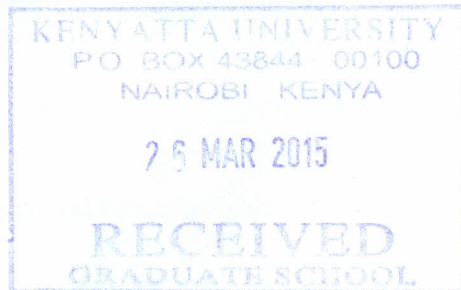


**FACTORS INFLUENCING THE OPPORTUNITY EXPLOITATION BY  
ENTREPRENEURIAL TREE FARMERS IN LARI DISTRICT OF KIAMBU  
COUNTY, KENYA**



**KANYI BENSON NJOGU**

**D86/5033/2004**

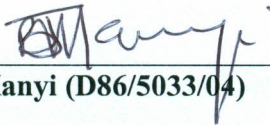
**A THESIS SUBMITTED TO THE SCHOOL OF BUSINESS OF KENYATTA  
UNIVERSITY IN PARTIAL FULFILMENT FOR THE AWARD OF THE DEGREE OF  
DOCTOR OF PHILOSOPHY IN ENTREPRENEURSHIP DEVELOPMENT**

**MARCH, 2015**

## DECLARATION

### Candidate's Declaration

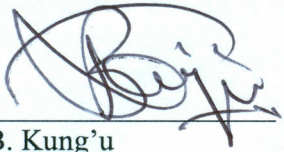
The thesis is my original work and has not been presented for a degree in any other university or any other award

Signature   
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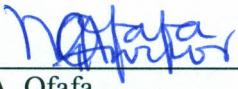
Date 11<sup>th</sup> March 2015

### Declaration by Supervisors


This work has been submitted with our approval as Supervisors

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## **DEDICATION**

To

My Late Mum and Dad

Samuel Kanyi and Prisca Wanjugu

For

They put me on a path to seek wisdom, knowledge and understanding

## ACKNOWLEDGEMENT

To the Almighty God from whom all gifts are granted for this opportunity to contribute to better understanding of our planet and how best to be good stewards of Mother Earth. I give glory to Him for this far He has brought me.

My Supervisor's Prof James Kung'u, Dr. Gorretty Ofafa and Prof. Peter Kibas for the guiding me through the process and offering their valuable time to support the research and writing of this report

My research assistants Njoki Karugu and William Nyakundi, field assistant Emanuel Kiuna, the forest growers in Lari and colleagues from Tree Biotechnology Trust.

My family for their support during the long working hours and for assistance in sorting all the paper works and the many assignments' that formed the ground work for this report.

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## OPERATIONAL DEFINITION OF KEY CONCEPTS

<b>Entrepreneurship</b>	Opportunity recognition and exploitation by smallholder forest growers through the uptake of improved eucalyptus germplasm.
<b>Entrepreneurial farmer</b>	farmers who have planted the improved eucalyptus trees varieties
<b>Entrepreneurial Opportunity</b>	genetically improved eucalyptus varieties offered for planting by farmers as a commercial venture
<b>Forest</b>	Land with tree crown cover (or equivalent stocking level) for example more than 10 percent and area of more than 0.5 ha. The trees should be able to reach a minimum height of 5 m at maturity in-situ.
<b>Improved seedlings</b>	High yielding and fast growing trees seedlings propagated vegetatively from hybrid clones or from genetically improved seeds.
<b>Invention</b>	It is the creation of new products or services.
<b>Innovation</b>	Commercialization of inventions
<b>Opportunity Exploitation</b>	the planting of improved eucalyptus trees by farmers

## **LIST OF ABBREVIATIONS**

<b>GDP:</b>	Gross Domestic Product
<b>GoK:</b>	Government of Kenya
<b>ICRAF:</b>	International Centre for Agroforestry
<b>ISAAA:</b>	International Services for Acquisition of Agri-biotech Applications
<b>KEFRI:</b>	Kenya Forest Research Institute
<b>KFS:</b>	Kenya Forest Service
<b>NALEP:</b>	National Agricultural & Livestock Extension Project
<b>SD:</b>	Standard Deviation
<b>SPGS:</b>	Sawlog Production Grant Scheme
<b>SPSS:</b>	Statistical Package for Social Sciences
<b>TBTK:</b>	Tree Biotechnology Programme Trust Kenya
<b>US \$:</b>	United States of America Dollar

## ABSTRACT

Entrepreneurship is a vehicle to improve the quality of life for individuals, families and communities and to sustain growth of the economy and livelihoods improvement. Farm-based entrepreneurship has been eclipsed by traditions and cultures as more a way of life rather than a business opportunity based on desired economic gains. Farm based entrepreneurship is driven by farmers who respond to new opportunities related to farm based activities. This study was carried out to assess the entrepreneurial characteristics of smallholder improved trees growers' in Lari District Central Kenya guided by the following objectives; to assess the entrepreneurial characteristics of small holder forest farmers, to determine the factors influencing the planting of improved eucalyptus trees and to analyse the relationship between the entrepreneurial characteristics of farmers and their motivation to plant the improved eucalyptus trees. The study applied a survey design. The target population for this study comprised of 2,500 smallholder tree farmers in Lari District. The researcher applied the snowball sampling technique to select the respondents. The sample size was 385 farmers. Structured questionnaire were employed in obtaining primary data for this study. Data was analysed using descriptive statistics and inferential statistics in form of multiple regression. The findings indicated that 87.3% of the respondents were over 36 years old which is the age of investments in assets such as land. 66% of the forest growers were male dominated as compared with 32.5% females while 46.8% respondents were educated up to secondary school level putting them in good stead for forestry extension and innovation. 66% of the growers operated on less than 2 acres of land which fits in the definition of smallholder farmers. Probit analysis indicated the p-value  $0.01 < 0.05$  meaning that there is no significant different between the number of trees planted and personality traits. Factor analysis indicates four factors had significant influence on the planting of the improved eucalyptus trees. These were prior knowledge in agro-forestry, skills that makes it work, passion for environmental conservation and availability of ready markets. The multiple regression analysis indicated that the focus on technology opportunities ( $p < 0.05$ ) also presents a new perspective on how entrepreneurial tree farmers, with fewer cutting-edge technological innovations, can still discover technological opportunities. It is recommended that to stimulate entrepreneurship in tree farming and enhance demand for improved trees varieties training and access to information on availability of the improved varieties needs to be more entrepreneurs friendly. Further research is recommended in determining the influence of role models in triggering the entrepreneurial opportunity exploitation by tree farmers.

## CHAPTER ONE

### INTRODUCTION

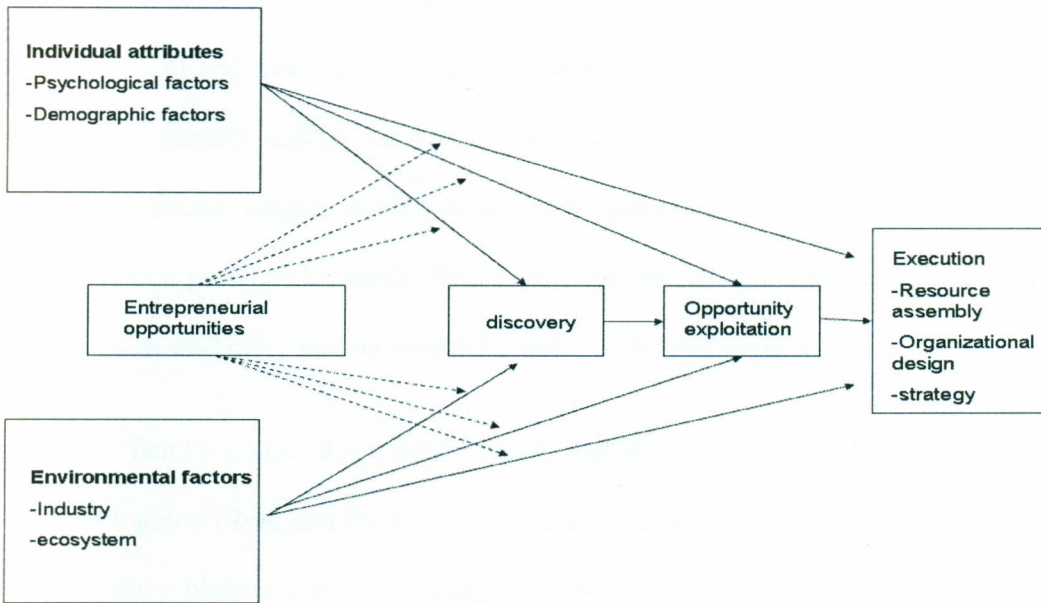
#### 1.1 Background of the study

Entrepreneurship is an activity that involves the discovery and exploitation of opportunities to introduce new goods and services, ways of organizing markets, processes, and raw material through a ranging efforts that previously had not existed (Shane & Venkataraman, 2000; Venkataraman, 1997). Acs & Audretsch, (2003) outline the benefits of engaging in discussions on whether opportunities are discovered or created by entrepreneurs. The discussion argues by addressing entrepreneurial action, the action that drives entrepreneurs to seek and exploit opportunities (Alvarez & Barney, 2007).

Entrepreneurship field can be divided into two approaches: from one hand, one that focuses exclusively on individuals and the other on external environment and ecosystem conditions. Venkataraman and Shane's theory emphasize the characteristics of individuals and opportunities as the first order forces explaining entrepreneurship and hold that environmental forces are second order (Davidsson, 2004).

They describe their approach as disequilibrium approach and they highlight variations in the nature of opportunities as well as variations across individuals. In short they depict the economy as fundamentally characterized by heterogeneity. Shane firmly believes and demonstrates that entrepreneurial opportunities exist independent of the actors in an economic system. In his view, prices, inventions, information "already engenders within itself opportunities for the creation of new ends" (Venkataraman 2003). However human creativity and some specific conditions have to exist for the objective opportunity to be

brought to life. The following Figure 1.1 presents the process of entrepreneurship in Shane's view.



**Figure 1.1: The Discovery School reference model (Shane, 2003)**

As shown in the figure 1.1, the entrepreneurial process involves the identification and evaluation of opportunity; the decision whether or not to exploit it; the efforts to obtain resources, the process for organizing those resources into a new combination and the development of a strategy for the new venture. These different activities are all influenced by individual, industry and institution level factors.

*Eucalyptus*, is a diverse genus of flowering trees (and a few shrubs) in the myrtle family, Myrtaceae. Species of *Eucalyptus* are cultivated throughout the tropics and subtropics including the Americas, Europe, Africa, the Mediterranean Basin, the Middle East, China and the Indian Subcontinent. *Eucalyptus* is one of three similar genera that are commonly referred to as "eucalypts," the others being *Corymbia* and *Angophora*. Many, but far from all, are known as gum trees because many species exude copious sap from any break in

the bark (e.g. Scribbly Gum) (Gledhill, 2008). Some *Eucalyptus* species have attracted attention from global development researchers and environmentalists. Such species have desirable traits such as being fast-growing sources of wood, producing oil that can be used for cleaning and functions as a natural insecticide, or an ability to be used to drain swamps and thereby reduce the risk of malaria. According Luzar (2007) noted that outside their natural ranges, eucalypts are both lauded for their beneficial economic impact on poor populations while Santos and Robert, (2007) criticised it for being "invasive water-suckers", leading to controversy over their total impact.

On the other hand it prefers deep, fertile, moist, well drained soils, but will tolerate short-term water logging (Reid and Potts, 2005). It is somewhat frost sensitive but is probably the most widely planted industrial eucalypt because of its ease of care, excellent form, rapid growth, and its variety of end uses. It also responds very well to irrigation in drier climates. The rose-coloured timber is versatile, but only moderately durable outdoors. Disease and pest information on this species is well documented. Improved/select growing stock is available and recommended (Luzar, 2007). Scholars and researchers' dedicated greater attention and effort towards the construct called entrepreneurial opportunity (Shane and Venkataraman 2000, Sarasvathy *et al.* 2003, Plummer *et al.* 2007, Davidsson 2008, Harms *et al.* 2009). Casson, (1982) defines entrepreneurial opportunities as those situations in which new goods, services, raw materials, and organization methods can be introduced in the market and sold at greater than their cost of production Shane (2003) defines entrepreneurial opportunity as a situation where a new means-end solution will create new value from the recombination of resources. In addition, this act refers to the development of economic value and thus gives entrepreneurs and firms the possibility to make a profit by exploiting the opportunity (Sarasvathy *et al.*, 2002).

Opportunities are like mushrooms in the forest (Davidson 2008) Because of individual differences and information asymmetries all actors do not have access to exactly the same opportunities. This is the core of the "Discovery school": although recognition of opportunities is a subjective process, the opportunities themselves are objective phenomena that are not known to all parties at all time (Venkataraman 1997, Shane and Venkataraman 2000, Shane and Eckhardt, 2003). The second view is called Creative School: opportunities are created in the entrepreneur's mind and it is not meaningful to talk about these opportunities separated from their creators. Venture ideas are internally generated based on more or less explicit and correct perceptions of external conditions. (Baker and Nelson 2005,) opportunities do not exist objectively, but are subjectively enacted (Gartner *et al.* 2001, Sarasvathy 2001, 2008) Sarasvathy defines an entrepreneurial opportunity "a set of ideas, beliefs, and actions that enable the creation of future goods and services in the absence of current markets for them." Her notion of opportunity consists of new idea or invention that may or may not lead to the achievement of one or more economic ends that become possible through those ideas or inventions. Beliefs about things being favourable to the achievement of possible valuable ends and actions generate and implement those ends through specific new economic artefacts (Sarasvathy *et al.*, 2003).

