulations, desire for social status, and weather conditions motivate farmers to be members of churches. Nevertheless, portfolio diversification reduces the chance of farmers becoming members of the church.

Education predictor model results show that structural and portfolio diversifications have no significant effect on farmers' ability to pay school fees for their dependants as compared to vertical diversification. It is further indicated that access to loan facilities, existence of business opportunities and government regulations have some influence on the farmers' ability to meet education expenses. The health predictor model indicates that structural diversification has an influence on farmers being able to meet their medical bills. It is further revealed that unfavourable government regulations and existence of business opportunities have some effect on the ability of farmers to meet their health expenses.

Income predictor model estimates show that portfolio diversification has a strong impact on labour income of the farmers as compared to vertical and structural diversifications. However, 2SLS estimates reveal that years of schooling, desire for independence and achievement and access to loan have a significant influence on income. Employment predictor model estimates show that vertical diversification has a significant effect on the creation of employment on farms as compared to portfolio and structural diversifications. 2SLS estimates indicate that farmer education and desire for achievement are very important in employment creation in smallholder agriculture.

6.3 Entrepreneurship Implications of the Findings

This study viewed economic activity diversification as an entrepreneurial behavior that leads to better livelihood as stipulated by Markides (1997). The small-scale farmers who diversify their livelihoods through their own volition are perceived to be creative, innovative and risk takers and these are classical elements of entrepreneurship (Casson, 1982 and Hisrich 2008). This study discovered that small scale farmers in Thika area of Kiambu and Murang'a counties were involved in a variety of economic activities and this concurs with Michuki's (2008) findings about rural livelihoods in Kenya. This thesis classified diversification into

vertical, structural and portfolio categories. This was adopted from Carter's (2001) classification of economic activity diversification among farmers in United Kingdom. Vertical diversification is an economic activity whereby farmers are involved in adding value (Schumpeter, 1934) while structural diversification is referred to as mixed farming (Carter, 2001) and portfolio diversification is the undertakings of non-agricultural businesses by farmers (Kirzner, 1985).

The study was largely informed by the Schumpeterian school of thought that describes entrepreneurship as a process of creative destruction whereby new products, new forms of commerce and new teehnology replace the conventional way of doing things. This school of thought qualifies with vertical diversification as an entrepreneurial behaviour among farmers; however very few farmers (6%) were found to be adding value to their produce and those who were adding value were either storing their farm products in granaries, packing, or processing them. Farmers with proper storage facilities are entrepreneurs because they reduce after harvest loss and preserve their produce in order to sell at the right time when the prices are good. Packaging and branding of agricultural products are entrepreneurial marketing decisions that add value to agricultural products by increasing demand of agricultural produce. Drucker (1985) said that entrepreneurs search for change through exploitation of technology; this is applicable to agro-industry where farmers use technology to come up with finished products. My study discovered that only 2% of the farmers interviewed were processing their products. Kenya vision 2030 is advocating for adding value as a national strategy for economic development.

The ability to identify profit opportunities in non-agricultural businesses is referred to as portfolio diversification and fits well in Kirzner's school of thought of entrepreneurship. The study observed that 38% of the respondents were running non-agricultural businesses. This entrepreneurial behavior improved the livelihoods of farmers, and according to the Schumpeterian school of thought, entrepreneurship leads to better livelihoods. This is supported by Ket De Vries (1985) assertion that entrepreneurship is characterized by challenging the status quo or doing something extra-ordinary which improves the livelihood outcomes of people. Rantamaki-Lahtinet (2008) says that there are many resources that

farmers are unable to exploit on their farms; however the study did not investigate the extent to which farmers where able to exploit the resources available on their farms.

It was established that all the small scale farmers are involved in mixed farming where they grow a variety of crops and keep different types of animals. This shows that structural diversification is the norm as almost every farmer is doing the same things. This is what McGrath et al (1992) refer to as a culture of collectivism which is common with non-entrepreneurs. Furthermore, this is a culture of high uncertainty avoidance that leads to low levels of entrepreneurship as people tend to avoid the unknown. The study found that farmers strictly confined in this category did not improve their livelihood outcomes. Michuki (2008) explained that although farmers do a variety of economic activities but livelihood diversification which is survival led, does not lead to better livelihood outcomes. Furthermore, Onduru et al (2002) said that diversification among the small-scale farmers is a survival strategy which might not lead to economic growth. The study revealed that structural diversification is more inclined to a survival strategy since it does not lead to better livelihood. These study findings, concur with Dose's (2007) assertion that structural diversification did not improve the livelihoods of small-scale farmers in the western province of Kenya. Nonetheless, my study shows that structural diversification among small-scale farmers has a strong influence on human capital formation.

This study discovered that farmers with high education levels in non-agricultural businesses had higher incomes than those with low education levels. According to Schultz (1980); Scott and Twommey (1988); McCormick (1996) and Minniti (2007), education is a strong determinant of entrepreneurship. It should be noted that portfolio diversification is the only diversification classification that improved the incomes of farmers, and that education was found to be one of its strong determinants. Access to loans is an important determinant of vertical and portfolio diversification and this is supported by studies of Casson (1982); McCormick (1996) and Minniti (2007) who stated that education is very important in entrepreneurship. My study discovered that electricity is a major factor in vertical diversification, while running water has a strong influence on portfolio diversification and this concurs with Carter's (2001) argument that farm characteristics enhance entrepreneurship among farmers.

Most of the respondents said that they were motivated to diversify because of high need of achievement and desire for independence. This is in agreement with entrepreneurship classical theories of McClelland (1961), McGrath et al (1992) and Hofstede (2001). Rotter (1989) introduced the concept of internal locus of control in entrepreneurship as a driving force for individuals to achieve more, he further states that success or failure depends on an individual. Many respondents said that food, financial and social security also motivated them to diversify their livelihoods. Ket De Vries (1985) explains that the dark side background of entrepreneurs make them feel insecure and therefore work hard to protect themselves against such insecurities. Feminine culture as described by Hofstede (1980) was also observed whereby 90% of the respondents were blaming the government for not doing enough to help them in their problems. This can be interpreted as a dependency syndrome which is a sign of lack of entrepreneurship.

6.4 Conclusion

Most of the small-scale farmers in Thika area are literate and are involved in various economic activities. Half of the farmers have stone houses, and running water. But very few households have electricity on their farms. The farms are relatively small with an average of 1.77 acres and nearly all of the small-scale farmers practice mixed farming, however, a negligible number of the farmers are adding value to their primary agricultural produce. Nevertheless, some farmers are in non-agricultural businesses such as welding, transportation and hairdressing services.

The further the farmers are from the market, the more likely they are to add value to their agricultural produce specifically by storing their products in granaries. However, the larger the farm the higher the chance of a farmer engaging in mixed farming while those with small farms tend to go into non-agricultural businesses. Electricity and running water supply are very important to those who are doing non-agricultural businesses. Farmers tend to go into non-agricultural businesses when they: have access to loan facilities, are highly educated, are able to identify business opportunities in the environment, and are faced with high cost of farming. Desire for food security and social status motivate farmers to engage in non-agricultural businesses. Farmers practicing non-agricultural businesses tend have better

incomes than those specializing in agricultural businesses and they also tend to have higher chances of buying physical assets like cars, land and building permanent houses. Nevertheless, mixed farmers tend to have higher ability to meet their medical expenses than those in portfolio and vertical diversifications. On the other hand, Vertical diversification assists small-scale farmers to become members of social capital like SACCOs, and increases employment in the rural areas. Further, structural diversification among farmers in Thika area, is a survival strategy since it does not lead to better livelihood outcomes of the farmers. Therefore, based on the Schumpeterian entrepreneurship concept, structural diversification is not an entrepreneurial activity. In contrast, portfolio and vertical diversification are entrepreneurial activities as they improve the livelihoods of the small-scale farmers

6.5 Recommendations

The study suggests policies and best management practices that can lead to more entrepreneurial activities and consequently result in better livelihoods among the small-scale farmers.

6.5.1 Policy

The government should provide an enabling environment for small-scale farmers to be more entrepreneurial for better livelihoods. The supply of electricity on farms has an effect on value addition of primary products and therefore, the government should intensify rural electrification programme to motivate more farmers to diversify vertically. Farmers should be encouraged to add value by processing, packaging and branding since value addition is largely limited to storage of farm produce in granaries. Very few farmers are processing and packaging their agricultural produce, therefore, there is limited value addition which minimizes their profit margins. The study established that vertical diversification among farmers is good for employment creation and also helps farmers to become SACCO members. The government should encourage farmers to diversify vertically in order to create employment in the rural areas. Furthermore, the government should invest more in agro-entrepreneurship projects like MSME, ALRMP, EPHTFCP, KAPP and ASAL, because it is through such projects that the farmers will be trained to add value to their agricultural produce and also be sensitized in commercial farming. Research is needed to address the issue of limited agro-entrepreneurship in smallholder agriculture since agriculture is the

backbone of Kenyan economy. Kenya vision 2030 will remain a mirage unless many more farmers participate in agro-industry. All the stake-holders including GoK, FAO, KEPOFA, KFSSF, KENFAP, KAP, DFID, KPCU, KTDA and DIDC take a pro-active role in agricultural research, agricultural policy formulation and implementation for better means of livelihood in smallholder agriculture.

Access to loan facilities is a strong determinant of vertical diversification among farmers; therefore, the government should establish financial institutions which can facilitate small-scale farmers to get loans at subsidized rates in order to encourage them to diversify their livelihoods. Although the government has initiated some institutions such as women and youth development funds; she is yet to establish such initiatives specifically targeting smallholder agriculture. Access to loan facilities assists farmers to improve their livelihood outcomes such as purchasing of land and building of permanent houses. Therefore, the government should establish financial institutions where farmers can access funds to improve their livelihoods. Insurance companies should come up with products to cover insurable risks faced by small scale farmers and aggressively market the products to create more awareness of the benefits the farmers stand to gain. Availability of insurance cover facilitates vertical and portfolio diversification among farmers, therefore, the government should initiate training programmes to sensitize small-scale farmers on the various aspects of risk management to mitigate shocks like droughts, crop failure, crop & animal diseases and floods.