Plummer *et al.* (2007), found that many of the opportunities exploited by entrepreneurs may not be new objectively and that any theory of opportunity should distinguish between those opportunities that are new and those that are not. Their survey of the strategy literature suggests that Holcombe's (2003) contention that entrepreneurial activity leads to the emergence of new entrepreneurial opportunity is a compelling position from which to further investigate the origins of opportunity. They also emphasized that some opportunities born of prior exploitation are not objectively new as

Holcombe suggests. They therefore introduce the concept of underexploited opportunity, and suggest that although such opportunities may be seen as new by future entrepreneurs, they are not objectively new at all.

The exploitation of opportunities is a vital part of the economy's response to external shocks. When new scarcities arise, or existing scarcities tighten their grip, opportunities arise to economize on the scarcer resources and substitute other resources for them instead. Opportunity recognition, stimulated by the prospect of profit, encourages entrepreneurs to seek out the projects, which help the economy to adapt to changing conditions (Plummer *et al.*, 2007). In Austrian theory, it is the prospect of profit from an opportunity that motivates the search that leads to discovery. By their theoretical and rich work, they present following conclusions; an opportunity is defined as an unexploited project, which is perceived by an individual to afford potential benefit. A discovery is the process of identification of an opportunity by an individual who scans the set of possible projects. An opportunity is discovered when a project meets the criteria established by the individual for a potentially successful project. This view of entrepreneurial opportunities invokes the principle of rational action. An entrepreneur is someone who specializes in exercising judgment regarding the investment of scarce resources in projects.

Outside the research field labelled, as entrepreneurship the concept of "opportunity" seems to some scholars (Harms *et al* 2009) be underdeveloped. The core of entrepreneurship is the recognition or the creation of new opportunities. The core of strategic management is how these opportunities can be transformed and exploited in order to create a sustainable competitive advantage (Kuratko *et al.*, 2005, Zahra and Dess 2001). In Harms *et al.* (2009), the following Porter's quote is reported: "a firm should always aggressively pursue all cost reduction opportunities that do not sacrifice

differentiation. A firm should also pursue all differentiation opportunities that are not costly. Beyond this point, however, a firm should be prepared to choose what is the ultimate competitive advantage will be and resolve the tradeoffs accordingly". Key literature on Resource Based View seems not to deal with the concept of opportunity. Only Foss and Knudsen define resources as "being valuable when they help seizing an opportunity in the firm's environment". Summing up we can accept the assertion of Harm *et al.* (2009): the majority of authors in strategic management tends to have an implicit understanding of the concept of opportunity, which is geared towards the existent and non-context specific nature of opportunities.

Tree growing sector enterprises and entrepreneurship is affected by many policies that can either impede or foster decisions on engaging entrepreneurship. These policies can be divided into those of supporting the demand or to those of supplying for entrepreneurial activities. The demand side policies aim to elaborate the opportunities for enterprise development and entrepreneurial activities (Pettenella and Secco, 2006). They include, for example, deregulation of entry in the markets, privatisation of public services and promotion of firm linkages or clustering (Shanley *et al.*, 2005). The *supply* side policies focus on promoting the capabilities of individuals and firms, and facilitating access to resources, e.g. via education and training, incubators, micro-credits and other financial incentives and various promo-campaigns. Policies can also directly change the *risk-reward* profile of an entrepreneur by shaping taxes, subsidies, labour market rules and bankruptcy regulations (Pettenella and Secco, 2006).

The demand for enterprises and entrepreneurship in the tree growing sector reflects the opportunities mainly in tree growing, wood processing and forest services and products other than wood. If the opportunities are prominent, it is likely that the existing

enterprises will develop further and new entrepreneurial activities will emerge, although due to a path dependency, creating new businesses in very new business branches may be difficult. Entrepreneurial activities may include wood production, production of other forest products, processing and manufacturing of these forest-based products and a provision of tree-based services, e.g. in the form of nature-based tourism (Niskanen, 2006).

If the demand for tree-based enterprises is low, there are few opportunities for forest owners, wood processors and the providers of forest services to engage in the entrepreneurial activities for numerous reasons. For example, if the demand for wood is low compared to the tree growth, it is hard to build new business opportunities on wood production. As a comparison, if the demand on recreational or amenity services is low, as may be the case in remote and inaccessible rural areas, it may be difficult to find viable opportunities for a business in services (Mendes *et al.*, 2006).

If the demand for wood as a source of bio energy is high, but the ability to pay for wood for that purpose is low, this again provides little opportunities for forest owners' business developments. Often the demand for intangible services, such as landscape or noise protection, and for non-marketable assets, e.g. biological diversity, may be high. Despite the high demand, the opportunities for enterprises and new entrepreneurial activities may be low. Without markets where the demand and supply of intangible goods and services are able to meet, opportunities for entrepreneurial activities are minima (Mitchell-Banks, 2006).

Entrepreneurship has not been an issue, in particular, in the production of forest resources. Tree growing policies are sometimes even used to increase forest resources and their use without any real attention on the demand for the products produced (Bull and

Ferguson 2005). In the forest sector, entrepreneurship of small- and medium-scale enterprises (SMEs) has a much stronger role than in the forest resources production. Forest sector SMEs include firms in wood processing, recreation and forest-based tourism activities. These companies are managed very much alike any other SME.

Many SMEs face problems in the access to markets, business management, and technical efficiency, which is likely the case also in the forest sector. On the other hand, SMEs in the forest sector as in any other sector have an advantage in being flexible and able to use local materials and resources in their production. Furthermore, business opportunities in local forestry-wood-processing-chains, if innovative and competitive also in the exogenous markets may bring the highest benefit to rural areas and closer to the origin where trees are growing. Essential for the success of local forest-based enterprises, e.g. in wood and non-wood processing industries, is to find suitable market niches, build innovations and have a good business management competency (Mantau *et al.*, 2006).

**Table 1.1: Wood Products - Local Consumption**

Forest Products	2007	2008	2009	2010	2011
<b>Timber- '000 m<sup>3</sup></b>					
Softwood	423.4	503.7	347	401.2	419.2
Hardwood	0	0	12.7	19.3	9.5
<b>Total</b>	<b>423.4</b>	<b>503.7</b>	<b>359.7</b>	<b>420.5</b>	<b>428.7</b>
<b>Stacked '000 m<sup>3</sup></b>					
Fuel-wood /charcoal	25	89.7	0.9	60.3	6.6
Power & Telegraph poles	2	52	12.2	6.4	0.8

*Source: Statistical Abstract (2011), Central Bureau of Statistics, Ministry of Planning and National Development*

According to the Ministry of Energy, by 2012, the consumer demand for electricity will have doubled from the current. However, the country's demand for power distribution poles is far greater than national production and Kenya yearly imports electricity poles worth KSH 4 billion. With a selling price comprised between 1,000 KSH (KFS, 2009) and 21,000 KSH the estimated current unmet annual demand of transmission poles is 450,000 units (KFS, 2009). Table 1.2 gives the local consumption of wood products in Kenya as provided by Central Bureau of Statistics.

With a fast growing economy (5.2% predicted in 2014), high population growth rates (average of 2.7% 2008-2011) and a 70% dependency on wood fuel for a range of industrial and domestic uses the demand for wood in Kenya is already significantly larger than the available sustainable supply. The existing 12million m3 wood supply deficit is currently being met through a mix of unsustainable extraction from natural forests and both formal and informal imports (PwC, 2014). Current demand for timber in Kenya is very high demand as shown in Table 1.3.

**Table 1.2 Projected demand for timber**

<b>Year</b>	<b>Sawn softwood</b>	<b>Annual growth rate</b>	<b>Sawn hardwood</b>	<b>Annual growth rate</b>	<b>Total demand</b>	<b>Annual growth rate</b>
2000	239.7		23.1		262.8	
2005	297.5	24.1%	28.7	24.2%	326.2	24.1%
2010	352.3	18.4%	34.0	18.5%	386.3	18.4%
2015	407.7	15.7%	39.3	15.6%	447.0	15.7%
2020	491.4	20.5%	47.4	20.6%	538.8	20.5%

**Source:** Forest outlook studies in Africa (FOSA), 2000

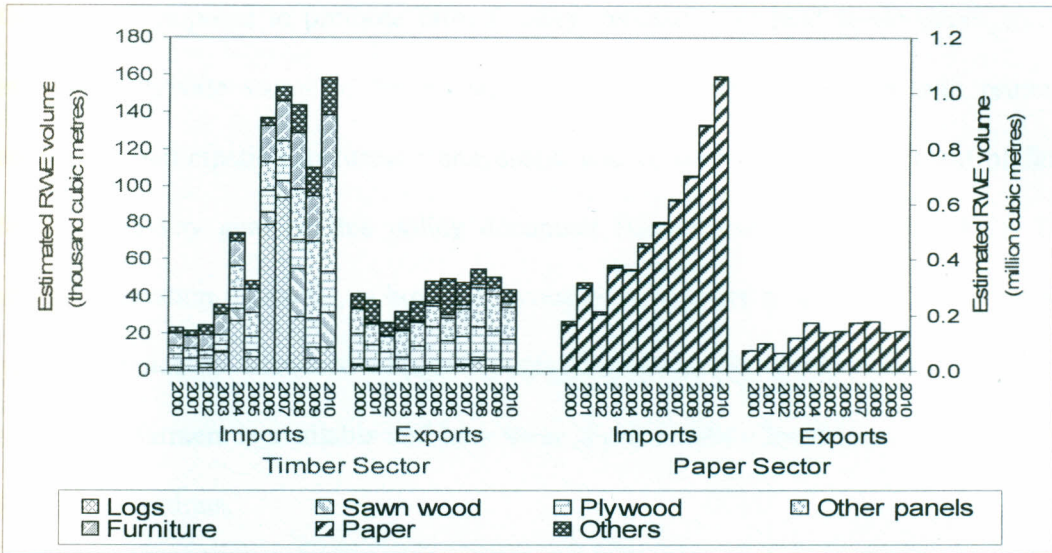
Kenya is a net importer of sawn timber, panel products, paper, furniture and transmission poles. Information on quantities of wood products imported into the country is scanty but according to KFS (2011) wood products worth Ksh.3.36 billion were imported into the country from the COMESA region (Table 6 & 9). The country also imported paper products as shown in Table 1.4..

**Table 1.3: Imports by Category from COMESA in 2009/2011 FY**

Category	Quantity	Amount (K.Sh)	Origin
			Malawi and
Softwoods(m <sup>3</sup> )	75,354.00	1,921,537,200.00	Tanzania
Hardwood timber (m <sup>3</sup> )	18,645.00	1,150,694,558.00	Tanzania & DRC
			Uganda and
Poles (No.)	35,000.00	101,710,080.00	Tanzania
Wattle bark(tons)	24,000.00	192,000,000.00	Uganda
<b>Total</b>		<b>3,365,941,838.00</b>	

*Source: KFS Annual report 2009/2010 FY*

Kenya's imports of timber have tended to increase since early last decade. However, relatively large volumes of logs imported from Tanzania during 2006 and 2007 distort the underlying trend. Given that the trend has continued long after 1999, when logging in plantations in Kenya was prohibited, it is unlikely that the increase is attributable to that prohibition. The majority of those imports of logs are not recorded as exports from Tanzania.



**Figure 1.2: Trade in Selected Wood Products in Kenya**

*Source: COMTRADE (2012)*

The demand for wood and *Eucalyptus* is high. The total area under eucalypts is estimated at 100,000 ha comprising 15,000 ha in gazetted forests, 35,000 ha on private land owned by large companies and 50,000 ha on land owned by individual farmers and local authorities. The demand for wood product articulates mainly around timber, poles, and fuel wood (KFS, 2009). 70% of national energy is met by fuel wood and in rural areas dependence on fuel wood for cooking and lightning is almost total. In order to ensure a sustainable supply of timber, it is necessary to extend the timber production horizons beyond the state forests and include tree farmers and the private sector (KFS, 2009).

Kenya is internationally considered a low forest cover country as it has less than 10 percent of its total land area classified as forest (Senelwa *et al.*, 2004, Government of Kenya, 2007). The Government of Kenya has put in place measures to significantly increase the area under forest cover as stated in the draft Sessional Paper Number 1 of 2007 on Forestry Policy (Government of Kenya, 2007). To increase the forest cover, the

Government proposes to promote farm forestry, intensify dry land forest management, involve the private sector in the management of industrial plantations, and promote community participation in forest management and conservation. Development of farm forestry is a key goal of this policy document (Government of Kenya, 2007). The important question, however, is how the government is going to achieve that goal. This question cannot be answered adequately unless information on the characteristics of smallholder farmers is available and how these characteristics determine the adoption of forestry innovations.

Far-reaching changes are taking place in the social, political, and economic systems in the world with possible consequences for farm forestry and its institutional arrangements, particularly in developing countries like Kenya. These changes include an increase in the country's population and a rise in forest related activities. According to the 2009 population census, Kenya's population stood at 38.6 million people (Government of Kenya, 2010). The increasing population will continue to exert pressure on the forest resources through a growing demand for forest products, services, and land for alternative uses. It is projected that on current trends, the demand for wood in the high potential and medium potential districts will increase from 15.1 million m<sup>3</sup> in 1995 to 30.7 million m<sup>3</sup> in 2020 (Government of Kenya, 1994). Wood fuel (firewood and wood for making charcoal) which accounted for 86 percent of the total wood demand in 1995 will increase to 89 percent in 2020 (Selenwa *et al.*, 2004). Enhancing the uptake of improved tree species is therefore an option that policy makers have to consider if this demand is to be met. In order to meet future demand of forestry products in Kenya, planting rates need to be increased to between 60-200 million seedlings per year (Wakhusuma and Kanyi, 2002). Policy options that can be used to enhance the adoption of improved tree seedlings by smallholder farmers in Kenya are not clearly understood.