The government should intensify free primary and secondary education by building and equipping more schools, since education was found to have a very significant influence on portfolio diversification among farmers. The study found that the more the farm size reduces, the more likely the farmers go into non-agricultural businesses. Nevertheless, portfolio diversification increases the incomes of farmers better than vertical and structural diversifications. Given that most of the farmers have small farms, the government should start training farmers in entrepreneurship skills in order to sensitize them to venture into viable non-agricultural businesses. There are many valuable resources available on the farms that could be turned into non-agricultural products and services, but farmers seem to be ignorant of these resources amongst them for example, if eco-tourism is fully exploited it can

supplement income of farmer. The Government should come up with water programmes to provide water on the farm since running water is a major factor for portfolio diversification. Nevertheless, portfolio diversification is associated with farmers' ability to meet their medical bills.

The study established that structural diversification among farmers is good for human capital formation. The size of the farm and financial security are strong determinants of mixed farming as the larger the land the more likely farmers are to practice structural diversification and feel financially secure. Therefore the government should discourage partitioning of land in order to allow farmers to produce more food and also be able to act commercially. If possible, big section of land in the rural areas should be set aside for commercial farming as this would ensure food security in the country. Further research should be carried out in different parts of Kenya to identify viable non-agricultural businesses that small scale farmers can undertake to improve their livelihoods. Research should also be done to establish the possibility of merging small farms into larger ones to encourage commercial farming and to assess the sustainability of the livelihoods of smallholder agriculture in Kenya.

6.5.2 Management Practice

Best management practices are effective, practical, structural or nonstructural methods used by farmers to reduce the cost of farming and increase quality and quantity of the agricultural and non-agricultural products for better livelihoods. Structural diversification among small-scale farmers was found not to have significant effect on their livelihoods. This could be an implication that farmers are not using best management practices and they need to be sensitized in planning of their agricultural activities and budgeting for their resources. This would enable mixed farmers to act commercially, which in turn would result into better livelihood outcomes. The small-scale farmers should be sensitized to best management practices. This includes, use modern ways of farming such as ICTs in branding and packaging to reduce the cost of farming and maximizing profits. We are living in the information age therefore; it is a best management practice to make good use of ICTs in economic activities, for example, use of internet to catch up with new method of farming and modern ways of plant and animal diseases control. Furthermore, ICT can be used to ascertain competitive prices and reaching world-wide markets by use of e-commerce. If farmers are

equipped with modern technological skills they will be able to improve the quality and quantity of their agricultural produce as advocated by agro-entrepreneurship and consequently get value for money. Vertical diversification would encourage more farmers to participate in value addition and consequently create employment in the rural areas.

Professional marketing management practices involves coming up with right product, price, place and promotion decisions that is proper marketing mix. Good marketing decisions are part and parcel of best management practices used in managing agricultural and non-agricultural businesses. This ensures efficient and effective flow of goods from the farmers to the consumers. Proper marketing mix dictates that farmers should create awareness of their agricultural and non-agricultural products using the right promotion tools and this can be done in form of advertising, sales promotion, personal selling, public relations or publicity. Through such promotion initiatives products of the farmers will be competitive in the market. Proper storage facilities should be encouraged among farmers in order to reduce post harvest loss. Lack of proper storage facilities force farmers to sell their agricultural produce at throw away prices during a pamper harvest and this makes them vulnerable when the season adversely change. Best management practice demands that small-scale farmers should have proper records of accounts in order to ascertain net profit, gross profit, assets and liabilities of their businesses. Lack of such information amounts to poor management practices. Best management practices for small-scale farmers typically include providing quality agricultural and non-agricultural products, marketing decisive decision-making, and comprehensive strategic planning.

6.6 Limitations of the Study

The research only covered small-scale farmers in Thika area of Kiambu and Murang'a counties and therefore, the results might not be true for small-scale farmers from the other counties in Kenya. The study only looked at the influence of economic activity diversification on livelihood outcomes. It did not investigate livelihood outcomes influencing economic activity diversification. It is possible that livelihood outcome can also influence small-scale farmers to diversify their economic activities. For example if a farmer buys a vehicle it can be used as a taxi business which is a non-agricultural business. In this study it was assumed that economic activity diversification is an indication of risk taking which

essentially is a trait of entrepreneurs. However, economic activity diversification may be motivated by the need to avoid risk. This research did not go into the issue of risk-aversion. The study relied on the subjective answers given by the respondents about entrepreneurship, therefore, a study based on objective measures is recommended.

6.7 Suggestion for Further Research

It is suggested that an investigation into the influence of livelihood outcome on the economic activity diversification among small-scale farmers be carried out. A research should be carried out to find out the extent to which small-scale farmers are risk averse. A study should be carried out using objective measures to establish the influence of economic activity diversification on livelihood.

REFERENCES

Aina, L. G. (2007). "Globalization and Small-scale Framing in Africa: What Role for Information Centres?" *World Library and Information Congress: 73rd IFLA General Conference and Council,* Durban, South Africa, pp. 1 – 8. Retrieved on January 7, 2009 from: http://www.ifla.org/iv/ifla73/index.htm

Aliber, M., Walker, C., Machera, M., Kamau, P., Omondi, C. and Kanyinga, K. (2004). "The Impact of HIV/AIDS on Land Rights: Case Studies from Kenya." *Human Sciences Research Council (HSRC),* Published by HSRC Publishers, South Africa / Nexus.

Alila, P. O. and Atieno R. (2006). "Agricultural Policy in Kenya: Issues and Processes." Future Agricultures, *A paper for the Future Agricultures Consortium workshop*, Institute of Development Studies, 20-22 March.

Allen K. R. (2010), *New Venture,* South – Western, New York

Babu, M. (2003). *The Many Models of Entrepreneurship*, Mumbai, India: Indian Express Group, pp. 1 – 3.

Barnett, C. G. (1993). "Defining Entrepreneurship," *Paper delivered at the 7th annual conference of small business,* Southern Africa.

Barret, C., Reardon, T. and Webb P. (2001). "Non-farm income diversification and household livelihood strategies in rural Africa: concepts, dynamics, and policy implications." *Food Policy,* Vol. 26, Issue No. 4, August, pp 315-331.

Barringer, B. and Ireland D. (2008). *Entrepreneurship: Successfully Launching New Ventures*, 2nd Edition, Pearson Prentice Hall.

Birley, S. (1997). *Entrepreneurship in the Global Context.* London: Routledge 1st edition.

Block, S. and Webb P. (2001). "The Dynamics of Livelihood Diversification in Post-famine Ethiopia", *Food Policy*, Vol. 26, Issue No. 4, August, pp 333 – 350.

Boli, R. (2005). "Livelihood Assets of Rural Kenyans." Senior Seminar in International Development Studies (IDS) Final Paper, Menno Simons College Affiliated with University of Winnipeg.

Brock, W.A. and Evans, D.S. (1989), "Small Business Economics", *Small Business Economics,* Vol. 1, Issue 1, pp 7-20

Brodbeck, M. (1968). *Readings in Philosophy of Social Sciences.* New York: The McMillan Company.

Bryceson, D. (2000). "Rural Africa at The Crossroads: Livelihood Practices and Policies." *Natural Resource Perspectives* Number 52. ODI. Retrieved on March 30, 2008, from: http://www.odi.org.uk/nrp/52.htm.

Butler, L. M. and Mazur, R. E. (2007). "Principles and processes for enhancing sustainable rural livelihoods: Collaborative learning in Uganda." *International Journal of Sustainable Development and World Ecology.* Vol. 14, Issue No. 6, December, pp 604 - 617.

Byrd M. J. and Megginson L. C. (2009) *Small Business Management,* An Entrepreneur's Guidebook, McGraw Hill, New York.

Cameron, S. (2005), *Econometrics,* London: McGraw Hill Education

Cantillon, R. (1931). *Essay on the Nature of Trade in General*, London : Macmillan & Co., .Ltd.

Carter, S. (1999). "Multiple Business Ownership in the Firm Sector: Assessing the Enterprise and Employment Contributions of Farmers in Cambridgeshire." *Journal of Rural Studies,* Vol. 15, Issue 4, October 1999, pp 417 – 429.

Carter, S. (2001). "Multiple Business Ownership in the Firm Sector: Differentiating Monoactive, Diversified and Portfolio enterprises." *International Journal of Entrepreneurial behaviour and Research,* Emerald Publishing Ltd, Vol. 7, Issue 2, pp 43 – 59.

Casson, M., (1982). *The Entrepreneur*: *An Economic Theory.* Oxford: Martin Robertson.

CEC [Commission of the European Communities] (2005a). "Cohesion Policy in Support of Growth and Jobs: Community Strategic Guidelines." 2007-2013. Brussels.

CEC [Commission of the European Communities] (2005b). "Working Together for Growth and Jobs; a New Start for the Lisbon Strategy." Brussels..

Chambers, R. and Conway, G. (1991). "Sustainable Rural Livelihoods: Practical Concepts for 21st Century." *IDS Discussion Paper 296*, IDS, Brighton.

Chapman, R. and Tripp, R. (2004). "Background Paper on Rural Livelihood Diversity and Agriculture." *Paper prepared for the 2004 AgREN electronic conference* on the Implications of Rural Livelihood Diversity for Pro-poor Agricultural Initiatives.

Deakins, D. and Freel, M. (2003). *Entrepreneurship and Small Firms Edition.* , New York: McGraw Hill Education.

DFID, (1999). "Sustainable Livelihoods Guidance Sheets." London, Department for International Development (UK), 1999–2005. Retrieved on March 13, 2011 from: http://www.livelihoods.org/info/info_guidancesheets.html.

Djankov, S., Miguel, E., Yingyi Qian, Gérard Roland & Ekaterina Zhuravskaya, (2005). "Who are Russia's Entrepreneurs?" *Journal of the European Economic Association,* Vol. 3, Issue 2-3, pp 587-597.

Dose, H. (2007). "Securing Household Income among Small-scale Farmers in Kakamega District: Possibilities and Limitations of Diversification." *GIGA Working Paper Series 41*, GIGA German Institute of Global Area Studies.

Drucker, P. F. (1994). *Innovation and entrepreneurship*: *Practice and principles*, Oxford: Butterworth Heineman Ltd.

Eggleston, K., Jensen, R. and Zeckhauser, R. (2002). "Information and Communication Technologies, Markets, and Economic Development." Working paper, Tufts University, Department of Economics, Medford, Mass.

Ellis, F. and Mdoe, N (2003). "Livelihoods and rural poverty reduction in Tanzania." *World Development* Vol. 31, Issue 8, pp 1367-1384.