The way forested farms are managed is therefore expected to shift from a traditional view of a raw material supplier to an entrepreneurial provider of a multitude of services (Remetsteiner and Weiss, 2004; Government of Kenya, 2007). Developments in forestry technologies and information technology are also expected to result in considerable organizational changes in the administration of farm forestry (Remetsteiner, 2000). There is therefore an urgent need to back up an improved supply of good quality planting materials of desirable species with the transfer of appropriate knowledge and better management practices (Remetsteiner, 2000).

The tree products of interest to foresters are both timber and non-timber forest products (NTFPs), with timber predominating in forest industries. NTFPs are important in the valuation of forest and as a resource for the livelihoods of forest people (Belcher, 2003). Trees promote entrepreneurship, value-adding and processing technologies for the new tree products thus increasing availability of the products, expanding trade and creating off-farm employment opportunities outputs which should help to reduce the levels of poverty. In this way, rural based people can generate income, which can be used to improve their livelihoods and to begin the climb out of poverty, malnutrition, and hunger towards achievement of Millennium Development Goals (Belcher, 2003). There is growing evidence that tree domestication can help rural communities to be self-sufficient, to support their families on an area of less than 2 ha and to contribute to the payment of children's school fees and uniforms (Schreckenber *et al.*, 2006; Degrande *et al.*, 2006).

There is now additional evidence from Cameroon based on the development of over 300 village nurseries involving over 6000 farmers engaged in the domestication of indigenous trees. This venture is generating income to help farmers meet specific income needs as well as to attract young people to remain in their villages (Leakey and Tentchou, 2009;

Tchoundjeu *et al.*, 2010) and reversing urban migration. The positive impacts, include improved diet, increased income (rising to as high as US\$10-20 per day), and improved livelihoods (Leakey and Tentchou, 2009). Other positive impacts include education, health, and infrastructure developments (Tchoundjeu *et al.*, 2010).

To effectively reduce poverty in Developing Countries, where about 80% of rural households are engaged in agriculture, will involve the development of in-country processing and value-adding of agricultural produce and hence the diversification of the rural economy. Experience to date indicates that, by enabling market opportunities for these local resources, significant livelihood options for otherwise marginalised farmers and producers can be facilitated (Lombard and Leakey, 2010).

Partnerships between producers and the local-to-global cosmetic, food, beverage, herbal medicine and pharmaceutical industries can be developed by carefully constructing commercial agreements with leaders in the relevant sector. Critically this involves the establishment of strong and viable trade associations that are forward thinking and market oriented. Through these partnerships, it is possible to ensure long-term relationships and supply agreements, which ensure that the target producers remain in the value chain. A large part of interest in entrepreneurship stems from the fact that economic development is the outcome of purposeful human activity and hence promoting entrepreneurship is the key to it. Entrepreneurship in agriculture is not solely guided by profit and entrepreneurs in agriculture do not form a social class like the capitalists. Recent interest in agricultural development coupled with the problems of poverty and unemployment and opening of markets has brought the concept of rural entrepreneurship to the fore (Lombard and Leakey, 2010). In Lari division such rural entrepreneurship has been observed.

Lari Division is in Kiambu West, a District within the Central Province of Kenya, about 60 km west of Nairobi with a population of about 150,000 people. The division's altitude varies from 1800-2400 meters above sea level. A bi-modal rainy season is experienced from March-May (long rains) and in October- November (short rains). The major economic activity is tree farming although other practices like lumbering, stone mining are carried out on a very small scale. The higher part of the Division adjacent to Kereita forest is more agriculturally rich compared to the lower part that borders the Rift Valley (Republic of Kenya, 2004).

*Eucalyptus* growing is an important source for income for many tree owners and employees in rural areas (Lengkeek, 2003). A new variety of genetically superior eucalyptus trees was introduced in Kenya, a move that could save Kenya's forests from further depletion (KFMP, 1994). The trees are being introduced to rural farmers in an initiative spearheaded by the National Agriculture and Livestock Extension Program - an extension initiative funded by the Swedish International Development Agency. With the concept of a forestation on farms changing in the last few years rural farmers appear to have realized that they can grow trees as an economic enterprise and diversify income generation in their areas. For Susan Mwangi of Kamuchege village in Kiambu the idea to spare more than two acres of her farm to plant trees was as a result of this new realization. Mwangi is one of the many small-scale farmers in Lari division of central Kenya who have planted the new genetically superior eucalyptus.

The planting of the genetically superior *Eucalyptus* is part of the National Agro forestry Research Project, a collaborative project jointly implemented by the Kenya Agricultural Research Institute (KARI), the Kenya Forestry Research Institute (KEFRI) and the International Centre for Research in Agro forestry (ICRAF). The genetically superior

eucalyptus tree seedlings and clones are being distributed by Kenya Forestry Research Institute at Karura Forest near the city of Nairobi. The role of NALEP in the initiative is to rally farmers groups to realize the potential of planting the genetically superior trees in their own farm plots (KFMP, 1994).

To accelerate economic development in rural areas, it is necessary to increase the supply of entrepreneurs, thus building up the critical mass of first generation entrepreneurs (Petrin, 1992), who will take risks and engage in the uncertainties of a new venture creation, create something from practically nothing and create values by putting together a unique package of resources to exploit an opportunity. By their example they will stimulate an autonomous entrepreneurial process, as well as dynamic entrepreneurship, thereby ensuring sustained rural development. The part played by entrepreneurs in agriculture is of vital importance in developing country, where the entrepreneurial characteristics play a major role (Mallikarjun *et al.*, 2010). Keeping this in view the present study was undertaken with the objective of understanding entrepreneurial opportunity exploitation by entrepreneurial tree growers in Lari District of Kiambu County.

Institutions and individuals promoting rural development now see entrepreneurship as a strategic development intervention that could accelerate the rural development process (Petrin, 1994). Further, more institutions and individuals seem to agree on the urgent need to promote rural enterprises, development agencies see rural entrepreneurship as an enormous employment potential, politicians see it as the key strategy to prevent rural unrest, farmers see it as an instrument for improving farm earnings and women see it as an employment possibility near their homes which provides autonomy, independence and a reduced need for social support (Mallikarjun *et al.*, 2010). To all these groups, however, entrepreneurship stands as a vehicle to improve the quality of life for individuals, families

and communities and to sustain a healthy economy and environment (Petrin, 1994). Hence this research seeks to understand the opportunity exploitation by entrepreneurial tree growers in Lari District of Kiambu County.

## 1.2 Statement of the problem

The introduction of improved *Eucalyptus* trees varieties to Kenya in 1997 from Mondi Forests in South Africa by Tree Biotechnology Project has rekindled tree-planting culture. Millions of seedlings have been distributed across the country. It is estimated that from 2001 to 2011, the project had distributed 22.8 million seedlings nationally with smallholder farmers taking largest percentage. For example, in 2007 a total of 2.9million seedlings were distributed with smallholder farmers taking 73.1% (2,120,524), private/corporate bodies 21.9% (634,825) and organized groups 5% (144,429) (TBPT,2009). The key problem is why there is a slow uptake of the improved eucalyptus despite scientific evidence on their fast growth, wood quality and drought tolerance, and if entrepreneurship can be one of the drivers to accelerate the rate of uptake..

Since the introduction of improved eucalyptus varieties from South Africa ten years ago only about 16,000 growers have taken up the planting of the seedlings. Considering there are about 10 million smallholder farmers in Kenya the potential has not been realized in tree growing commercialization unlike with tea growing where about 550,000 smallholder farmers have taken to green leaf production. Often forest growers search for genotypes that show stability, vigour, and high yield over the years and locations that can ensure higher returns for their investments (Reid and Potts, 2005). The inability of government department to benefit the rural poor and address the continuous destruction of the remaining patches of trees has led to individuals and groups pursuing active planting and managing of trees on either communal or privately owned land and chosen to devote

labour, financial capital, and time in growing trees. The study hence seeks to establish if the eucalyptus tree growers are entrepreneurial in character and the factors that influenced them to take up the growing of the trees. Based on Shane and Venkataraman's (2000) suggested key questions for entrepreneurship research, this study sets out to determine why some smallholder farmers and not others identify improved varieties of eucalyptus trees as an entrepreneurial opportunity for economic gain.

### **1.3 Objectives**

#### **1.3.1 General Objective**

The purpose of the study was to determine the factors that influenced the opportunity exploitation by entrepreneurial tree farmers in Lari District.

#### **1.3.2 Specific Objectives**

The study is guided by the following specific objectives:

1. To identify the entrepreneurial personality traits of tree farmers in Lari District who have planted improved varieties of eucalyptus varieties.
2. To examine the environmental factors that influences the exploitation of opportunities by entrepreneurial tree growers of improved eucalyptus varieties.
3. To analyze the influence of technological innovations on the intensity of opportunity exploitation by entrepreneurial tree farmers of improved eucalyptus trees.

#### **1.3.3 Research Questions**

1. How does possession of entrepreneurial personality traits influence the decision of tree farmers in the planting of improved eucalyptus trees varieties?

2. What environmental factors influence opportunity exploitation by tree farmers who have planted improved eucalyptus varieties?
3. What is the influence of technological innovations on the intensity of opportunity exploitation by entrepreneurial tree farmers who have planted improved varieties of eucalyptus trees?

#### **1.4 Significance of the Study**

The goal of this study is to contribute to the existing entrepreneurship knowledge by examining the improved eucalyptus opportunity exploitation process by entrepreneurial tree growers in Lari District and factors influencing it. The improved eucalyptus varieties are generated from new technologies and provide an opportunity to entrepreneurial growers. It is anticipated that findings will be used to contribute to policy formulation in the development and dissemination of improved tree varieties to smallholder farmers for increased productivity and attainment of the 10% forest cover as envisaged in the Kenya Constitution 2010 and Vision 2030.

For the policy and practical relevance, this study will offer an empirical basis for identifying precise policy options that have the potential to enhance the adoption of improved tree seedlings by smallholder farmers in Kenya. This study will also weight the policy statements for the development of farm forestry that contained in draft Forest Policy and Forest Bill 2014 now headed to Parliament (Government of Kenya, 2014) and provide a basis for its implementation by service providers in farm forestry in Kenya. Taken as a whole, the study contributes to the emergent individual-opportunity nexus perspective, which views entrepreneurship as the exploitation of opportunities in the environment by opportunity-seeking individuals.

## **1.5 Scope of the study**

This study focused on smallholder eucalyptus tree farmers in Lari District of Central region in Kenya who had already adopted eucalyptus tree farming. The study sought to establish whether the adoption of improved tree seedlings among smallholder farmers in Kenya can be modelled as a two-step process as suggested by entrepreneurship literature (Shane and Venkataraman, 2000). Specifically, it sought to test whether the opportunity and the exploitation of the innovative forestry technologies are influenced by the same set of factors. The relationship between the internal and external factors influence on the entrepreneurial opportunity exploitation by eucalyptus tree growers in Lari district was also tested.

## **1.6 Organization of the study**

The study was divided into five chapters. Chapter one focused on the introduction and it contained background to the study, statement of the problem, objective of the study, hypothesis, scope, limitations and organization of the study. Chapter two focuses on the literature review and has the introduction, smallholder tree farming in different countries, small holder tree farming demand in Kenya, promoting eucalyptus in Kenya, Kenya distributes improved eucalyptus to farmers, smallholder farmer in Lari, some factors on Kiambu County and Lari District potential, sustaining smallholder tree farming systems, eucalyptus species, demand for wood and eucalyptus, entrepreneurial process, entrepreneurship and the forest sector, theoretical background for forest sector entrepreneurship, forest sector enterprises development in bio-fuel business, conceptual framework, summary of literature review and research gaps. Chapter three contains the research methodology and has introduction, research design, study area, selection of study site, population and sampling procedure, research instruments, validity and reliability of

the instrument, data collection procedure and data analysis techniques and ethical considerations. Chapter four is the analysis of the data and interpretation of findings. Chapter five contains the summary of the study, conclusion, and recommendations and suggestions for future research.

## CHAPTER TWO

### 2.0 LITERATURE REVIEW

#### 2.1 Introduction

This chapter seeks to explain the arguments of entrepreneurial opportunity exploitation by improved eucalyptus tree growers in Lari district. In doing so, this chapter starts by providing general overview analysis of the development of entrepreneurship. This is followed by factors influencing exploitation of opportunities. The aim of the analysis is to examine the improved eucalyptus entrepreneurial opportunity exploitation process by tree growers in Lari District and factors influencing it. This will provide foundation to the context of the research. This chapter also covers a wide range of arguments, including external factors influencing the exploitation of opportunities in tree farming, small holder tree demand in Kenya, sustaining small holder tree farming systems, entrepreneurial process. This chapter also covers a wide range of arguments, including both the discovery and creation views of entrepreneurial opportunities. These arguments help outlines the key dimensions of the entrepreneurial opportunity processes. These arguments help outlines the key dimensions of the entrepreneurial opportunity processes. The chapter ends with a proposed framework to be used as a guide for this research that links to the all elements as found in the literatures. Schumpeter (1934) identified five different categories of change. They include the creation of new products or services, discovery of new geographical markets, the creation or discovery of new raw materials, new methods of production and new ways of organizing.

## 2.2 Theoretical Review

This study is based on the entrepreneurship theory postulated by Shane and Venkataraman, (2000). The theory consists of opportunity recognition and exploitation as the nexus of entrepreneurship. The theory highlighted the four critical elements influencing entrepreneurship which are nature of the opportunity, prior experience, cognition and individual differences. Nature of the opportunity refers to the differences between opportunities and why some people recognize certain opportunities while others do not. Prior experience refers to both tacit and acquired skills as relates to the opportunity. Cognition refers to the ability to process information which leads to the recognition and evaluation of the opportunity while individual differences occurs as different people place different values to the outcomes of each endeavour. This study examines the process of opportunity exploitation by tree farmers where some have planted improved trees varieties with expected higher returns while others have not.