Ellis, F. (1998). "Household Strategies and Rural Livelihood Diversification." *Journal of Development Studies*; Vol. 35 Issue 1, pp 1-38.

Ellis, F. (1999). "Rural Livelihood Diversity in Developing Countries: Evidence and Policy Implications." *Natural Resource Perspectives* Number 40, ODI. Retrieved on June 8, 2011 from: http://www.odi.org.uk/nrp/40.html.

FAO (2002). "Promoting farm/non-farm linkages for rural development: Case Studies from Africa and Latin America." Food and Agriculture Organization of the United Nations, ROME.

Fouracre, P. (2001). "Transport and Sustainable Rural Livelihoods", *Rural Travel and Transport Program.* Vol. 5, Issue 3a, pp 1 – 9.

Giddens, A. and Griffiths S. (2006). *Sociology.* 5th Edition, Cambridge: Polity Press .

Haggblade, S. & Hazell, P. (1989). "Agricultural technology and farm/non-farm growth linkages." *Agricultural Economics*, Vol. 3, pp 345-364.

Hirschman, A. (1988). "Entrepreneurship and Innovation: The Impact of Venture Capital in the Development of New Enterprise." *The Journal of Economic History*. Vol. 48, Issue 1, March, p. 241.

Hisrich, R. D., and Peters, M. P. (1998). *Entrepreneurship.* 4th ed., Boston: Irwin / McGraw Hill.

Hisrich, R. D., Peters, M. P. and Shepherd, D. A. (2008). *Entrepreneurship,* 9th ed., Boston: McGraw Hill.

Hofstede, G. (1980). *Culture's Consequences: International Differences in Work-related Values,* Beverly Hills, CA.: Sage Publications

Hoof, L. (27 August 2007). "Kakuzi is the largest avocado exporter in Kenya". Retrieved October 23, 2011 from: http://www.freshplaza.com/news_detail.asp?id=6458.

Hoogland, M. and Holen, P. (2005). *Granaries*, Wageningen: Agromisa Foundation.

IFAD (2001). *The Challenge of ending rural poverty: Rural Poverty Report*. Oxford: Oxford University Press.

Jaffee, S. & Morton, J. (1994). "Africa's agro-entrepreneurs: private-sector processing and marketing of high-value foods." *AFTES Working Paper,* Washington DC, World Bank Environmentally Sustainable Development Division. No.15.

Jennings, D. F. (1994). "Multiple Perspectives on Entrepreneurship: Text, Readings and Cases. Cincinatti", OH: Southwestern Publishing Company.

Kagira, K. F., (2007). "Modeling the influence of land use changes on water and sediment yield in the Thika river catchment using SWAT model." *MSc* Jomo Kenyatta University of Agriculture and Technology, Kenya.

Kapp, J. (2003). "A Psychological Model of Entrepreneurial Behaviour," *Journal of Business and Economics.* Vol. 2, Issue 2, pp 1-11.

Karanja, M. (2009). "Kenyan economy diversifies". *Butterfly Freedom,* Retrieved on February 2, 2010 from: www.butterfly.co.ke/news/business/kenyan-economy-diversifies.

Karugia, J. T., Oluoch-Kosura W., Nyikal R., Odumbe M., Marenya and Paswell P. (2006). "Access to Land Income Diversification and Poverty Reductions in Rural Kenya". Paper provided by International Association of Agricultural Economists in its series 2006 Annual Meeting, August 12-18, 2006, Queensland, Australia with number 25488.

Kauffman, C. (2005). "Financing SMEs in Africa." *Policy insights* No. 7, may 2005. Retrieved on February 16, 2010, from: www.OECD.rg/dev.insights .

Kenny, C. (2002). "Information and Communication Technologies for Poverty Alleviation: Costs and Benefits Development Policy Review ." *Kenya, Republic of National Development plan (2002-2008)*, Nairobi: Government printer.

Kenya Vision 2030 (2007). "A Globally Competitive and Prosperous Kenya". Nairobi: Government printer.

Kets de Vries, M. (1985). "The Dark Side of Entrepreneurship." *Harvard Business Review,* Nov-Dec. Vol. 85, Issue 6, pp 160 – 167.

Khauka S. S. (2012) *Entrepreneurial Development.* S. Chanda & Co. Ltd, New Delhi

Kibwage, J. K., Odondo A. J. and Momanyi, G. M. (2009) "Assessment of livelihood assets and strategies among tobacco and non tobacco growing households in south Nyanza region, Kenya." *African Journal of Agricultural Research* Vol. 4, Issue 4, April, pp. 294-304.

Kilby, P., (1971) *Entrepreneurship and Economic Development,* New York: The Free Press.

Kimenye, L.N. (1995). "Kenya's experience in promoting smallholder production of flowers and vegetables for European markets." *African Rural and Urban Studies*, Vol. 2, Issue No. 2-3, pp 121-141.

Kimenyi, M. S., Mwabu, G., and Manda D. K. (2006). "Human Capital Externalities and Private Returns to Education in Kenya." *Eastern Economic Journal,* Vol. 32, Issue No. 3, Summer 2006.

Kinyanjui, F. K. (2007). "Causes of Persistent Rural Poverty in Thika District of Kenya c.1953-2000." *A Thesis* Submitted in Fulfilment of the Requirements of the Degree of Doctor of Philosophy of Rhodes University.

Kirzner, I. M. (1985). *Discovery and Capitalist Process.* Chicago: University of Chicago Press.

Knight, F. H. (1971). *Risk, Uncertainty and Profit.* G. J. Stigler (Ed.), Chicago: University of Chicago Press.

Kuratto F. D. and Hodgetts R. M. (2007) *Entrepreneurship in the New Millennium.* South Western, Cengage Learning, USA.

Lanjouw, J.O. & Lanjouw, P. (1995). "Rural non-farm employment: a survey." Washington DC, World Bank. *Policy Research Working Paper*, No. 1 463.

Lewis, L., Onsongo M., Njapau H., Schurz-Rogers H., Luber G., Kieszak S., Nyamongo J., Backer L., Dahiye A. M., Misore A., DeCock K., Rubin C., and the Kenya Aflatoxicosis Investigation Group (2005). "Aflatoxin Contamination of Commercial Maize Products during an Outbreak of Acute Aflatoxicosis in Eastern and Central Kenya." *Environmental Health Perspectives,* Vol. 113, Issue No.12, December, pp 1763 - 1767.

Litondo, K. O. (2010). "Mobile Phones and E-Commerce among Micro and Small Enterprises in the Informal Sector: An Empirical Investigation of Entrepreneurship in Nairobi." Unpublished PhD *Thesis.* School of Business, University of Nairobi.

Little, P. D. (2001). "Income Diversification among East African Pastoralists", Research Brief: 01-08-PARIMA. California: Global Livestock-Collaborative Research Support Program (GL-CRSP), University of California.

Local Council of Thika Website (2008). "Municipal Council of Thika." *Melting Pot Publications Ltd.* Copyright © 2008 – 2011. Retrieved on July 2, 2010, from: http://web.thikamunicipal.com/index.php/about-thika/background-information.

Makaya, Z. (2007). "Eradicating Poverty; My Senegal Experience:" *Sustainable Agriculture Magazine*. A SACDEP-KENYA MAGAZINE "Issue" No. 5 March, 2007, pp. 4.

Macke, D. & Markley, D. (2003). "Readiness For Entrepreneurship: Tools For Energizing Entrepreneurship" *Centre for Rural Entrepreneurship.* Retrieved on April 20, 2007 from: http://www.tvaed.com/pdf/readiness_entreneurship.pdf.

Markides, C. (1997). "Diversification and Organizational Structure." *Resource – Based View. The Academy of Management* Journal, No. 39, pp. 340 – 367.

Markides, C. (1997). "To Diversify or Not to Identify". *Harvard Business Review*, November - December, pp 93 – 99.

Marshall, A. (1930). *Principles of Economics.* London: Macmillan and Company.

Maslow, A. (1994). *Further Reaches of Human Nature.* New York: Arkana, New Ed edition

Mburu, P. T., Massimos K. (2005). "A comparative study of Marketing: Problems faced by small-scale farmers in Botswana and Kenya. Is there Away Out?" *Journal of Applied Science,* Vol. 5, Issue 6, pp 113 – 114.

McClelland, D. (1961). *The Achieving Society,* Princeton, NJ: Van Nostrand Co.

McCormick, D. (1996). "Enterprise Clusters in Africa: From Collective Efficiency to Industrialization." *Report prepared as part of a research project on collective efficiency and small enterprises in Kenya*: University of Nairobi; Institute for Development Studies.

McGrath, R.G., I.C. MacMillan, E. Ai-Yuan Yang & W. Tsai (1992). Does Culture Endure, Or Is It Malleable? Issues for Entrepreneurial Economic Development, *Journal of Business Venturing,* Vol. 7, pp 441-458.

McGrath, R.G., MacMillan I.C., and Scheinberg S. (1992). "Elitists, Risk-Takers, and Rugged Individualists? An Exploratory Analysis of Cultural Differences between Entrepreneurs and Non-Entrepreneurs," *Journal of Business Venturing,* Vol. 7, pp. 115-132.

Mckenzie, D. and Sakho, Y. S. (2007). "Does it Pay Firms to Register for Taxes? The Impact of Formality on Firm Profitability." *Policy Research Paper 449,* The World Bank, Development Research Group, Finance and Private Sector Team, December 2007.

McQuaid, R.W. (2002). "Entrepreneurship and ICT Industries: Support from Regional and Local Policies." *Regional Studies*, Vol. 8, Issue No. 36, pp. 909-919.

McQuaid, R.W. (2002). "Social Entrepreneurship and Public Private Partnerships." Montanheiro, L., Berger, S. and Skomsoy, G. (eds), *Public and Private Sector Partnerships – Exploring Co-operation.* (Sheffield Hallam University Press, Sheffield) pp. 291-300.

Michuki, G. (2008). "Trapped in subsistence? A study of poor rural livelihoods in Kenya with a focus on non-agricultural activities". A doctoral dissertation, University of Leipzig.

Ministry of Agriculture, Livestock Development and Marketing. (1996). "Kenya: agriculture strategy for agricultural growth." Government Printers – Nairobi.