Personality trait is becoming popular as an explanation of entrepreneurial behaviors and intentions. Personality trait is described as constructs to explain regularities in people's behaviour. Contemporary theorist identifies five fundamental personality dimensions which are extroversion, neuroticism, agreeableness, conscientiousness and openness to experience. Traits predicting behaviour include risk taking, achievement motivation and locus of control. Personality traits are partly developed by innate nurturing, socialization and education. These tacit traits are also formed values/beliefs held and play an important role in driving social entrepreneurial decision making. Thus, personality traits may influence the intentions and the manner in which the individual acts. In the psychological literature on entrepreneurship, as well as in some theories by economists, entrepreneurs are often described as individuals with certain kinds of stable and enduring characteristics or features (Covin and Slevin, 1991). While others emphasize on personality traits such as

self-confidence, risk taking, always looking for opportunities, innovative, long-term thinkers realistic outlooks and attracted to challenges (Cromie, 2000). In this study the theory postulated by Covin and Slevin (1991) was utilised in examining the influence of the personality traits on the decision of tree farmers who planted improved tree varieties in Lari District.

Entrepreneurship can be characterized as a stepwise process which is influenced by both exogenous as well as endogenous factors, such as the existence of a business friendly environment, availability of the required factor endowments, ability to acquire desired resources, and ability to implement and manage the business (Morris et al., 2001). On the other hand, some authors argue that entrepreneurship can be taught or encouraged through entrepreneurship education (Drucker, 1985).

Technologies are 'rules and ideas that direct the way goods and services are produced' (Kemeny, 2010). Technological inventions are new rules and ideas about what to produce and how to do it. It results in technological innovations when new rules and ideas find practical use through being applied and/or commercialized by entrepreneurs. Technological innovation contributes to higher levels of economic output and can deliver new goods and services that change human lives and capabilities. Today we live in a technological age and global economy where competition has become knowledge-based. In modern theories of growth and development technological innovation has taken the centre stage.

### 2.3 Empirical Review

Entrepreneurship research in connection with forestry is relatively scarce. It is therefore necessary to build a theoretical basis and define what the entrepreneurship and entrepreneurial opportunity exploitation are in order to fulfil the objectives of the study.

This literature review constitutes the first step in the definition process by providing a narrative account of forestry entrepreneurship in the literature. Farmers are becoming more entrepreneurial and developing new skills and functional capabilities in order to be competitive. The aims of entrepreneurial development in farm based business are modernization and reconstruction of fragmented farming systems, building an farm based business environment and creating new jobs in rural areas.

The overarching theory is based on Shane and Ventakaraman (2000) in which they define entrepreneurship as the discovery and exploitation of opportunities. This study identifies the planting of improved tree varieties as an opportunity for entrepreneurial farmers to exploit for profit. To have entrepreneurship, you must first have entrepreneurial opportunities. Entrepreneurial opportunities are those situations in which new goods, services, raw materials, and organizing methods can be introduced and sold at greater than their cost of production. Entrepreneurial opportunities come in a variety of forms. Although the focus in most prior research has been on opportunities in product markets (Venkataraman, 1997), opportunities also exist in factor markets, as in the case of the discovery of new materials (Schumpeter, 1934). Moreover, within product market entrepreneurship are three different categories of opportunities namely the creation of new information, as occurs with the invention of new technologies such as improved tree varieties, the exploitation of market inefficiencies that result from information asymmetry, as occurs across time and geography such as in forestry and the reaction to shifts in the relative costs and benefits of alternative uses for resources, as occurs with

political, regulatory, or demographic changes such as in the shift to biomass energy due to climate change (Shane & Ventakaraman, 2000).

Entrepreneurship requires that people hold different beliefs about the value of resources for two reasons. First, entrepreneurship involves joint production, where several different resources have to be brought together to create the new product or service. Therefore, for entrepreneurship to occur, the resource owners must not share completely the entrepreneur's conjectures. Second, if all people (potential entrepreneurs) possessed the same entrepreneurial conjectures, they would compete to capture the same entrepreneurial profit, dividing it to the point that the incentive to pursue the opportunity was eliminated (Schumpeter, 1934).

The characteristics of opportunities themselves influence the willingness of people to exploit them. Entrepreneurial opportunities vary on several dimensions, which influence their expected value. For example, a technological innovation in telecommunication has greater expected value than does an increase in wood production per unit area of land. The exploitation of an entrepreneurial opportunity requires the entrepreneur to believe that the expected value of the entrepreneurial profit will be large enough to compensate for the opportunity cost of other alternatives, the lack of liquidity of the investment of time and money, and a premium for bearing uncertainty (Kirzner, 1973; Schumpeter, 1934).

Not all potential entrepreneurs will exploit opportunities with the same expected value. The decision to exploit an opportunity involves weighing the value of the opportunity against the costs to generate that value and the costs to generate value in other ways. Thus, people consider the opportunity cost of pursuing alternative activities in making the decision whether or not to exploit opportunities and pursue opportunities when their

opportunity cost is lower (Amit, Mueller, & Cockburn, 1995). In addition, people consider their costs for obtaining the resources necessary to exploit the opportunity. For example, Evans and Leighton (1991) showed that the exploitation of opportunities is more common when people have greater financial capital. Similarly, Aldrich and Zimmer (1986) reviewed research findings that showed that stronger social ties to resource providers facilitate the acquisition of resources and enhance the probability of opportunity exploitation. Furthermore, Cooper, Woo, and Dunkelberg (1989) found that people are more likely to exploit opportunities if they have developed useful information for entrepreneurship from their previous employment, presumably because such information reduces the cost of opportunity exploitation. Finally, the transferability of information from the prior experience to the opportunity (Cooper et al., 1989), as well as prior entrepreneurial experience (Carroll & Mosakowski, 1987), increases the probability of exploitation of entrepreneurial opportunity because learning reduces its cost.

The decision to exploit an entrepreneurial opportunity is also influenced by individual differences in perceptions. The creation of new products and markets involves downside risk, because time, effort, and money must be invested before the distribution of the returns is known (Knight, 1921; Venkataraman, 1997). Several researchers have argued that individual differences in the willingness to bear this risk influence the decision to exploit entrepreneurial opportunities (Khilstrom & Laffont, 1979; Knight, 1921). For example, people who exploit opportunities tend to frame information more positively and then respond to these positive perceptions (Palich & Bagby, 1995). The decision to exploit entrepreneurial opportunities is also influenced by individual differences in optimism. People who exploit opportunities typically perceive their chances of success as much higher than they really are— and much higher than those of others in their industry (Cooper, Woo, & Dunkelberg, 1988). Moreover, when these people create new firms,

they often enter industries in which scale economies play an important role at less than minimum efficient scale (Audretsch, 1991), and they enter industries at rates exceeding the equilibrium number of firms (Gort & Klepper, 1982).

However, in most industries, at most points in time, most new firms fail (Dunne et al., 1988), and few firms ever displace incumbents (Audretsch, 1991), suggesting that people who exploit opportunities, on average, are overly optimistic about the value of the opportunities they discover. This over optimism motivates the exploitation of opportunity by limiting information, stimulating rosy forecasts of the future (Kahneman & Lovallo, 1994), triggering the search for relatively small amounts of information (Kaish & Gilad, 1991), and leading people to act first and analyze later (Busenitz & Barney, 1997). Other individual differences may be important in explaining the willingness to exploit opportunities. Researchers have argued that people with greater self-efficacy and more internal locus of control are more likely to exploit opportunities, because exploitation requires people to act in the face of skepticism of others (Chen, Greene, & Crick, 1998). Similarly, opportunity exploitation involves ambiguity, and people who have a greater tolerance for ambiguity may be more likely to exploit opportunities (Begley & Boyd, 1987). Finally, the exploitation of opportunity is a setting in which people can achieve, providing a valuable cue for those who possess a high need for achievement (McClelland, 1961).

Consequently, those who are high in need for achievement may be more likely than other members of society to exploit opportunities. Readers should note that the attributes that increase the probability of opportunity exploitation do not necessarily increase the probability of success. For example, over optimism might be associated with a higher probability of both exploitation and failure. Of the population of individuals who discover

opportunities in a given industry, those who are pessimistic may choose not to exploit discovered opportunities because they more accurately estimate what it will take to compete and how many other people will try to do similar things. Overoptimistic individuals do not stop themselves from exploiting these opportunities, because their over optimism limits information and motivates rosy forecasts of the future.

Entrepreneurship is less likely to take the form of de novo startups when capital market imperfections make it difficult for independent entrepreneurs to secure financing (Cohen & Levin, 1989). Entrepreneurship is more likely when the pursuit of entrepreneurial opportunity requires the effort of individuals who lack incentives to do so in large organizations; when scale economies, first mover advantages, and learning curves do not provide advantages to existing firms (Cohen & Levin, 1989); and when industries have low barriers to entry (Acs & Audretsch, 1987). Research on the appropriability of information has shown that entrepreneurship is more likely to take the form of de novo startups when information cannot be protected well by intellectual property laws, inhibiting the sale of entrepreneurial opportunities (Cohen & Levin, 1989). Finally, research on the nature of opportunities has shown that entrepreneurship is more likely to take the form of de novo startups when opportunities are more uncertain (Casson, 1982), when opportunities do not require complementary assets (Teece, 1986), and when opportunities destroy competence (Tushman & Anderson, 1986).

According to McElwee (2005) farmers are defined as those occupied on a part or full time basis on a range of activities, which are primarily dependent on the farm in the practice of cultivating the soil, growing crops and raising livestock as the main source of income. Fostering entrepreneurship and the creation and support of farming businesses is a crucial goal for the survival and integrated development of rural local economies. However,

despite the recognition that entrepreneurship is one of the primary facets through which rural economic development can be achieved, empirical research on farm based entrepreneurship in Kenya is relatively sparse and this concept remains largely unknown as well as the role and the function of rural entrepreneurs, the driving force behind birth, survival and growth of rural enterprises.

Carter (1998) argues that farmers have traditionally been entrepreneurial and that farmers are primarily business owner managers and that farm can be characterized as businesses. Carter draws parallels between portfolio entrepreneurship in non-farm (business) sectors and farm plural activities. She suggests that farmers have multiple business interests and these offer employment creation and rural economic development. Eikeland and Lie (1999) argue that plural active farmers are entrepreneurial, but as Alsos *et al.* (2003) acknowledge 'there is still a paucity of knowledge about which factors trigger the start-up of entrepreneurial activities among farmers'.

According to Kallio and Kola (1999) in a study of farmers in Finland attempted to determine what factors gave farmers competitive advantage over other farmers. Their results suggested that characteristics of a successful farm and farmer can be roughly divided into seven groups. The first the profitable production seemed to be associated with continuous follow-up of production, incomes and expenditures. Secondly, the constant development of cognitive and professional skills increased competitiveness. Thirdly, farmers seemed to benefit from an attitude which indicates that they are ready to work hard and believe in what they are doing. Fourthly, goal-oriented operations such as the ability to set goals, to reach them and to set new ones favoured competitiveness. Fifth, utilization of recent information that is relevant for own circumstances and needs of the farmers increased competitiveness. Sixth, favourable starting points for the enterprise,

meaning good condition of machinery, buildings, land or proper proportion between pricing of the farm and investments in production helped gain more competitiveness. Seventh, utilization of cooperation and commodity association of groups of farmers had a positive effect on individual farmer's competitiveness.

This issue of farmer entrepreneurial identity was explored further in a large quantitative study of over 2000 farm businesses by Vesala and Peura (2002). The authors compared groups' of on-farm business diversifiers, conventional farmers and non-farm rural entrepreneurs along nine dimensions of entrepreneurial identity, and revealed that only two dimensions – economic utility and own independence – did not differentiate the groups from each other, i.e. these values were equally important for all of them. Major findings concerning the group of Finnish business diversifiers imply that they seem to have quite a strong entrepreneurial identity: they see themselves as growth oriented, prone to risk taking, innovative and have faith in the success of their enterprise. However, on two dimensions the business diversifiers have a weaker entrepreneurial identity than the non-farm entrepreneurs: they do not categorize themselves as entrepreneurs nor do they have such a strong sense of personal control as the non-farm entrepreneurs.

In answer to the question concerning the factors that influence entrepreneurial identity seems to be that, personal factors explained variation in entrepreneurial identity the least and the enterprise related factors the most. The business diversifiers' stronger entrepreneurial identity compared to conventional farmers was explained the most by their better competitiveness, bigger enterprise size and more active customer relationships. The more active customer relationships seem also to contribute to the fact that the non-farm entrepreneurs manifest the strongest entrepreneurial identity.

Riepponen's (1995) study of 50 rural entrepreneurs from the province of Mikkeli in South-East Finland, who were active in food processing, wood processing or in tourist industry attempted to explore factors that influence the start-up and success of rural enterprises. The data was divided into successful and non-successful entrepreneurs based on researchers' and entrepreneurs' own subjective evaluations and the income derived from the business. The reasons to start a business distinguished the successful entrepreneurs from the non-successful ones: successful ones were motivated by market-related factors such as demand, favourable location, recognition of a market niche and non-successful ones were motivated by income-related factors such as unemployment, need for compensating income, factors related to health. Thus, the successful ones seemed to benefit from favourable external circumstances related to the demand of products, whereas the non-successful ones seemed to have started the business, more or less, because of external pressures.

The successful ones had typically invented the business idea themselves and had also elaborated the idea for a lengthy time, whereas the non-successful ones had typically received the business idea from others and devoted shorter times for its elaboration. Alsos *et al.* (2003), attempts to use models from other disciplines to explain the phenomena of the entrepreneurial farmer. Their unit of analysis was the farm house-hold. Their analysis revealed ideal types of farm entrepreneurs which were classified as plural-active entrepreneurs, resource based entrepreneurs and portfolio entrepreneurs. Alsos' *et el* (2003) ideal types are to a lesser or greater extent dependent on the farm for their financial security.

Schiebel (2002) attempts to use personality traits and characteristics to provide a definition of rural entrepreneurs using labels which could be just as conveniently applied

within other sectors. In his empirical assessment of the entrepreneurial personality with a representative sample of male and female farmers in Austria (881 respondents) he showed, that approximately 10% of the sample have a combination of personality traits that corresponded to those required for entrepreneurial activity. Hanf and Muller (1997) also consider personality/character traits, and painting a picture of a farm based entrepreneur who has cognitive capacities that are more limited than would be necessary to be able to solve all identified problems, is aware of this restriction and has a tendency to maximize his benefit and is responsible for management and operational tasks on his farm at the same time.

These attempts to match personality traits to entrepreneurial activity have been open to criticism and alternative interpretations. Vesala and Peura, 2002; Peura, *et al.*, 2002 suggest that to understand farmers as entrepreneurs we need to ask them how they perceive themselves i.e. do farmers see themselves as being entrepreneurs.

So far this review suggests that the role of entrepreneurship has been given relatively little emphasis in farm based business literature. Those who have attempted to engage with this question recognize that it should be regarded as a priority with policy makers and is a critical aspect of value-added agriculture. However, we also recognize that there appears to be a growing interest in the area, albeit in a fragmented fashion.

### **2.3.1 The Schumpeterian and Kirznerian perspectives**

Researchers have debated whether entrepreneurial opportunities are socially constructed through interacting people or existing in an objective sense (Shane & Venkataraman, 2000). According to Sarasvathy *et al.* (2002), this discussion is somewhat futile as all opportunities could be claimed to be unique. Shane (2003) adds that the discussion most

likely refers to different perspectives of opportunities, which can be present simultaneously on a market; Schumpeterian and Kirznerian opportunities. These two perspectives differ in the way they explain how situations for new means-end frameworks emerge as well as how they affect economic activity. For instance, Schumpeterian opportunities disrupt the existing system by innovative reconfigurations of resources (Shane, 2003). Schumpeter (1934) claimed that this was the result of the new information created by changes in technology, political forces, regulations, macro-economic factors, and social trends. Moreover, entrepreneurs to elaborate on novel ways of approaching products and services, organizing, combining raw materials, markets, and production processes, can then use the new information. In contrast, Kirzner (1997) suggests that existing information is the basis for entrepreneurial opportunities as people have different access to certain information. As a result, some people will interpret the existing information in relation to their experiences and find ways to better recombine resources (Shane, 2003).

### **2.3.2 Opportunity recognition**

Vaghely and Julien (2010) exploit the knowledge management and information processing principles in order to evaluate if opportunities are recognized or constructed. Based on a case study of ten SMEs, they show how the entrepreneur's information processing is a dynamic combination of algorithmic and heuristic information treatment. During the processes of interpretation, construction, and enactment of their environment, entrepreneurs – and thus their organizations – use a trial and error type of information processing for sense making and opportunity construction (Vaghlieni and Julien, 2010). They combine this behaviour with patterns of information based on their experience to

identify opportunities. The authors describe two different entrepreneurial information-processing patterns.

**Cognitive information processing:** “entrepreneurs compare their representations of the environment in order to shape the dominant logic of their network. Based on available information, the entrepreneur tries to shape a model of reality, which is as accurate as possible. In this sense, the entrepreneur may be compared to an information-processing machine. According to the cognitive vision, knowledge is explicit, and formal.

**Constructionist information process:** “Entrepreneurs process new information in a interpretative way; they construct their reality by using information from their environment. Information, in turn, leads to knowledge-based action. The information result from sense making and reconstruction.” They conclude that entrepreneurs, considered and studied as information processors use more or less both approaches to identify opportunities and thus entrepreneurial opportunities can be recognized and constructed at the same time in a variety of combinations and recognized and constricted individually.

Technological changes and development are sources of new entrepreneurial opportunities that unfold by applying new technologies to different areas. However, before these new technologies can be utilized, these entrepreneurial opportunities of exploitation must first be discovered (Shane 2000). In this respect, Shane (2000) asks the question, why some entrepreneurial opportunities are discovered by certain people and not by others? One main argument is that people possess idiosyncratic information. According to Shane, this information can stem from various sources such as life and work experience, education or even serendipity. According to this concept, people then recognize those opportunities that are related to information they already possess. This type of information is called by

Shane prior information or prior knowledge. Prior information and prior knowledge are synonyms in Shane's understanding. One key characteristic of prior information and knowledge is that they are more a stock than a flow dimension. This stock of prior knowledge influences the entrepreneur's ability to interpret, comprehend and apply new information. Consequently, if the same piece of new information is given to several entrepreneurs it is likely that they will discover different entrepreneurial opportunities, based on their different stock of prior knowledge.

According to Venkataraman (1997), three broad categories of theories deal with the question of how to exploit opportunities. One category focuses on cost aspects, such as transaction and agency cost theories. One emphasizes speed and market power, such as theories of strategic behavior. The last category highlights appropriability, such as the resource and capability view of the firm. Venkataraman suggests a more integrated view of these broad categories for entrepreneurship research, because in reality, the exploitation of opportunities is often a trade-off between costs, speed and the protection of knowledge.

Venkataraman, Shane, and related researchers (Venkataraman 1997; Shane and Venkataraman 2000; Eckhardt and Shane 2003; Dew, Velamuri et al. 2004) have based their entrepreneurial opportunity research strongly on the nexus between the enterprising individual and the entrepreneurial opportunity. They argue that previous research in entrepreneurship has mostly focused on the characteristics of the entrepreneur alone and has largely overlooked the roles of opportunities. They further argue that this person centric approach is problematic, because entrepreneurial behaviour is not stable but transitory over time and depends heavily on episodic information that people have gathered about particular opportunities (Eckhardt and Shane 2003). Shane and

Venkataraman emphasize in particular the correlation between the attributes of an individual with the attributes of an opportunity.

As Shane expounds (2000) “Much of the existing empirical evidence on opportunity exploitation has assumed that the attributes of people who discover opportunities are uncorrelated with the attributes of the opportunities that they discover. Researchers making this assumption have studied how individual differences affect the way people exploit opportunities while ignoring the attributes of the opportunities themselves.”

In this sense, the above mentioned researchers have started to study the attributes of individuals, such as prior information and cognitive properties, and the attributes of entrepreneurial opportunities, such as their existence and characteristics, and have in particular started to investigate possible correlations between the attributes of the two ends of the individual-opportunity nexus (Shane and Venkataraman 2000; Eckhardt and Shane 2003).

New technologies and technological inventions, which are used in order to create new goods and services, are also put into the interplay of the individual-opportunity nexus, emphasizing that individuals use new technologies to exploit different entrepreneurial opportunities, depending on the attributes of the individual and the opportunity identified (Shane 2000). In this respect, Shane understands stands in contrast to the opinion of other researchers, such as the neoclassical economists. Shane (2000) emphasizes that neoclassical economists have argued that multi-purpose technologies should be exploited by a single entrepreneur across different market applications because such centralizations minimize duplication of effort and contracting costs, and increase economies of scale and scope (Bresnahan and Trajtenberg 1995). In contrast, Shane underlines that if people do not identify the same entrepreneurial opportunities, a decentralized approach to use multi-

purpose technologies is superior to the centralized one, because no central agent can identify all the possible entrepreneurial opportunities of a new technology with the consequence that it would lead to under identification of possible opportunities.

As a conclusion, the individual-opportunity nexus certainly plays an important role in the entrepreneurial process, such as emphasized by Shane and Venkataraman. However, based on some academic comments in respect of Shane and Venkataraman's framework (Zahra and Dess 2001), the individual opportunity nexus can be expanded by two other important elements in the entrepreneurial process, namely, the consideration of the firm level and the environmental context. However, I would also like to stress that other levels of investigation should not be forgotten. Based on the empirical data of the three software firms researched and based on some academic comments in respect of Shane and Venkataraman's framework (see e.g. Erikson 2001; Singh 2001; Zahra and Dess 2001), the individual opportunity nexus can be expanded by two other important elements in the entrepreneurial process, namely, the consideration of the firm level and the environmental context.

Entrepreneurial individuals also act in an environment and it is difficult to argue that entrepreneurial individuals do not have to consider the environmental context in their decisions and behaviour. In this respect, Zahra and Dess (2001) criticize Shane and Venkataraman's framework in an academic dialogue, indicating that environmental factors are important antecedents to entrepreneurial activities and change. They also mention that the understanding of environmental factors can help to contextualize the results of empirical studies and that it is a means to improve prescriptive theory. Shane and Venkataraman (2001) defend themselves by arguing that they do not recommend ignoring environmental forces, but that the individual-opportunity nexus is the first-order

force that explains entrepreneurship and that environmental forces are second order forces, because environmental forces alone cannot explain entrepreneurial activities.

Interestingly, Bruyat and Julien (2001) incorporate the individual-opportunity nexus and the environmental context in a theoretical framework. In particular, they place the entrepreneur as an individual, the entrepreneurial project, and the environmental context at the core of future entrepreneurial investigations. Based on a constructivist stance they view the entrepreneur as a person who is in a constant dialogue with his entrepreneurial project. The two authors argue that this dialogue takes place within a specific environmental context and at a particular point in time. In particular, the environmental context on the one side influences the entrepreneur and its project, but on the other side, the entrepreneur as a creative and intelligent human being also shapes the environment. According to Bruyat and Julien, the phenomenon of entrepreneurship will not be understood comprehensively, unless the individual (the entrepreneur), his projects, and the environment are considered and examined together.

Beside this theoretical work, there also exist several empirical studies that demonstrate the impact of the environment on entrepreneurial endeavors. Most of them show the moderating role of the environment on firm performance. For instance, Zahra and Bogner (1999) examined different technology strategies of 116 US based software ventures, exploring the moderating effect of the competitive environment and its impact on the ventures' performance. The authors analyze five technology strategies (development and introduction of new products ahead of competitors; the intensity of product upgrades; the level of R&D spending; the use of external technology sources; the use of copyrights) under different environmental conditions (the degree of dynamism, price hostility, non-price hostility, and heterogeneity). Their results show that not all technology strategies

had an impact on firm performances and that influential strategies were moderated by the external environment. For instance, only frequent product upgrades had a significant impact under all four environmental conditions. New radical products enhanced performance in dynamic environments but decreased firm performance in price hostile environments. Or, external technology sources positively influenced the ventures' performance in all environments, except in non-price hostile ones.

Lumpkin and Dess (2001) analyzed the influence of two dimensions of "entrepreneurial orientation" - proactiveness and competitive aggressiveness on firm performance, moderated by the environment and industry life cycle. Results show that in dynamic environments, characterized by rapid change and uncertainty, proactive firms had a better performance relative to competitively aggressive firms. In hostile environments, where competition was intense and resources were constrained, competitively aggressive firms had superior firm performance compared to proactive companies.

Covin, Slevin et al. (2000) examined the impact of entrepreneurial pioneers and followers on firm growth, studying different competitive tactics in different environments. Their findings indicate that in general market pioneers did not significantly grow more or less rapidly in terms of sales than market followers. However, in hostile environments, pioneers might break out of the dominant price based competition and might grow equally well regardless of higher prices charged by them. In hostile environments, pioneers also profited from limiting their product line to specific and narrow market needs. On the other hand, followers should seek to reduce their cost structures following a low price strategy in order to be competitive.

These studies underline the importance of the environment as a key moderating factor for the success of entrepreneurial strategies and firm performance. However, the

environmental impact on opportunity identification per se has so far hardly been examined. One of the rare studies in this area is the one by Sine and David (2003) in which the authors examine the effect of environmental jolts on institutional change and the creation of entrepreneurial opportunities in the US electric power industry. Their findings indicate that in stable institutional environments, incumbent organizational forms and embedded logics in big enterprises might intensively hinder entrepreneurial activities. On the contrary, in times of environmental jolts, search processes are triggered and institutional logics are re-evaluated. Therefore, their findings imply that in environments characterized by scarcity and crises, existing and well-established institutional arrangements are scrutinized, new search processes are initiated and new solutions are worked out and checked, which expatiates for new entrepreneurial opportunities.

#### **2.4 Entrepreneurial personality traits of tree farmers**

There are three basic ideas that explain the appearance of entrepreneurial activity. The first focuses on the individual, in other words, entrepreneurial action is conceived as a human attribute, such as the willingness to face uncertainty (Kihlstrom and Laffont, 1979), accepting risks, the need for achievement (McClelland, 1961), which differentiate entrepreneurs from the rest of society. The second fundamental idea emphasizes environmental factors that motivate and enable entrepreneurial activity, such as the dimension of markets, the dynamic of technological changes (Tushman and Anderson, 1986), the structure of the market, normative and demographic (Acs and Audretsch, 1990) or merely the industrial dynamic. The third factor is linked to the functioning of institutions, culture and societal values. These approaches are not exclusive (Eckhardt and Shane, 2003), given that entrepreneurial activity is also a human activity and does not

spontaneously occur solely due to the economic environment or technological, normative or demographic changes.

Coon (2004) defines personality traits as stable qualities that a person shows in most situations. Several personality factors are associated with entrepreneurial opportunity exploitation, and therefore they emergence and success of entrepreneurs (Cismariu & Mocan, 2010; Zhao, Seibert, & Lumpkin, 2010). Identified traits associated with entrepreneurial orientation include proactiveness, autonomy, risk taking, innovativeness, and competitive aggressiveness (Covin & Wales, 2011; Lumpkin & Dess, 1996; McElwee, 2008).