Minniti, M., and Nardone, C., (2007). "Being in Someone Else's Shoes: Gender and Nascent Entrepreneurship" *Small business economics Journal*, Vol. 28, Issue 2-3 March, pp 223 – 238.

Minniti, M. (2004). "Characteristics of the Entrepreneur, Global Entrepreneurship Monitor" *(GEM)*. Retrieved on May 3, 2010, from: http://www.gemconsortium.org:

Mintzberg, H. (1980), *The nature of managerial work, Theory of management policy series.* Prentice-Hall, USA.

Mureith, J.G, Mwaura P.M. and Nekesa, C.O. (2002). "Introduction of Legume Cover Crops to smallholder farms in Gatanga ." Central Kenya.

Ndemo, B. (2005). "Maasai Entrepreneurship and Change." *The Journal of Small Business and Entrepreneurship*, Vol. 18, Issue 2, pp 83-94.

Nduguti, S. W. (2007). "Determinants of performance of micro and small poultry enterprises in Thika District." MSc, Jomo Kenyatta University of Agriculture and Technology, Kenya.

Nee, V. and Young, F.W. (1991). "Peasant Entrepreneurs in China's 'Second Economy'." An Institutional Analysis, *Economic Development and Cultural Change*, Vol. 39, issue No. 2, pp. 293-310.

North, D. C. (1991). "Institutions", *Journal of Economic Perspectives,* Vol. 5, Issue 1, pp 97 – 112.

Nzioka, S. M. (2009). "Economic Efficiency Analysis of Banana Farmers in Kiambu East District of Kenya: Technical Inefficiency and Marketing Efficiency." *Journal of Developments in Sustainable Agriculture*, Vol. 4, Issue 2, pp 118 -127.

Oberthur, T., Aliguma, L., Biryahwaho, B., Kuria, D., Jarvis, A., Anyona, S.G., Njeri, R., Kamau, S., and Kinyanjui, N. (2009). "Markets For Eco-agriculture In East Africa, With Focus On Kijabe, Kayunga And Kisoro Landscapes." *Eco-agriculture Partners.*

Ochango, O. (2007). "Small Scale Farmers: Key to African's Future". *The African Executive,* pp 1-2.

OECD (2003). "Entrepreneurship and Local Economic Development." *Programme and Policy Recommendations*, OECD, Paris.

OECD, (1999). "Best Practice Policies for Small and Medium-Sized Enterprises" *In ADB/TA 3150-PRC: A Study on Ways to Support Poverty Reduction Projects, Final Report, October 2000* (pp16).

Onduru, D. D., Gachimbi, L., Maina, F., Muchena, F.N., and Jager, A. de (2002). "Sustaining agricultural production in the semi-arid areas of Eastern Kenya: A case study of Mbeere District." *INMASP Report* No. Ke-03. ETC-East Africa and KARI (NARL), Nairobi, and LEI- DLO. The Netherlands.

Organization for Economic Cooperation and Development (OECD), (1998a). "Fostering Entrepreneurship." *The OECD Jobs Strategy*, Paris: OECD.

Orr, A. and Orr, S. (2002). "Agriculture and Micro Enterprise in Malawi's Rural South". Agricultural Research & Extension Network, Network Paper, No. 119.

Pascotto, S. (2006). "Labour Organization and Economical Aspects with On-farm Diversifying Households; some evidence from Italian Alpine Areas", *International Journal of Rural Management,* Vol. 2, Issue 1, pp 1-28.

Rantamaki-Lahtinen (2008). "Turning Rural Potential into Success: Farm Diversification from Resource-Based Viewpoint. Retrieved on November 22, 2009, from: www.ruralfutureconference.org/2008/Rantimaki-Lahtinem.pdf.

Reardon, T. (1997). "Using evidence of household income diversification to inform study of the rural non-farm labour market in Africa." *World Development*, Vol. 25, Issue No. 5, pp 735-747.

Republic of Kenya (2005). "Millennium Development Goals in Kenya." *Report by Ministry of Planning and National Development,* Courtesy of the UNDP, Kenya, and the Government of Finland.

Republic of Kenya (2005 – 2010). "Thika District Strategic Plan." Published by: National Coordination Agency for Population and Development, Ministry of Planning and National Development.

Republic of Kenya, (2007). "Kenya Vision 2030." The National Economic and Social Council of Kenya (NESC) and Ministry of Planning and National Development, Published by Government printers.

Republic of Kenya (2008). "Feasibility Study on Small Hydropower Project For 12 Sites For Tea Factories in Kenya". *Ministry of Energy Report,* Supporting Report (3), (Environmental Impacts Assessments) Volume IV. Rpt No. 08-04.

Republic of Kenya (2010). "Environmental and Social Impact Assessment." *Study Report* For the Proposed Kilimambogo – Thika – Githambo – Kiganjo (Nyeri) and Thikakiganjo (Gatundu) 132 Kv Transmission Lines and Associated Substations Ministry of Energy.

Rotter, J. B. (1989). "Internal versus External Control of Reinforcement: A Case History of a Variable." *American Psychologist*, Vol.45, Issue 4, pp 489 - 493.

Rurigi, J. K., (2007). "Effects of the agronomic, financial and records management and their impact on the growth of the small scale coffee farmers in Kenya: a case study of Thika District." *MSc* Jomo Kenyatta University of Agriculture and Technology, Kenya.

Rwigema V. U. (2011) *Entrepreneurship: Theory in Practice,* Oxford University Press, Cape Town - Southern Africa

Saleemi N. A. (2011) *Entrepreneurship Simplified.* Saleemi Publications Ltd, Nairobi – Kenya

Saleemi N. A. (2011) *How to Become an Entrepreneur.* Saleemi Publications Ltd, Nairobi – Kenya

Sarkar, S. (2005). "Women as Paid Domestic Workers", *Journal of Social Sciences.*, Vol.11, Issue1 1, pp 35-41.

Say, J. B. (1971). *A Treatise on Political Economy or the Distribution and Consumption of Wealth,* New York: A. M. Kelly Publishers.

Schultz, T. W. (1980). "Investing in Entrepreneurial Ability," *The Scandinavian Journal of Economics*, Vol. 82, Issue 4, pp. 437- 448.

Schumpeter, J. (1934). *The Theory of Economic Development.* Cambridge, Mass.: Harvard University Press.

Scott, M. G. and D. F. Twomey (1988). "The long-term Supply of Entrepreneurs: Students' Career Aspirations in Relation to Entrepreneurship", *Journal of Small Business Management,* Vol. 26, Issue 4, pp 1 – 13.

Southerland, W. L. (2000). *The conservation handbook: Research, Management and Policy*, Conwall: TJ International Ltd, Padstow.

Sproull, N. L. (1995). *Handbook of Research Methods: Guide for Practitioners and Students in Social Sciences.* 2nd Edition Metuchen, New Jersey; Scarecrow.

Streeter, D.H., Jaquette Jr., J.P. and Hovis, K., (2002). "University-wide Entrepreneurship and Education: Alternative Models and Current Trends." Cornell University Working Paper, No. 2.

TechnoServe (1997). "Delivery of non-financial services to micro and small enterprises in Nairobi, Kenya." *Paper for workshop* at Barclays Bank Staff Training Centre, Karen, Nairobi, Kenya, May.

Terichow, G. (2009). "Climate change affecting small-scale farmers in Kenya". Mennonite Central Committee (MCC).

Thika District Strategic Plan (2008-2010). "Thika District Strategic Plan 2005-2010 for Implementation of the National Population Policy for Sustainable Development." National Coordination Agency for Population and Development, Ministry of Planning and National Development.

Timmons, J. A. and Spinelli S. (2007). *New Venture Creation: Entrepreneurship for the 21st Century.* New York: McGraw Hill, Seventh Edition.

Torkko, M. (2006). "Maatilakytkentaisten yritysten toimintamalleja: laadullinen tutkimus resursseista, kehittymisesta ja ohjaustarpeista." Oulu: Oulun yliopisto. Acta Universitatis Ouluensis. p. 239, In Finnish.

Tschirley, D. L. and Benfica R. (2001). "Smallholder agriculture, wage labour and rural poverty alleviation in land-abundant areas of Africa; evidence from Mozambique." *The journal of Modern African studies,* No. 39. pp. 333-358.

USAID Kenya (2003). "Kenya BDS Tree Fruits Sub-Sector." *Baseline Survey Report.* Kenya BDS, USAID Kenya Business Development Services Program.

USAID Kenya (2008). "Update On Kenyan Horticulture." *Kenya Horticultural Development Program,* Monthly Update — March.

Veciana, J. M. and Urbano, D. (2008). "The Institutional Approach to Entrepreneurship Research. Introduction." *International Entrepreneurship and Management Journal.* Vol. 4, pp 365 – 379.

Waikwa, S. W. (1998). "Kenyan farmers on the treadmill - liberalization threatens food security and sustainable farming." *Pesticides News,* No. 43, March 1999, pp. 10-11

Wasserman, A. (2008). "Small Grower in Michigan Finds New Path to Bigger Profits." Rodale Institute, pp. 1-2

Weber, M. (1930). *The Protestant Ethic and the Spirit of Capitalism.* New York, Scribner

Webster, A. L. (1995). *Applied statistics for Business and Economics.* 2nd Edition Irwin, USA

World Bank. (1994). *Employment Growth for Poverty Alleviation.* Washington DC, World Bank.

Zimmerer T. W. & Scarborough N. M., with Daug W. (2008) *Essentials of Entrepreneurship and Small Business Management.* Pearson Education, Upper Saddle River New Jersey, USA.

APPENDICES

Appendix I: Questionnaire

General Information

a) Serial No. _____

b) District _____

c) Interviewer _____

d) Date _____

Section A. General Information about the Farm and Farmer

1. Location _____
2. How big is your farm? Below 1 acre [ ] 1 – 4 acres [ ] 5 – 10 acres Above 10 acres [ ]
3. How long have you been farming? _____
4. How many employees do you have in your farm? _____
5. What type of housing do you have? Permanent [ ] Semi-permanent [ ] Temporary [ ]
6. What economic activities are you engaged in?

   Subsistence farming [ ] Commercial farming [ ] Non-agricultural business [ ]
7. Do you have running water or Tap water? Yes [ ] No [ ]
8. Do you use electricity in your farm? Yes [ ] No [ ]
9. What is your level of education?