One inevitably important factor for entrepreneurial activities and processes is the individual behind all activities and initiatives, the entrepreneur. A new venture depends very much on individual decisions; hence past research has focused on the characteristics, traits, behavior, and abilities of the entrepreneur (Gartner, 1988). Specifically, research includes the need for achievement, the locus of control, risk-taking behaviors, and values (McClelland, 1961; McClelland and Winter, 1969; DeCarlo and Lyons, 1979; Hull, Bosley and Udell, 1980).

Numerous researchers state that the need for achievement has been associated with entrepreneurial behavior (McClelland, 1961; Durand, 1975; Mescon and Montanari, 1981; Welsch and Young, 1982; Johnson, 1990; Stewart and Roth, 2007). McClelland (1961) associates the entrepreneur with economic change and growth and states his need for achievement translates into economic development. Hereby the entrepreneurs set targets, strive for them and want to solve problems themselves. They get a personal achievement when taking responsibility for their success but also their failures (McClelland, 1961). Especially in the early phases of a new venture, an emphasis and

passion to solve problems is an important factor to survive the critical operational phase (Littunen, Storhammar and Nenonen, 1998).

One attribute associated with entrepreneurs is their risk propensity and tolerance for uncertainty and ambiguity (Hornaday and Bunker, 1970; Brockhaus, 1980; Begley and Boyd, 1987). Budner (1982) described the tolerance for ambiguity as the propensity of individuals to view situations without clear outcomes as attractive rather than threatening. Especially in the early phases of a new venture, entrepreneurs are faced with unknown, unstructured, and uncertain situations, which might be problematic for risk-averse individuals. Hereby, the entrepreneur does not only identify opportunities (Shane, 2003), but also has the ability to turn resources and situations into practical account and deals with the risks and failure (Hisrich, 1990).

Besides uncertainty and risks in new ventures, Liles (1974) adds that entrepreneurs often have to accept uncertainty and risks in regard to financial matters, psychic well-being, career security, and family relations. Consequently, past studies predict that entrepreneurs have a higher tolerance for ambiguity and uncertainty than non-founders (Begley and Boyd, 1987). Another common theme in research on entrepreneurial individuals is based on Rotter's (1966) locus of control theory. Hereby, an individuals' locus of control can be differentiated in internal and external. On the one hand, internal control expectation can be referred to control over one's own life and where actions depend on one's own behavior and characteristics.

This characteristic can also be closely linked to effectuation, where individuals aim to control an unpredictable future. Moreover, they seek entrepreneurial roles because they desire positions in which their actions have a direct impact on results (Rotter, 1966). On the other hand, external control expectation focuses on actions of other people, or other

circumstances such as luck, fate, or chance. While external control encourages passivity and repress learning, internal control fosters active striving, constant learning, and boost one's motivation and therefore is generally associated as a typical characteristic of an entrepreneur (Rotter, 1966; Begley and Boyd, 1987).

Self-efficacy can be seen as task-specific self-confidence and is the belief that one can muster and implement necessary personal resources, skills, and competencies in order to attain a certain level of achievement on a given task (Bandura, 1997). Attributes of self-efficacy may be important within the entrepreneurial process as situations are often ambiguous. Individuals with high self-efficacy for a given task will exert effort for a longer period, persist through challenges and setbacks, accept higher goals, and develop strategies for the task. In addition, individuals will take negative feedback and put it into a positive manner which will be used to improve their performance (Shane, Locke and Collins, 2003).

Furthermore, Frese (2009) develops three characteristics of entrepreneurial actions and states that an entrepreneur needs to be proactive, persistent in the face of obstacles, and self-starting. Proactive can be described as having a long-term focus and anticipating future problems and opportunities. Persistence is required in order to overcome problems and obstacles a new venture faces. Furthermore, clear goals and a clearly communicated vision are fostered (Baum and Locke, 2004). Lastly, self-starting refers to taking actions without external triggers, which corresponds to the theory of locus of control by Rotter (1966).

Brandstätter (2011) looks into the personality aspects of entrepreneurs using various meta-analyses and identifies the Big Five (OCEAN): openness to experience, conscientiousness, extraversion, agreeableness, and neuroticism. Openness to experience

describes the mental and experiential life of the individual in its depth and breadth, but also originality and complexity. The goal-directed behavior and prescribed impulse control is illustrated by consciousness. Besides, it also includes one's achievement motivation. Behavior and traits such as active, social, assertive, and positive emotion describe extraversion. Additionally, an energetic approach toward the social and material world is implied. Agreeableness includes characteristics such as altruism, tender mindedness, trust, and modesty and is in contrast with pro-social behavior and communal orientation. Lastly, neuroticism can be described as feeling anxious, nervous, sad, and tense and is in contrast to emotional stability. Other characteristics and traits associated with entrepreneurs include a high self-esteem, creativity, dominance and a need for power (McClelland, 1961; Ryckman, Rodda and Sherman, 1972; Sexton and Bowman, 1985; Brandstätter, 2011).

Exploitation of entrepreneurial opportunities relies on a set of personal attributes and environmental influences. From an individual perspective, strengthening individual resources not only strengthens the capabilities of a society but also encourages more lasting forms of entrepreneurship (Shane, 2008). On the individual level, increasing the levels of education, networking with other entrepreneurs, having entrepreneurial role-models, having many different career experiences with a deepened knowledge of a single sector and having had start-up experience influences the intensity of exploitation of entrepreneurial opportunities (Shane, 2008). Personal attributes are influenced by psychological factors such as extroversion, need for achievement, risk-taking, desire for independence, locus of control, self-efficacy, overconfidence, and intuition (Shane, 2008). Table 2.1 sets out a framework of internal characteristics that exerts influences on individual's propensity to exploit opportunities. These factors are key to this study and considered in further details as in Table 2.1 here below.

**Table 2.1: The Individual Framework Affecting the Entrepreneurial Process**

Discovery process		Exploitation process		
Individual Capabilities	Psychological Factors	Individual Differences	Personal Characteristics'	
Prior Experiences	Life Ability to evaluate Information accurately	Education	Extroversion	
		Career Experience	Need for Achievement	
		General Business Experience	Risk-Taking	
		Access to finance	Desire for Independence	
		Industry Experience	Locus of Control	
		Start-up Experience	Self-Efficacy	
		Having a Role-Model	Overconfidence	
			Intuition	

*Source: Adopted from Nikolina Fuduric, 2004)*

Entrepreneurs are individuals who discover an opportunity and exploit it to create a new venture (Shane & Venkataraman, 2000). Moreover, entrepreneurs are significantly more innovative than non-entrepreneurs (Ho & Koh, 1992; Robinson & Sexton, 1994), and their personality traits have a direct effect on firm performance (Wong et al., 2006; Cantner et al., 2007). Some of the characteristics include need for achievement, locus of control, and risk-taking propensity are represented as key entrepreneurial personalities.

### 2.4.1 Need for Achievement

Need for achievement is a key characteristic of individuals who strive to excel in all activities, regardless of the obstacles to be faced (Berthelot, 2008); it is thought to be a key entrepreneurial personality and has been studied extensively in the entrepreneurship literature (Johnson, 1990; Shan, 2003). McClelland (1961) in Shane et al., (2003) argued that individuals who have a high need for achievement enjoy challenging activities or tasks that have a high degree of individual responsibility for outcomes (Shane et al., 2003). Thus, the characteristics of need for achievement are significantly related to founding entrepreneurs (Collins et al., 2004), entrepreneurial activity (Johnson, 1990; Sagie & Elizur, 1999) and especially venture performance (Lee & Tsang, 2001).

The need for achievement leads people to choose activities where they have personal responsibility for outcomes, where specific individual skills are required, and where a direct feedback loop is given. The nature of entrepreneurial opportunities are novel and not clearly specified thereby providing a challenge that is eagerly met by people with a high need for achievement (Harper, 1996). Exploiting opportunities requires goal setting, planning and information gathering. People who are achievement focused have the drive to establish future goals, gather information, learn, bring ideas into fruition, sustain goal-directed activities over a longer period of time, persevering through failures, setbacks and other obstacles that are inevitable when decision making is done under uncertainty and with incomplete information (Wu, 1989). Entrepreneurs are driven by this need to achieve and excel. While there is no research evidence to support personality traits, there is evidence for the relationship between achievement motivation and entrepreneurship (Johnson, 1990). Achievement motivation may be the only convincing personal factor related to new venture creation (Shaver & Scott, 1991).

#### 2.4.2 Internal Locus of Control

Locus of control is the belief that individuals' actions or personal characteristics affect outcomes (Shane et al., 2003). Individuals with a high internal locus of control believe they can influence outcomes with their ability, effort and skill, whereas people with an external locus of control believe that their success depends on fate and destiny (Shane et al., 2003; Berthelot, 2008). Entrepreneurs are usually oriented towards the internal locus of control (Korunka et al., 2003; Shane et al., 2003; Vecchio, 2003) because of their desire to have a direct impact on results (Shane et al., 2003). Thus, internal locus of control is significantly related to venture growth (Lee & Tsang, 2001). Moreover, entrepreneurs with an internal locus-of-control personality tend to undertake innovative strategies (Wijbenga & van Witteloostuijn, 2007). It is also belief that internal locus of control is within the entrepreneur without cultural boundaries (Bonnett & Furnham, 1991).

The entrepreneur's success comes from his/her own abilities and also support from outside. While individuals with an internal locus of control believe that they are able to control life events, individuals with an external locus of control believe that life's events are the result of external factors, such as chance, luck or fate. Empirical findings that internal locus of control is an entrepreneurial characteristic have been reported in the literature (Cromie, 2000, Ho and Koh, 1992; Koh, 1996; Robinson et al., 1991). In a student sample, internal locus of control was found to be positively associated with the desire to become an entrepreneur (Bonnett & Furnham, 1991). Rauch and Frese (2000) also found that business owners have a slightly higher internal locus of control than other populations. Other studies have found a high degree of innovativeness, competitive aggressiveness, and autonomy reports (Utsch et al., 1999). The same is reported of protestant work ethic beliefs (Bonnet and Furnham, 1991), as well as risk taking (Begley

& Boyd, 1987). Having an internal locus of control is a person's belief that he can influence his environment and will be more likely to exploit an entrepreneurial opportunity than a person with an external locus of control. Research also points to this fact, even across cultural boundaries (Bonnett & Furnham, 1991; Evans & Leighton, 1989).

### **2.4.3 Risk-Taking Propensity**

Risk-taking propensity can be defined as an individual's tendency to take or avoid risk (Sitkin & Weingart, 1995). In situations with uncertain consequences, risk is a vital component of most entrepreneurial decision-making. Some may be high risk takers while some may be risk-averse (Salleh & Ibrahim, 2011). Those entrepreneurs with a high propensity for risk do not perceive their actions as risky (Shane et al., 2003). In addition, risk-taking propensity may be the only trait in which founders and non-founders differ (Begley, 1995). Risk-taking is a fundamental part of entrepreneurship (Knight, 1921). Compared to the general population, entrepreneurs are more likely to exhibit higher levels of risk-taking behaviour (Begley & Boyd, 1987; Caird, 1991).

### **2.4.4 Need for independence**

The need for independence is simply an aspect of personality that drives people to undertake actions alone rather than involving others. Entrepreneurship requires the trust in one's own judgment versus the judgment of others. Some empirical evidence suggests that entrepreneurs' desire for independence is the most common reason they give for starting their own businesses (Burke, Fitzroy and Nolan, 2000).

#### **2.4.5 Prior knowledge**

Prior knowledge on tree farming has proven to increase the likelihood that people will exploit opportunities. It seems that people with prior knowledge are more likely to see new venture opportunities (Freeman, 1992). The nature of these experiences seems to provide easier access to new knowledge and technology (Freeman, 1992). Regarding experience variety, it has been shown that people with greater variation in employment experience (Evans & Leighton, 1989) and in the places that they have lived (geographic mobility) are more apt to become entrepreneurs (Delmar & Davidson, 2000). Obviously, knowledge is related to knowing and refers to the more rational part of entrepreneurship. Like knowing the rules for administration, knowing the principles of marketing, knowing the difference between debit and credit, and knowing the Dutch laws and rules. But experience also belongs to knowledge. Prior knowledge can provide an absorptive capacity that facilitates the acquisition of additional information about markets, technologies and production processes, which enhances the ability to create new entrepreneurial frameworks in response to new information (Cohen & Levinthal, 1990). Two types of knowledge enhance the absorptive capacity necessary for opportunity exploitation namely, knowledge about markets and knowledge on how to serve them (Shane, 2000).

#### **2.4.6 Extroverted**

People are more likely to exploit opportunities if they are more extroverted (Barrick & Mount, 1991) which means that they have attributes of sociability, assertiveness, talkativeness, expressiveness, impetuosity. Compared to introverts, extroverts are more likely to exploit opportunities because they are better able to assemble resources and organize under conditions of information asymmetry and uncertainty (Shane, 2003).

## **2.5 Environmental factors that influences the exploitation of opportunities**

Entrepreneurs face peculiar challenges in an attempt to achieve success (Hatcher, Terjersen & Planck, 2007) and entrepreneurship in less developed countries face much more barriers to formal economic participation than those in developed countries (Allen et. al., 2008). Entrepreneurs face unique obstacles in starting and growing their firms such as lack of skill or training, limited access to capital or credit, lack of savings and social networks, and limited choice of industry (Akanji, 2006; Ibru, 2009; Lakwo, 2007; Martin, 1999; Ojo, 2009; Peter, 2001). Gender-related discriminations, especially in developing countries, occasioned by socio-cultural factors also pose hindrance to women entrepreneurial activity (Otero, 1999). Such discriminations are in the area of distribution of social wealth such as education and health (May, 2007; Mayoux, 1999; Otero, 1999; Porter & Nagarajan, 2005; Roomi & Parrot, 2008).

The type of industry and the industrial differences also affect entrepreneurial performance, and people in knowledge industry have high propensity to access information which leads to business performance in terms of market size and growth (Shane, 2003). Incidence of informal sector investment was higher among firms in the manufacturing, wholesale and retail, and knowledge industry in UK and Canada respectively (Carter & Shaw, 2006; Riding, 2006). Entrepreneurs are mostly found in agriculture, services such as education and health, retail and manufacturing where they had experience or where experience was not necessary (Akanji, 2006; IFC, 2007; Okpukpara, 2009). Such businesses are most active in the urban centers, except agriculture (Carter & Shaw, 2006). The concentration of women entrepreneurs in these sectors is due to their low level of education because higher educational attainment leads

to the possibility of self-employment in economically rewarding industry ( Stohmeyer, 2007).

The business environment factors pose a lot of challenges to business because they are outside the control of the business owner. Such environmental constraints which are sometimes volatile include the economic, financial, legal, political and socio-cultural factors. These factors play a greater role in entrepreneurial activity because, despite the possession of the requisite personal entrepreneurial characteristics such as education, right attitude to risk, motivation, energy and working experience, the environment may hinder women entrepreneurs from exploiting entrepreneurial opportunities (Kuzilwa, 2005; Shastri & Sinha, 2010; Vob & Muller, 2009). Business environment factors that seem to be more important to the success of women entrepreneurial activity is financial aid or credit accessibility. Credit or loan is very necessary for new and growing enterprises. Banks, not surprisingly, are inclined toward low-risk ventures. Women were more likely to observe that they were not given due respect by financial institutions; they did not think their account managers were easy to talk to; they reported that they were not made to feel comfortable by financial institutions; and they perceived that bank employees.

### **2.5.1 Social network**

The social network is an important way that people receive information. Characteristics of a social network that encourages opportunity exploitation are diversity of the actors in the network to help avoid redundant pieces of information and strong ties with people encourages them to believe that the information they receive is accurate (Aldrich, 1999). Strong ties in a network are very important for an entrepreneur. Studies have shown that entrepreneurs, more than managers, obtained information from people they knew and

trusted (Koller, 1988). Weak ties have an important purpose for the entrepreneur as well. Entrepreneurial opportunities are positively related to the number of weak-ties in an entrepreneur's social network (Singh, Hills, Hybels, & Lumpkin, 1999). Weak ties are like informational bridges giving the entrepreneur access to different sources of information and knowledge than is readily available from strong-tie networks. Singh also discovered that more opportunities are recognized by entrepreneurs who use a mixture of strong and weak ties versus using only strong or only weak ties (Singh *et al.*, 1999). Networks can serve as a source of new ideas and products through the exchange of best practices. The cross-exchange of knowledge, ideas, and practices between various actors' such as academia, business and farmers can enhance innovation potential. Moreover, networks can serve as reliable source of information. The need to access knowledge is closely linked to accessing specific information out of the vast amount of information available. However, the amount of information available is disproportionate to the time farmers have to acquire this knowledge. Filtering the information through networks, and especially through informal events such as peers and 'barazas' is essential for entrepreneurial farmers to exchange valuable knowledge and information.

### **2.5.2 Government interventions**

Entrepreneurship happens within a regulatory framework, which affects performance. A combination of opportunity, capabilities and resources does not necessarily lead to entrepreneurship if opportunity costs and start-up costs outweigh the potential benefits. In this framework, the regulatory framework is defined very broadly and includes all taxes, regulations and other public rules and institutions affecting entrepreneurship.

The intensity of business licensing and permit requirements will dictate when and how the entrepreneur will go about starting business. It is important to limit barriers and costs

so that the entrepreneurs can quickly establish in the market. Some potential costs and barriers are found in certifications, standardizations, chain-of-custody, financial capital outlays and procedural complexity (Verheul *et al.*, 2001). Over regulation of the forestry sector especially the issuing of harvesting permits and transportation licences stifles entrepreneurship.

According to Storey (1999), deregulation has two aspects. First, it lifts administrative and legislative burdens that take time, energy and resources away from fundamental entrepreneurial activity. Second, it stimulates free markets which increase competition. A deregulated environment ensures that only the fittest businesses can remain in the market due to competitive pressures. Such an environment makes it possible for people to reallocate resources to new uses in ways that are more profitable or that redistribute wealth. Research has shown that deregulation of industries such as the telecommunications, utilities, railroad, and banking have created new industry structures, new products and markets, and have redefined the way profits can be made (McMillan & Woodruff, 2002). In forestry some regulation may create standard especially in relation to resources trade-offs and mitigate conflicts and hence positively impact on entrepreneurship.

Government resource related policies stimulate small firm access to labour, financial capital and information/knowledge. Policies have the distinction of either improving the financial conditions of the firm or improving the operating efficiency of the firm (Storey, 1994). Financial oriented policies focus on reducing market imperfections and take the form of alternative capital markets. Often this is seen as direct payments of loans or grants to the firm or even as a form of venture capital. One problem with stimulating entrepreneurship in this way is that the wrong type of person may be attracted to such an

offer. A person may become an entrepreneur because the funding is available not because their idea is marketable. Efficiency enhancing policies remedy information imperfections and often include business training, consultancy and counselling. Research has shown that government supplied entrepreneurial services help most in initiating and stabilizing a business but do very little for the growth of businesses (Bosma & Harding, 2006). Forestry sector and related policies have remained static and creates disincentives to entrepreneurship.

Instead of general policies that focus on the small business sector as a whole, policies can also target specific sectors, regions or groups. Some of these policies include different groups of people (women, young people, immigrants and the unemployed), different sectors of industry (IT, biotechnology, life sciences forestry). And yet, some policies focus on encouraging entrepreneurial activity in different geographies in the hope of combating rural – urban dichotomy. There are mixed results with sectoral policies (Storey, 1994). It seems that execution and efficiency are integral to carrying out these policies successfully. The current forest policy in Kenya was enacted in 1968 and seems to promote a business as usual approach.

### **2.5.3 Land size**

Land is the central factor of production in agrarian economies like Kenya where the entire rural population makes its livelihood from it. The combination of a rising rural population and a land base naturally limited should lead to a reduction in the average size of holdings. Farmers may be able to compensate for the lack of land due to population pressure by partitioning land 'unequally among their heirs. Zilberman et al. (1980) note that given the uncertainty, and the fixed transaction and information costs associated with innovations, there may be a critical lower limit on farm size that prevents smaller farms

from adopting. As these costs increase, the critical size also increases. It follows that innovations with large fixed transaction and/or information costs are less likely to be adopted by smaller farms. Many farmers have to adjust to the new economic conditions and are likely to experience the decrease of income. Land size options may significantly correlate with technology and entrepreneurial adoption.

#### **2.5.4 Access to Finance**

The key issue is not the availability of finance or business development services, rather it is the access and use made of the funding and support by creative businesses. Specifically, it is the low propensity and ability of many entrepreneurs to make full use of the available finance, advice and expertise that inhibits increased productivity and growth in the creative industries. Perhaps the greatest obstacle faced by entrepreneurs and enterprises is how to locate the funds to finance. This observation was confirmed by the sectoral experts who, when asked about the most important transversal issues faced in their own sectors, prioritized access to finance. Indeed, many studies on entrepreneurship highlight capital as one of the most critical factors for success. Capital and access to finance play an important role during all phases of the entrepreneurial lifecycle and can directly affect how well a business performs (Creative Economy Programme, 2006).

#### **2.5.5 Collaboration with Research Institution**

Research and technology creates new inventions that the entrepreneur and entrepreneurial businesses can turn into new products or processes. The Research and technology in this context should be understood as a resource that can be created or purchased, whether directly or in an embodied or diffused form.

### **2.5.6 Availability of ready markets**

Opportunities are created by the market conditions in the country. These market conditions include public involvement in markets, competition in the markets, access to foreign markets, procurement regulation, and standardisation.

### **2.6 Influence of technological innovations on the intensity of opportunity**

#### **exploitation**

Today the world exists in a technological age and global economy where competition has become knowledge-based. In modern theories of growth and development technological innovation has taken the centre stage. The love for novelty and new gadgets is thus based on practical and theoretical foundations. Moreover, there is growing interest in the relationship between technological innovation, entrepreneurship and how it can promote global growth and development. Entrepreneurial farmers have to keep up with technological innovations in order to maximize their farm incomes with one of the critical aspect being new improved varieties.

Hybrid maize offered roughly a 200 percent return on investment with little risk of actually losing money. The seed was introduced in the mid-western US 1930s and by the end of the decade farmers had planted it in nearly two-thirds of all corn fields. In the case of hybrid maize, it can be concluded that farmers invested in the seed because it was accessible leading to the seed's rapid diffusion (Clarke, 1988). The first major work on entrepreneurship came from Schumpeter (1934) who for the first time put the human agent at the centre of the process of the economic development and assigned a critical role to the entrepreneurship in the 'Theory of Economic Development'. In Schumpeter's theory, the entrepreneurship is essentially a creative activity. The entrepreneur is the innovating individual who introduces something new into the economy, a method of

production not yet tested by experience in the branch of manufactured concern, a production with which consumers are not familiar, a new source of raw material or of new market hitherto unexploited, and other innovations in the strict sense of the term. According to Schumpeter (1934), an entrepreneur is the agent who provides economic leadership that changes the initial conditions of the economy and causes discontinuous dynamic changes. By nature he is neither a technician nor a financier, but he is considered an 'innovator'. Entrepreneurship has been conceived in many ways, personality characteristics, innovative activities and managerial abilities. Schumpeter took entrepreneurship for innovative activities under the adage of "destructive creation".

Cultivation of pineapple in the NE region and in the state of Nagaland has been practiced since time immemorial but initiatives for commercialization and adoption of modern technology started recently. This has resulted in substantial increase in area and production of pineapple to the tune of 140.72 % increase in area and 141.16% increase in production (Jha, 2009). Respondents in a study from Thailand reported adoption of a range of agricultural technologies such as new crops (coffee, macadamia, fruit trees, and ornamentals), new farming systems (agroforestry, multi-cropping systems) and use of organic fertilizers (manures, organic composts). Although routinely adopted elsewhere, prior to project start these technologies were virtually unknown to the farmers (Ellis, et al, 2012).

### **2.6.1 Product differentiation**

Opportunity exploitation involves experimenting, searching and testing (e.g., March, 1991). This represents a significant rupture with what is currently being done and are associated with risk taking, creativity, and flexibility. Exploitation capabilities involve new technological knowledge and the development of completely new products to

customers. Developing product offerings that contain new, emergent ideas and distinct features is likely to result in product differentiation (Atuahene-Gima & Murray, 2007). Scholars have posited that product differentiation and firm performance are positively linked (e.g., Bayus, Erickson & Jacobson, 2003; Damanpour & Evan, 1984). The basis of this argument is that firms that are able to innovate and introduce differentiated products into the market are ahead of competitors and thus obtain higher sales and profits (e.g., Hurley & Hult, 1998; Song & Parry, 1997). Differentiated products usually follow a skimming or premium price strategy, attract customer attention and demand, and incur increased profit margins and lower customer acquisition and retention costs (Bayus *et al.*, 2003; Morgan *et al.*, 2004). Hence, firms that offer differentiated products are likely to experience enhanced market effectiveness.

### **2.6.2 Opportunities for learning during the technology life cycle**

It is difficult to overestimate the value of new product development, especially in highly dynamic markets with increasing levels of competition, high technical obsolescence, and short product life cycles (Griffin, 1997). Because of the ever shortening shelf life of opportunities, entrepreneurs have to be constantly in vigil of any innovation that could be introduced into the marketplace, even before there exists demand. In technology-based firms, technological opportunities are ideas that are created by new advances in a technology (Shane, 2003). However, such ideas are usually extremely volatile and fluid, with a very short life cycle, requiring constant updating. This means that entrepreneurs should be innate risk takers, as they are expected to allocate resources based on market demands or intuitions, as well as decision makers as they have to fix a price in a market where demand is still unknown.

As new technologies are characterised by their volatile and unpredictable nature, the process of developing a technology-based firm entails an extraordinary level of uncertainty being much riskier than the non-technology entrepreneurship process. Thus, it is clear that choosing the right timing and the appropriate strategy for commercializing a technological opportunity is of vital importance. As the entrepreneurial process is a mechanism for continuous and rapid innovation, early-stage enterprises require business model experimentation to rapidly test the market and validate or reject the business opportunity. According to Amit and Zott (2001), the usefulness of business models in these initial stages stems from their explanatory power in regard to the value creation potential of the new venture, the plans to make money in the long run (Afuah and Tucci, 2001), and how the venture will sustain itself over time.

### **2.6.3 New innovative ideas**

Innovative ideas are not easy to formulate in terms of existing notions, nor to evaluate and implement them; in fact, there is no fundamental definition of new ideas in economics. We take the view (advanced, among others, by Schumpeter) that ideas are essentially new combinations of existing elements, and that while many such new combinations are useless or nonviable, valuable new ideas represent combinations which put together, in the sense of aggregating the different components in a novel and functional way (Weitzman ,1998). Entrepreneurs with novel concepts need to identify the critical dimensions along which the idea must be assessed, and then secure the collaboration of relevant experts for screening.