   Primary [ ] Secondary [ ] Post secondary [ ] None of the above [ ]
10. What is your profession? _____
11. Gender? Male [ ] Female [ ]
12. Marital status? Married [ ] Single [ ]
13. How old are you? _____ years
14. Have you diversified your economic activities? Yes [ ] No [ ]

Section B: Portfolio, Vertical and Structural Diversification

15. a) Do you have non-agricultural businesses? (Portfolio Diversification) Yes [ ] No [ ]

b) If Yes, Please state the type of non-agricultural businesses _____

_____

16. a) Have you added value to your farm produce? (Vertical Diversification) Yes [ ] No [ ]

b) If Yes,

i. Do you process your products? Yes [ ] No [ ]

If Yes, Specify _____

ii. Do you package your products? Yes [ ] No [ ]

iii. Have you branded your products? Yes [ ] No [ ]

iv. Do you have storage facilities for your products? Yes [ ] No [ ]

17. Do you practice mixed farming? (Structural Diversification) Yes [ ] No [ ]

i. Indicate the crops you grow for income _____

_____

ii. Indicate the animals you keep for income _____

_____

18. Which of the following motivated you to do a variety of economic activities?

	[Yes]	[No]
a. Identification of business opportunity	[ ]	[ ]
b. Need for independence	[ ]	[ ]
c. Desire for high achievement	[ ]	[ ]
d. Desire for financial security	[ ]	[ ]
e. Desire for social status	[ ]	[ ]
f. Desire for food security	[ ]	[ ]
g. Threat to employments	[ ]	[ ]
h. Frustration	[ ]	[ ]
i. Hobby	[ ]	[ ]
j. Unemployment	[ ]	[ ]
k. Influence of relatives	[ ]	[ ]

l. If any other, please specify _____

Section C: Policies & Environmental Factors

19. Which of the following factors motivated you to do a variety of economic activities?

	[Yes]	[No]
a. Weather conditions	[ ]	[ ]
b. Crop diseases	[ ]	[ ]
c. Competition	[ ]	[ ]
d. Increased cost of farming	[ ]	[ ]

e. If any other, please specify _____

20. Which of the following affect your economic activities?

	[Yes]	[No]
a. Price control	[ ]	[ ]
b. Input costs	[ ]	[ ]
c. Input regulations	[ ]	[ ]
d. Agricultural services	[ ]	[ ]
e. Risk insurance	[ ]	[ ]

f. If any others, specify _____

_____

21. How far is the nearest market place from your farm? _____ km

22. Do you use banking services Yes [ ] No [ ]

23. If yes, indicate the type of services you get from your bank

Mobile phone banking services [ ] saving [ ] borrowing [ ] Financial advice [ ] Paying of bills [ ]

If any other, specify _____

_____

24. How far is the nearest bank from your farm _____km

25. How far is the nearest tarmac road from your farm _____km

26. Are the businesses in your vicinity similar to yours? Yes [ ] No [ ]

Section D: Livelihood Outcomes

27. Indicate whether (Yes or No) the variety of economic activities helped you to have access to the following items.

Physical assets	**[Yes]**	**[No]**
a. Land	[ ]	[ ]
b. Permanent house	[ ]	[ ]
c. Domestic animals	[ ]	[ ]
d. Television Set	[ ]	[ ]
e. Motor vehicle	[ ]	[ ]
f. If any other, please specify _____		

Social Capital	**[Yes]**	**[No]**
a. SACCO memberships	[ ]	[ ]
b. Church memberships	[ ]	[ ]
c. Table banking	[ ]	[ ]
d. Associations like merry-go-round	[ ]	[ ]

Human capital		
a. Educate your dependants/children	[ ]	[ ]
b. Meet your health expenditure	[ ]	[ ]
c. Meet your entertainment expenditure	[ ]	[ ]

28. On average what is your income per month .....KES per month

Appendix II: Additional Results

Table 5.4a(i): The Effect of Endogenous Diversification on Physical Assets LM Estimates (Absolute z - Statistics in parentheses)

Variables	Livelihood Outcome					
	Land		Permanent House		Vehicles	
	Logistic regression parameters		Logistic regression parameters		Logistic regression parameters	
Type of Diversification						
Observed Vertical diversification (x 10)	.16299 (3.58)	.09430 (1.86)	.06226 (1.44)	.02470 (0.51)	.11214 (2.17)	-.00227 (0.04)
Observed Portfolio diversification (x 10)	.10870 (4.38)	.05345 (1.69)	.06792 (3.11)	.04026 (1.43)	.19249 (4.85)	.09208 (1.80)
Personal and social characteristics						
Years of schooling		.00513 (1.32)		.00400 (1.15)		.01260 (1.91)
Gender (1 = male)		.00164 (0.06)		.00098 (0.04)		-.04600 (1.09)
Age		.00221 (1.77)		.00205 (1.94)		.00126 (0.59)
Motivating factors (dummies)						
Desire for financial security		.00715 (0.08)		-.03924 (0.67)		
Desire for food security		.02458 (0.30)		.05006 (0.85)		-.10976 (1.10)
Cost of farming		.03535 (1.17)		-.06144 (2.31)		-.00546 (0.11)
Unfavourable government regulations		.01956 (0.63)		.05122 (1.82)		.07409 (1.47)
Access to loan		.08300 (2.71)		.07651 (2.79)		.14290 (2.76)
Insurance availability		-.01081 (0.35)		-.06581 (2.23)		.08822 (1.90)
Existence of business opportunity		.01290 (0.37)		.05020 (1.62)		.14656 (1.80)
Desire for independence		.03442 (0.80)		.12062 (3.01)		.02892 (0.39)
Desire for achievement		.00148 (0.03)		-.03031 (0.72)		-.16044 (1.86)
Desire for social status		.07336 (1.92)		.05506 (1.70)		.00466 (0.06)
Weather conditions (1 = weather)		.18693 (2.36)		-.03508 (0.85)		-.03039 (0.40)
Constant	-.01720 (9.60)	-.66464 (4.49)	-.08481 (6.00)	-.33543 (3.58)	-.33308 (9.66)	-.46601 (2.47)
Pseudo R^2	0.0829	0.1709	0.0252	0.1242	0.1359	0.2937
F-Statistics (p-value)	36.00 (0.0000)	74.21 (0.0000)	12.88 (0.0016)	63.45 (0.0000)	35.59 (0.0000)	75.19 (0.0000)
Observations	388	388	388	388	388	388

Source: Own estimates

Table 5.4b(i): The Effect of Exogenous Diversification on Physical Assets

LM Estimates

(Absolute z - Statistics in parentheses)

Variables	Livelihood Outcome					
	Land		Permanent House		Vehicles	
	Logistic regression parameters		Logistic regression parameters		Logistic regression parameters	
Type of Diversification						
Predicted Vertical diversification (x 10)	.50383 (4.00)	.80082 (3.72)	.36978 (3.29)	.55048 (2.89)	.30648 (1.81)	.35107 (1.19)
Predicted Portfolio diversification (x 10)	.18298 (3.57)	.49344 (3.22)	.05991 (1.39)	.14472 (1.12)	.42331 (5.40)	.71394 (3.00)
Personal and social characteristics						
Years of schooling		-.00408 (0.75)		.00341 (0.72)		-.00243 (0.27)
Gender (1 = male)		-.04942 (1.52)		-.01809 (0.64)		-.10627 (2.17)
Age		.00470 (3.15)		.00302 (2.44)		.00464 (1.78)
Motivating factors (dummies)						
Desire for financial security		.03856 (0.43)		-.04492 (0.75)		
Desire for food security		.20813 (2.14)		.13739 (1.77)		.13458 (1.02)
Cost of farming		-.08767 (1.90)		-.11478 (2.92)		-.13916 (1.93)
Unfavourable government Regulations		.02276 (0.70)		.04165 (1.43)		.09301 (1.75)
Access to loan		-.08027 (1.50)		-.00837 (0.18)		-.01170 (0.14)
Insurance availability		-.07815 (2.11)		-.09941 (2.97)		.02188 (0.41)
Existence of business opportunity		-.06585 (1.54)		.01970 (0.53)		.06252 (0.69)
Desire for independence		-.03334 (0.70)		.08710 (2.00)		-.03424 (0.43)
Desire for achievement		.11054 (1.83)		.01253 (0.25)		-.03930 (0.40)
Desire for social status		-.05353 (1.00)		.01608 (0.35)		-.14143 (1.51)
Weather conditions (1 = weather)		.13035 (1.62)		-.05111 (1.17)		-.11223 (1.37)
Constant	-.23073 (9.22)	-.79260 (5.19)	-.10204 (5.53)	-.38648 (3.75)	-.46727 (9.44)	-.64175 (3.15)
Pseudo R^2	0.1414	0.1995	0.0477	0.1372	0.2514	0.3210
χ^2-*Statistics (p-value)*	61.41 (0.0000)	86.63 (0.0000)	24.38 (0.0000)	70.09 (0.0000)	65.81 (0.0000)	82.18 (0.0000)
Observations	388	388	388	388	388	388

Source: Own estimates

Table 5.5a(i): The Effect of Endogenous Diversification on Social Capital, LM Estimates

(Absolute z - Statistics in parentheses)

Variables	Livelihood Outcome					
	SACCO Membership		Table Banking		Church Membership	
	Logistic regression parameters		Logistic regression parameters		Logistic regression parameters	
Type of Diversification						
Observed vertical diversification (x 10)	.15567 (2.78)	.08089 (1.32)	.25535 (3.42)	.21988 (2.56)	-.02330 (0.50)	-.02089 (0.38)
Observed portfolio diversification (x 10)	.00404 (0.19)	-.03385 (1.09)	.01562 (0.72)	-.03259 (1.11)	-.09016 (3.76)	-.05651 (1.67)
Personal and social characteristics						
Years of schooling		.00303 (0.82)		.00359 (1.03)		-.01497 (3.39)
Gender (1 = male)		.02730 (1.04)		-.04861 (1.88)		-.00908 (0.31)
Age		.00342 (3.11)		-.00024 (0.23)		.00014 (0.11)
Motivating factors (dummies)						
Desire for financial security		.19695 (2.98)		-.00195 (0.03)		.17823 (2.89)
Desire for food security		-.06640 (1.04)		.08313 (1.17)		-.00574 (0.09)
Cost of farming		.08898 (3.23)		.08828 (3.36)		-.09743 (2.93)
Unfavourable government Regulations		.05073 (1.71)		.06848 (2.50)		.13792 (4.09)
Access to loan		.17433 (5.55)		.08903 (3.15)		.00642 (0.19)
Insurance availability		-.03289 (1.04)		.01766 (0.60)		.03152 (0.89)
Existence of business opportunity		-.00084 (0.03)		.02799 (0.94)		-.12920 (3.07)
Desire for independence		-.06967 (1.88)		-.11131 (3.15)		-.19484 (3.79)
Desire for achievement		-.05460 (1.27)		.00273 (0.06)		-.04977 (0.96)
Desire for social status		-.10454 (3.19)		.00303 (0.10)		.09801 (2.47)
Weather conditions (1 = weather)		.00049 (0.01)		.02622 (0.58)		.11106 (2.46)
Constant	.00293 (0.22)	-.26671 (2.78)	-.02442 (1.85)	-.15667 (1.58)	.14868 (8.92)	.22968 (2.22)
Pseudo R^2	0.0193	0.2435	0.0422	0.1973	0.0343	0.2434
F-Statistics (p-value)	10.37 (0.0000)	130.62 (0.0000)	22.70 (0.0000)	106.05 (0.0000)	15.04 (0.0000)	106.73 (0.0000)
Observations	388	388	388	388	388	388

Source: Own estimates

Table 5.5b(i): The Effect of Exogenous Diversification on Social Capital

LM Estimates

(Absolute z - Statistics in parentheses)

Variables	Livelihood Outcome					
	SACCO Membership		Table Banking		Church Membership	
	Logistic regression parameters		Logistic regression parameters		Logistic regression parameters	
Type of Diversification						
Predicted Vertical diversification (x 10)	.65990 (5.16)	.54512 (2.66)	.40867 (3.56)	.17966 (0.94)	.23797 (1.83)	-.07235 (0.34)
Predicted Portfolio diversification (x 10)	-.06178 (1.43)	-.01868 (0.14)	.04948 (1.17)	.07853 (0.61)	-.25000 (4.86)	-.34831 (2.25)
Personal and social characteristics						
Years of schooling		.00453 (0.87)		.00095 (0.20)		-.00772 (1.35)
Gender (1 = male)		.01844 (0.62)		-.05870 (2.03)		.01607 (0.49)
Age		.00399 (3.18)		.00022 (0.18)		-.00103 (-0.70)
Motivating factors (dummies)						
Desire for financial security		.18115 (2.68)		.01608 (0.25)		.14230 (2.24)
Desire for food security		-.01402 (0.17)		.10675 (1.27)		-.09407 (1.13)
Cost of farming		.05684 (1.42)		.06501 (1.71)		-.04745 (1.07)
Unfavourable government Regulations		.03854 (1.26)		.07167 (2.56)		.12554 (3.63)
Access to loan		.11435 (2.26)		.06151 (1.30)		.07052 (1.24)
Insurance availability		-.05340 (1.48)		.00602 (0.18)		.05819 (1.45)
Existence of business opportunity		-.02181 (0.56)		.01397 (0.39)		-.09688 (2.05)
Desire for independence		-.09050 (2.22)		-.12190 (3.13)		-.17307 (3.22)
Desire for achievement		-.03088 (0.60)		.02094 (0.42)		-.09517 (1.61)
Desire for social status		-.12168 (2.59)		-.02432 (0.55)		.16575 (3.01)
Weather conditions (1 = weather)		-.00732 (0.15)		.01670 (0.36)		.13853 (2.87)
Constant	-.002023 (0.12)	-.28891 (2.82)	-.05066 (2.92)	-.17959 (1.72)	.19715 (8.52)	.31899 (2.76)
Pseudo R^2	0.0651	0.2541	0.0491	0.1783	0.0617	0.2498
χ^2-*Statistics (p-value)*	34.93 (0.0000)	136.28 (0.0000)	26.38 (0.0000)	95.80 (0.0000)	27.07 (0.0000)	109.55 (0.0000)
Observations	388	388	388	388	388	388

Source: Own estimates

Table 5.6a(i): The Effect of Endogenous Diversification on Human Capital, LM Estimates

(Absolute z - Statistics in parentheses)

Variables	Livelihood Outcomes			
	Education		Health	
	Logistic regression parameters		Logistic regression parameters	
Type of Diversification				
Observed structural diversification (x 10)	.06001 (1.50)	.04332 (0.99)	.11991 (2.30)	.09698 (1.43)
Observed portfolio diversification (x 10)	.03977 (1.26)	.01537 (0.41)	.14902 (2.60)	.19127 (2.52)
Personal and social characteristics				
Years of schooling		-.00140 (0.31)		-.01268 (1.94)
Gender (1 = male)		-.05502 (1.68)		-.02197 (0.46)
Age		.00097 (0.75)		.00259 (1.30)
Motivating factors (dummies)				
Desire for financial security		.01883 (0.29)		-.04324 (0.46)
Desire for food security		-.04823 (0.66)		.14094 (1.63)
Cost of farming		.01721 (0.52)		-.00859 (0.17)
Unfavourable government Regulations		.07406 (2.03)		.14146 (2.29)
Access to loan		.07146 (1.84)		-.06991 (1.23)
Insurance availability		-.01903 (0.48)		.03602 (0.51)
Existence of business opportunity		.08117 (2.18)		.21751 (3.46)
Desire for independence		-.01158 (0.26)		.06364 (1.00)
Desire for achievement		-.01349 (0.29)		-.12644 (1.86)
Desire for social status		-.02536 (0.65)		-.03664 (0.66)
Weather conditions (1 = weather)		.05130 (1.10)		.09288 (1.44)
Constant	.11058 (2.79)	.04600 (0.44)	.12480 (2.55)	-.09583 (0.66)
Pseudo R^2	0.0098	0.0939	0.0588	0.2687
χ^2-*Statistics (p-value)*	3.17 (0.2053)	30.41 (0.0160)	11.22 (0.0037)	51.27 (0.0000)
Observations	388	388	388	388

Source: Own estimates

Table 5.6b(i): The Effect of Exogenous Diversification on Human Capital

LM Estimates

(Absolute z - Statistics in parentheses)

Variables	Livelihood Outcomes			
	Education		Health	
	Logistic regression parameters		Logistic regression parameters	
Type of Diversification				
Predicted structural diversification (x 10)	.24095 (2.28)	.13735 (0.54)	.36845 (2.61)	.57472 (1.55)
Predicted portfolio diversification (x 10)	.07183 (1.39)	-.07785 (0.34)	.09891 (1.30)	.37802 (1.16)
Personal and social characteristics				
Years of schooling		.00056 (0.07)		-.01985 (1.84)
Gender (1 = male) ·		-.04080 (1.14)		-.01837 (0.35)
Age		.00040 (0.28)		.00243 (1.15)
Motivating factors (dummies)				
Desire for financial security		-.00884 (0.12)		-.12026 (1.14)
Desire for food security		-.08908 (1.06)		.11261 (1.08)
Cost of farming		.03552 (0.77)		-.03170 (0.48)
Unfavourable government Regulations		.07242 (1.69)		.18078 (2.54)
Access to loan		.08614 (1.44)		-.11316 (1.36)
Insurance availability		-.01498 (0.32)		.01322 (0.17)
Existence of business opportunity		.08796 (1.68)		.16455 (2.13)
Desire for independence		-.00733 (0.14)		-.00260 (0.04)
Desire for achievement		-.03525 (0.64)		-.11065 (1.51)
Desire for social status		-.00399 (0.07)		-.07492 (0.92)
Weather conditions (1 = weather)		.06291 (1.30)		.08384 (1.29)
Constant	-.05791 (0.60)	.03572 (0.20)	-.08451 (0.67)	-.30980 (1.16)
Pseudo R^2	0.0191	0.0950	0.0381	0.2370
χ^2-*Statistics (p-value)*	6.20 (0.0451)	30.77 (0.0144)	7.26 (0.0265)	45.20 (0.0001)
Observations	388	388	388	388

Source: Own estimates

Appendix III: Administrative Structure of Thika District

District	Division	Location	Sub-location
Gatanga	Samuru	Samuru	Golf view Mwitingiri
		Muthuri	Githambara Bahati/kiama
	Gatanga	Gatanga	Gatanga Chomo
		Mugomo ini	Mugumo ini Mabanda Mithanduku ini
		*Kigio	Kigio *Ithangarari *Gakurari
		*Kiriaini	Kiria ini *Thare Mureke *Gathanji
	Kariara	*Kariara	Gatura Gatunguru Karagia
		Ngabuya	Kiarutara Mwagu Kiganjo Gataka ini
		Mbugiti	Mbugiti Kimakia Karangi
	Kigoro	Kigoro	Kigoro Kanunga Giachuki
		Ndakaini	Ndakaini Kimandi wanyaga
		Ndunyu/Chege	Ndunyu/Chege Gitiri
	Kihumbu-ini	*Kihumbuini	*Kihumbuini Thuita *Nyaga *Kagongo
		Kiunyu	Kiunyu Gituamba Rugaita
		*Mukarara	*Mukarara Mukurwe Gatiikuru Njai ini

Thika East District	Gatuanyaga Division	Gatuanyaga	Gatuanyaga
		Munyu	Munyu Githima
	Kakuzi Division	*Ithanga	*Kaguku Giathani-ini Mianyani
		*Kakuzi	*Gituamba Kinyangi
		*Ngelelya	*Kwamukundi Thungururu Mugumo
	Ngoliba Division	Ngoliba	Ndula Maguguni Ngoliba
	Mutumbiri Division	*Mutumbiri	Nanga *Thuthua
Thika West	Thika Municipality Division	*Makongeni	*Komu Kianjau Kamenu
		*Biashara	Majengo Umoja *Kariminu Biashara
	Juja Division	*Juja	*Kiaora Mirimaini
		*Kalimoni	*Kalimoni
		Komo	Komo Witeithe
Ruiru	Ruiru	Ruiru	Gitothua Ruiru Municipality Mukuyu
		*Mugutha	*Mugutha Jacaranda
	Githurai	Kahawa Sukari	Kahawa Sukari Kahawa Wendani
		Githurai	Githurai Mwihoko
		*Gikumari	Gikumari *Gatongora
		Theka	Theka

The research was guided by this demarcation of larger Thika district.
***Note:** * refers to selected study areas.*

Appendix IV: Larger Thika District Fact Sheet

Information category	Statistics
Area	
Total area (Sq. Kim.)	1479.1
Water mass (Sq. Km.)	13.5
Arabic land (Sq. Km.)	1094
Non-Arabic land (Sq. Km.)	385.1
Gazetted Forest (Ha.)	21,315
Total urban area (Sq. Km.)	270.4
Number of towns: Thika, Juja & Ruiru	3
Topography and Climate	
Altitude: (Metres above sea level)	
Lowest	1200
Highest	1800
Temperature range (^{0}C)	
Highest	22.4
Lowest	12.7
Average	17.55
Rainfall:	
Upper Highlands (mm)	2,130
Sericulture (mm)	1,080
Makuyu Sisal Ltd. (mm)	965
Pre-school population age (3-5):	
Female pre-school population	15,921
Male pre-school population	16,310
Total	32,231
Population under five:	
Female	31,647
Male	32,589
Total	64,236
Youth population (Age 15-29):	
Female youth population	73,999
Male youth population	71,660
Total	145,659
Primary school age group (6-13 years):	
Female	42,432
Male	42,188
Total	115,635
Secondary school group (14-17 years):	
Female	25,108
Male	23,980
Total	49,088
Labour force (Age 15-64):	
Female	119.059
Male	120,918
Total	229,261
Female reproductive age (15-49)	107.629

Aged population (>65 years)	
Female	8,993
Male	11,080
Total	20,073
Dependency ratio	1:2
Infant population (age <1 year)	
Female	6,605
Male	6,897
Total	13,502
Population density:	
Gatanga District	362
Thika East District	187
Thika West district	668
Ruiru	825
Crude Birth rate (per 1000)	35
Crude Death rate (per 1000 live births)	12.7
Infant mortality rate (IMR) per 1,000	42
Neo-Natal Mortality Rate (NNMR) per 1000	18
Child Mortality Rate (CMR) per 1000	12
Under Five Mortality Rate (U5MR) per 1000	35
Life expectancy in the District :	
Male	53
Female	58.1
Number of households	
Gatanga District	30,211
Thika East District	20,441
Thika West district	72,051
Ruiru	75,184
Average household size	4
Total fertility rate	4.2
Poverty indicators	
Absolutely poverty:	
%	36.6
Number of people	170,134
% Contribution to national poverty	1.5
Urban poor:	
%	39
Number	110.904
Rural poor:	
%	35
Number	160,155
Food poverty:	
%	1.9
Number	8,832
Crop farming:	
Average farm size (small scale, Ha.)	1.64
Average farm size (large scale, Ha.)	150

Title Deeds issued	212,290
Total area under food crops (Ha.)	11,000
Main food crops (Ha):	
Maize	8,845
Beans	6,918
Irish-potatoes	1,295
Pigeon-peas	250.50
Bananas	339
Total area under cash crops (Ha.)	38,596
Main cash crops (Ha):	
Coffee	33,745.35
Tea	3,300.34
Pineapple	390
Macadamia	250
Cotton	303
Sunflower	121.5
Total area under soil/land conservation (Ha.)	
storage facilities (90 Kg. Bag):	186960
NCPB	3.000
In-house and Cribs	
Maize	8,570
Beans	2,000
Sorghum	8
Rice	13
Livestock farming:	
No. of Ranches	
Group ranches	5
Total	5
Average size of ranches (Ha.)	480
Main livestock bred (No.):	
Dairy cattle	46,429
Poultry	775,209
Dairy goat	6,188
Meat goat	22, 433
Bee keeping apiaries	856
Bee hives	4,282
Milk production:	
Quantity (Litres)	45,272,871
Value (Kshs.)	1,086,548,704
Beef production:	
Quantity (Kg.)	12,156,080
Value (Kshs.)	2,188,094,400
Egg production;	
Quantity (Trays)	2,077,046
Value (Kshs.)	280,401,210
Poultry production:	
Quantity (Kg.)	3,144,848
Value (Kshs.)	716.415,040

Honey production:	
Quantity (Kg.)	64,220
Value (Kshs.)	9,632,948
Pork production:	
Quantity (Kshs.)	1,875,150
Value (Kshs.)	300,024,000
Fish production:	
Total number of farms (Households)	49,304
Number of people working in agriculture	67,711
Number of fish farm families	169
Number of fish ponds	14,806
Area of fish ponds (Sq. M.)	
Total Fish harvest by species (tones):	
-Tilapia	0.173
-Trout	0.500
-Catfish	0.004
Total Fish harvest (Tonnes)	0.677
Value of total harvest (Kshs.)	65,520,000
Quarrying	
Quarrying quantities (Tonnes per year):	
Building stones	45,900
Co-operatives	
Total number of Co-operatives	250
Co-operatives by types:	
Coffee	23
Dairy	4
Urban Savings and Credit	173
Rural Savings and Credit	9
Transport Savings and Credit	7
Farm Purchase	15
Housing	16
Multipurpose	3
No. of Health facilities:	
District Hospitals	3
Provincial Hospitals	0
Sub-District	1
Mission/NGO Hospitals	11
Private Hospitals	7
Private Nursing Homes	3
Public Health Centres	7
Private Health Centres	1
* Public Dispensaries	25
Dispensaries (NGO/Mission)	151
*Dispensaries	31
Private/Mission Clinics	154
Total	374
Doctor/Population Ratio	11:1,621

No. of Nurses	416
Nurse/Population Ratio	1:1,170
Under-five Children fully immunized	89.6
Women over 18 years on contraceptives (%)	52.2
Antenatal Care Attendance (%)	47.2
No. of CHW	1,518
HIV prevalence rate (%)	3.7
No. of public VCTs	13
No. of private VCTs	11
No. of mission VCTs	6
No. of trained counselors	20
Average No. of people tested per month	1,500
No. of home based care	11
No. of institutions offering ARVs	10
No. on ARVs	3,363
No. of PLWAS	16,650
Morbidity Rates (%):	
Male	23.1
Female	25.9
Total for District	24.6
Malaria Control:	
Children under five who sleep under bed net (%):	
Untreated Net	31.5
Treated Net	14.6
Five most prevalent diseases (%):	
Malaria/Fever	27.4
Diarrhea	1.4
Stomach-ache	6.1
Respiratory Diseases:	
Upper	1.2
Lower	7.6
Flu	17.9
Education	
Pre-School:	
No. of ECD centres	500
No. of ECD teachers	732
Teacher/Pupil ratio	1:24
Total enrolment	17,808
Gross enrolment rate;	
Thika Municipality	43.9
Thika	33.7
Net enrolment rate;	
Thika Municipality	-
Thika	30.6
Average years of attendance	2
Completion rate	85
Retention rate	82
Transition rate	80

Primary Schools:	
No. of private schools	173
No. of public schools	144
Total No. of primary schools	317
No. of teachers	1,542
Total enrolment	93,512
Teacher/pupil ratio	1:61
Gross enrolment rate	119.9
Net enrolment rate (%)	80.2
Drop-out rate	16.15
Average years of attendance	8
Completion rate:	
Thika Municipality	89.0
Thika	85.1
Transition rate	59.6
Communities' distribution by distance to nearest public primary school (%):	
0-1 Km.	19.3
1.1-4.9 Kim	16.7
>5Km.	64
Secondary Schools:	
Public secondary schools	69
Private secondary schools	24
Total No. of secondary schools	93
No. of teachers	995
Teacher/pupil ratio	1:24
Total enrolment	24,134
Gross enrolment Rate	43.7
Net enrolment rate	30.4
Drop-out rate	I 7.65
Average years of attendance	4
Communities' distribution by distance to nearest public secondary school (%):	
0-1 Km.	12.7
1.1-4.9 Km.	38.6
>5Km	48.7
Tertiary Institutions:	
Public universities	2
Private universities	2
University Campuses/Colleges:	4
National Polytechnics	3
Science and Technology Institutes	2
Other public Colleges (No. by type)	0
Youth Polytechnics	5
Literacy: (Population Aged 15+)	
Ability to read:	
Can Read (%)	84.6
Cannot Read (%)	14.9

Ability to write:	
Can write (%)	83.5
Cannot write (%)	16.0
Ability to read and write:	
Can read and write	82.8
Cannot read and write	14.2
Adult Education:	
Number of Adult literacy class/centres	95
Male Enrolment by sex	231
Female Enrolment	714
Total No. of Adults Enrolled	945
Male Attendance	179
Female attendance	394
Total Attendance	675
Literacy rate (%)	74
Water and Sanitation	
No. of households with access to piped water	14,147
No. of households with access to portable water	11,547
Number of permanent rivers	6
No. of shallow wells	500
No. of protected springs	10
No. of un-protected springs	20
No. of water pans	17
No. of dams	55
No. of Boreholes	450
No. of households with roof catchments	8,500
Average distance to nearest water point (Km)	0.5
Energy	
Trading centres: (Under RES only)	
- with electricity	15
- without electricity	3
Health facilities: (Under RES only)	
- with electricity	28
Secondary schools: (Under RES only)	
- with electricity	5
Main cooking fuel by households (%);	
- firewood	47.1
- grass	0
- paraffin	34.1
- gas (LPG)	4.3
- Electricity	0
- charcoal	13.8
- biomass residue	0
- biogas	0
- others	0.8
Main lighting fuel by HH (%);	
- firewood	0.3

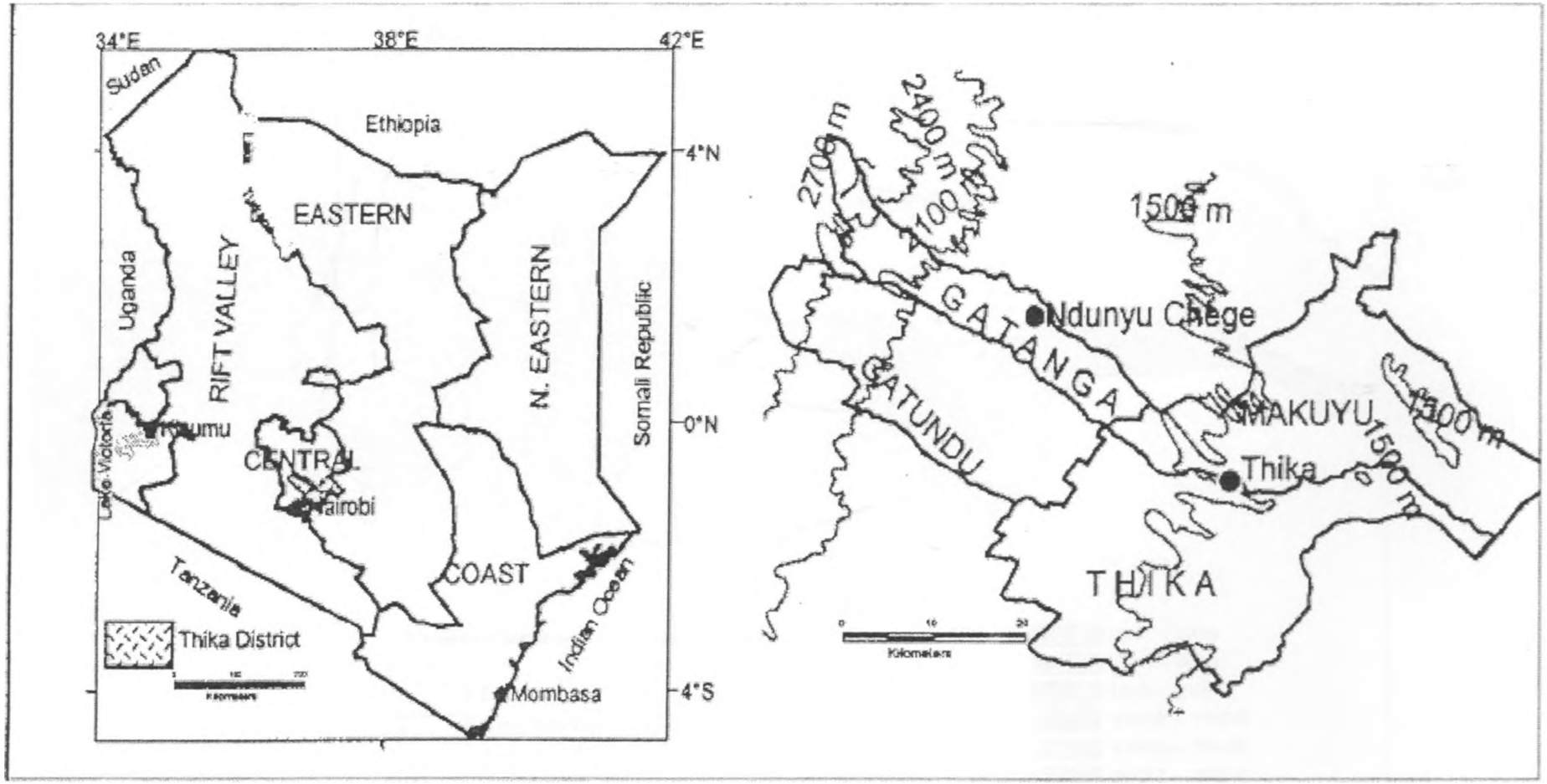
- grass	0
- paraffin	75.6
- electricity	21.0
- solar	1.7
- gas (LPG)	0.4
- dry cell (torch)	0.6
- candles	0.4
Cooking appliances by HH (%);	
- traditional stone fire	45.6
- improved traditional stone fire	3.2
- ordinary Jiko	6.5
- improved Jiko	5.4
- kerosene stove	33.8
- gas cooker	4.3
- electric cooker	0
- others	1.2
Transport & Communication	
Road lengths (Km.):	
Bitumen surface	1,006.8
Gravel surface	332.6
Earth surface	123.7
Railway line length (Km.)	51
Railway station (No.)	5
Number of telephone connections	3,000
Mobile network coverage (%)	98
No. of cybercafés	105
No. of private courier services	8
Number of post offices	6
Number of sub-post offices	3
Licensed stamp vendors	41
Community distribution by distance to nearest post office:	
0-1 Km.	112
1.1-4.9 Km.	30.8
>5 Km	58.0
Tourism, Trade & Industries	
Whole sale and Retail Trade & Industry;	
Trading centres (No.)	53
Registered Retail traders (No.)	2,500
Registered whole sale traders (No.)	335
Industry :	
Manufacturing industries (No.)	4
Total production by industries (Kg/tonnes)	-
Total consumption (Kg/Tonnes)	-
Surplus/deficiency (Kg/Tones)	-
Bakeries (No.)	-
Jua kali Associations (No.)	-
Jua Kali Artisans (No.)	-

Tourism:	
Hotels and Lodges by category (No.);	
Five star	0
Four star	0
Three stars	0
Two stars	1
One star	2
Unclassified hotels	178
Bars and Restaurants	63
Bars only	*37
Lodgings	*36
Hotel Bed capacity by category (No.):	
Five star	0
Four star	0
Three stars	0
Two stars	80
One star	40
Unclassified Hotels	24
Bars and Restaurants	15
Lodgings	25
Financial services (No.):	
Commercial Banks	12
Micro-finance Institutions	6
Building societies	3
Insurance Companies/branches	12
Security	
Administrations Police Posts	35
Administration Police Camps	15
Total A.P. staff	262
No. of police stations	5
No. of police post	10
Patrol bases	9
Army Barrack	1
No. of crime related incidences (Annually)	>1,000
No. of prisons	1
No. of law courts	1
Housing Sector	
Main wall materials (%):	
stone	43.6
brick/block	17.6
mud/wood	17.3
mud/cement	4.6
wood only	12.0
iron sheet	4.9
grass straw	0.0
in	0.0
others	0.0
Main floor materials (%):	

cement			57
tiles			1.0
wood			0.0
earth			41.7
others			0.3
Roofing materials (%);			
iron sheet			86.7
tiles			4.5
concrete			3.8
asbestos			0.3
grass			2.3
makuti			0.0
tin			2.4
others			0.0
Government houses by category:			
LG			727
MG			85
HG			31
Total			843
Community Development and Social Welfare Sector			
No. of active women groups			1.193
Total membership (District wide)			23.860
Source of project funding (%):			
-NGO			34
-International Donors			3
-GoK			24
No. of Youth groups			530
No. of community based project (District wide)			65
No. Orphan and Vulnerable children			3.780
Employment by Sectors			
Sector	Male	Female	Total
Agriculture	63,024	126,048	189,072
Private Sector	10,821	5.411	16,232
Informal Sector	1,681	841	2,522
Government	8,376	4.188	12,564
Others	2,957	5,915	8,872

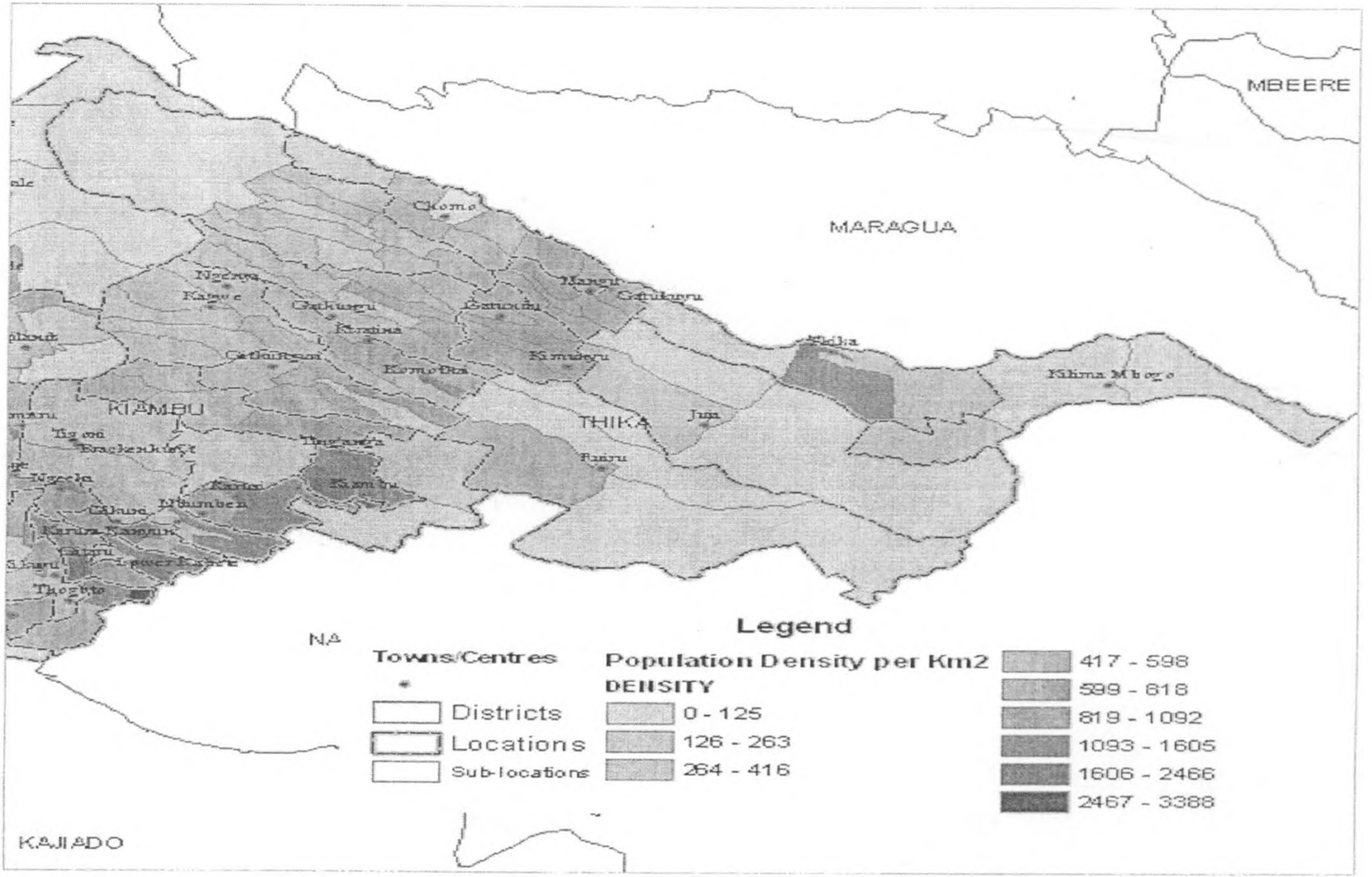
Source: Extract from Larger Thika development Plan 2008 – 2010

Appendix V: Map of the Study Area



Source: Mureithi et al (2002)

Appendix VI: Study Area Population Density



Source: Thika District Strategic Plan (2005 – 2010)