Entrepreneurship involves the utilization of new ideas, or a new use or a combination of existing knowledge. New ideas may either be generated by the innovating firm in the course of its innovation activities or acquired externally through various channels. The

use of new ideas or the combination of existing knowledge requires innovative efforts that can be distinguished from standardized routines. The basic definition of an innovative firm relates to an enterprise that has implemented at least one innovation, while a product or process innovator is defined as a firm that has implemented either a product or a process innovation. The product, process, marketing method or organizational method must be new to the firm or should be viewed as significantly improved as compared with the existing products, processes and methods. This definition includes, on the one hand, products, processes and methods that firms are the first to develop, and, on the other, those that have been acquired from other firms or organizations (Teece, 2007).

## **2.7 Summary of Literature Review and Research Gap**

The literature has acknowledged that entrepreneurship has long been associated with economic progress and the entrepreneurship in a unique individual who possess certain attributes and characteristics that are superior to others (Schumpeter 1934). The literature also shows that entrepreneurship could be influenced by prior knowledge, social network, absorptive capacity, extroverted, need for achievement, risk-taking and locus of control (Shane, 2003). The introduction of the concept of opportunities has changed the focus of the field of entrepreneurship over the past ten years (Shane, 2012) Research has focused less on the characteristics of entrepreneurs and more about the characteristics of opportunities (Mitchell *et al.*, 2004; Soh, 2003). However, as McMullen *et al.* (2007) and Davidson (2004) highlight, this advance has been limited in many ways.

In the 20th century, the concept of entrepreneurship was further refined and described entrepreneurs as innovators who drive change in the economy by serving new markets or

creating new ways of doing things. The function of entrepreneurs is to reform or revolutionize the pattern of production in many ways such as by exploiting an invention or, more generally, an untried technological possibility for producing a new commodity or producing an old one in a new way, by opening up a new source of supply of materials or a new outlet for products and by reorganizing an industry (Schumpeter, 1934).

While Schumpeterian theories emphasize starting new profit-seeking business ventures entrepreneurship may not necessarily involve starting a business. Rather the role of entrepreneurs becomes more as the catalysts and innovators behind economic progress. Entrepreneurship is not bound by rigid concepts of age nor plagued by homogeneity but they are diverse, found in every culture, class, race, ethnicity, gender, sexual orientation, physical ability and age. Hence, even farmers can be entrepreneurial in their efforts to change their means of production, farming systems, adoption of new varieties and technologies. Entrepreneurs are those people who exhibit common traits such as single-mindedness, drive, ambition, creative, problem solving, practical, and goal-oriented.

In common parlance, being an entrepreneur is associated with starting a business, but this is a very loose application of a term that has a rich history and a much more significant meaning (Dees, 1998). The notion of entrepreneurship was further extended by emphasizing opportunity (Drucker, 1985). Entrepreneurs are not required to cause change but exploit the opportunities that change creates in technology, consumer preferences and social norms among others. Starting a business is neither necessary nor sufficient for entrepreneurship. Every new small business is not entrepreneurial or represents entrepreneurship.

In brief, an entrepreneur is an individual who recognizes an opportunity or unmet need and takes the risk to pursue it. He needs to develop these abilities, managing productivity

and seeking out new markets. Besides, there are few traits essential for successful entrepreneurs. These traits are proactiveness, curiosity, determination, persistence, vision, hardworking, honesty, integrity, strong drive to achieve, high levels of energy, goal oriented, independent, demanding, self-confident, high self-esteem, disciplined, strong management and organizational skills, internally motivated, tolerance for failure, positive attitude, positive thinking, sees opportunities where others see problems. Evidences indicate that for farmers to be successful as entrepreneurs, they need to possess, most, if not all of these characteristics or qualities. While there are studies in most enterprises on entrepreneurship, few studies exist that present empirical evidence on the factors that influence entrepreneurship in tree planting.

To date, little work has explored the sources of entrepreneurial opportunities, and, as a result, we know little about why there are more opportunities in some places or at some points in time than at others (Shane, 2012). He claims there is little work describing entrepreneurial opportunities. It is also glaring to note that conceptual theories on entrepreneurship have been contributed mainly by scholars from the western developed countries whose reasoning could be largely shaped by their different individual, institutional support and socio cultural experiences. This could rather make their theories unsuitable to emerging economies such as Kenya as entrepreneurship or opportunity creation could not be judged in isolation of its environments. In summary, the review of literature demonstrates that there is a significant gap in knowledge on issues associated with entrepreneurship and entrepreneurial opportunity.

Despite the conceptual and empirical analysis, the debates on the whole idea of entrepreneurial opportunity has yet to produce a complete and fully developed alternative framework (Alvarez & Barney, 2007). In contributing to this the addressed factors

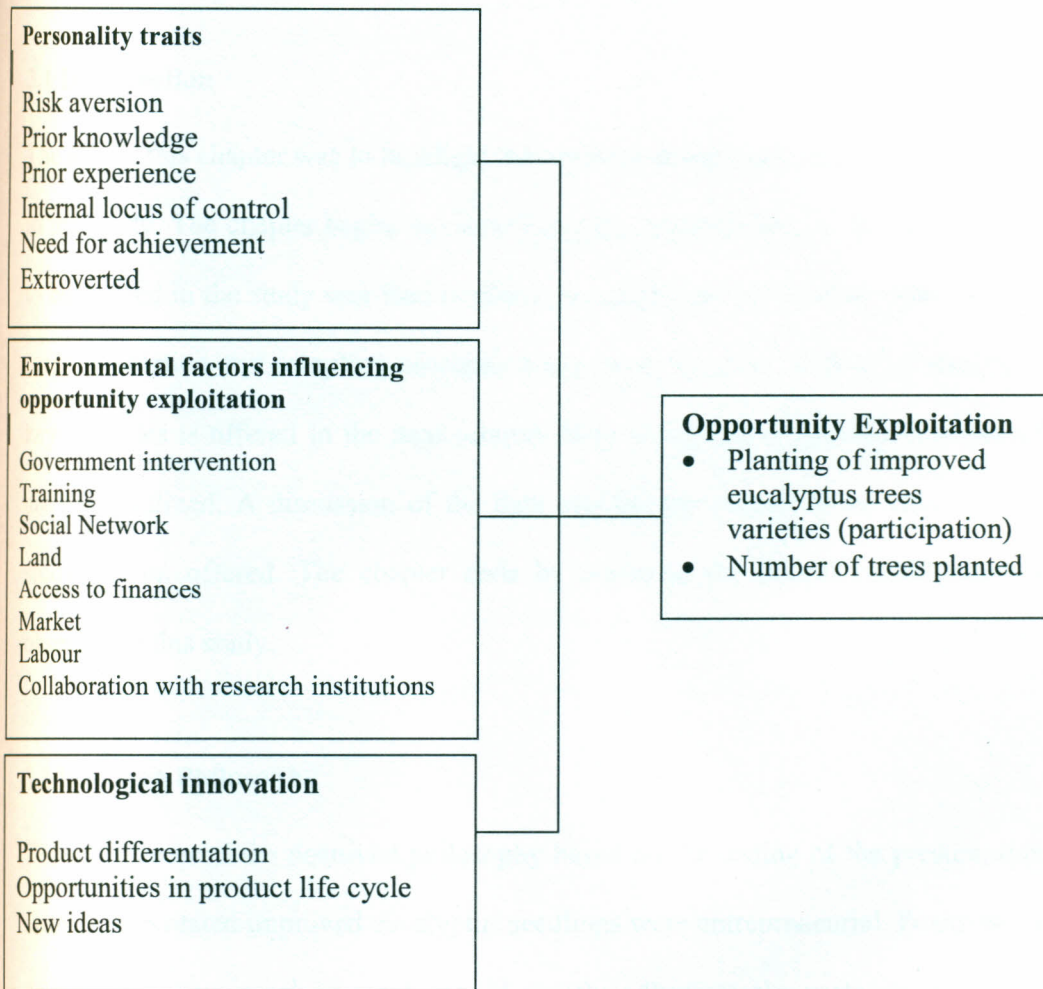
influencing the opportunity exploitation by entrepreneurial improved eucalyptus tree growers in Lari District of Kiambu County, Kenya.

## **2.8 Conceptual Framework**

Exploitation relies on the following factors: financial capital access, risk attitude and its perception, over-optimism and self-efficacy, tolerance for ambiguity, need for achievement and information from previous employment and its transferability. Investigations on the role of prior knowledge and cognition on the discovery of opportunities have largely been conducted among either high technology or manufacturing enterprises in the developing world. This study extended these investigations in smallholder farmer's opportunity exploitation in Lari District in central Kenya as per the conceptual model shown in Figure 2.1 below.

## Independent variables

## Dependent variable



**Figure 2.3: Conceptual Model**

*(Source: Researcher, 2014)*

## **CHAPTER THREE**

### **3.0 METHODOLOGY**

#### **3.1 Introduction**

The aim of this chapter was to highlight the research design and methods that was utilized in this study. The chapter begins by identifying the research design. The empirical model to be applied in the study was then outlined. A description of the study area follows. The study population and sampling procedures are discussed next. A detailed description of key variables is offered in the next section. Data collection instruments and procedures are then outlined. A discussion of the data analysis procedures to be employed in this study is then offered. The chapter ends by outlining the ethical consideration to be observed in this study.

#### **3.2 Research Philosophy**

The study adopted the positivist philosophy based on the testing of the presumption that farmers who plated improved eucalyptus seedlings were entrepreneurial. Positivism is the doctrine that the social sciences should strictly adhere to the methods of the natural sciences. Positivism is a philosophy that states the only authentic knowledge is knowledge that is based on actual sense of experience as well as holds monopoly of knowledge in science. In positivism, knowledge only comes from affirmation of theories through strict scientific method where metaphysical speculation is avoided. For positivism, social science is an attempt to gain predictive and explanatory knowledge of the external world and to do this the researcher must construct theories that consist of highly general statements, expressing the regular relationships (Hamiduzzaman 2009). Positivism also denies the perspective which states that all human qualities are beyond the

reach of scientific understanding. Positivism has been criticized for its universalism and also fails to prove that there are no abstract ideas, laws and principles, beyond particular observable facts and relationships and necessary principles.

### **3.3 Research Design**

The study applied an explanatory survey design. This design was appropriate in testing the relationship between different variables of business phenomena (Saunders *et al.* 2003). The researcher applied this design to investigate the opportunity exploitation among tree farmers in Lari District. The design was very useful in studying the inter-relations between the variables already mentioned in the conceptual framework. Surveys have been used to investigate innovation activities in the forestry sector (Remetsteiner and Weiss, 2005; Schaan and Anderson, 1999) and agriculture in general (Jabbar *et al.*, 1998). Surveys collect a large amount of data from a sizeable population in a highly economical way (Saunders *et al.*, 2003).

The interpretive critique has focused on positivism's inadequate view of the nature of social reality and it can't make the way in which social reality will be constructed or maintained. It entails the authentic view to every tool of social research. To achieve the objectives of the study a deductive approach was adopted. Deductive is taken to be reasoning from the particular to the general. If a causal relationship is presumed to be implied by a particular theory, it might be taken to be true in many cases. A deductive design might test to see if this relationship did obtain on more general circumstances as in the case of farmers who have planted the improved eucalyptus seedlings.

### 3.4 Empirical model

To examine exploitation of opportunity in the planting of improved eucalyptus tree varieties by entrepreneurial tree farmers, probit techniques that exploit Gibbs-sampling and data-augmentation were utilized (Holloway and Ehui, 2002). The Probit Analysis procedure is designed to fit a regression model in which the dependent variable  $Y$  characterizes an event with only two possible outcomes. Two types of data may be modeled; data in which  $Y$  consists of a set of 0's and 1's, where 1 represents the occurrence of one of the 2 outcomes and data in which  $Y$  represents the proportion of time that one of the 2 outcomes occurred. The fitted regression model relates  $Y$  to one or more predictor variables  $X$ , which may be either quantitative or categorical. In this procedure, it is assumed that the probability of an event is related to the predictors through the probit function.

$$P(.X) = \Phi(\beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_k X_k)$$

where  $\Phi(Z)$  is the standard normal cumulative distribution function.

P= Probability

X = Predictor variable

$\beta$ = Variable

The analysis of factors that influence exploitation of improved tree seedlings involved two steps. First, the numerical variables in the survey were subjected to correlation analysis. This exercise identified the critical factors that are associated with the exploitation of the improved tree varieties opportunity. It also helped to establish whether multicollinearity may pose problems in estimation of the econometric models. Subsequent analysis involved identifying factors that explain exploitation by the entrepreneurial tree farmers. The Covin and Slevin (1986) entrepreneurial orientation

scale was subjected to factor analysis. In the factor analysis, the principal component analysis procedure using varimax rotation was used.

The study assumed that the intensity of exploitation is a linear function of another set of farmer and opportunity characteristics, which may be the same or different from the set represented by the covariates  $x_i$ . Specifically, using  $v_i$ ,  $i = 1, 2, \dots, N$  to denote quantities, the intensity of exploitation is specified as:

$$q_i = x_i \beta + u_i$$

The second objective used factor analysis' mathematical model,  $p$  denotes the number of variables ( $X_1, X_2, \dots, X_p$ ) and  $m$  denotes the number of underlying factors ( $F_1, F_2, \dots, F_m$ ).  $X_j$  is the variable represented in latent factors. Hence, this model assumes that there are  $m$  underlying factors whereby each observed variables is a linear function of these factors together with a residual variate. This model intends to reproduce the maximum correlations.

$$X_j = a_{j1} F_1 + a_{j2} F_2 + \dots + a_{jm} F_m + e_j \quad (1)$$

where  $j = 1, 2, \dots, p$

The factor loadings are  $a_{j1}, a_{j2}, \dots, a_{jm}$  which denotes that  $a_{j1}$  is the factor loading of  $j^{\text{th}}$  variable on the 1<sup>st</sup> factor. The specific or unique factor is denoted by  $e_j$ . The factor loadings give us an idea about how much the variable has contributed to the factor; the larger the factor loading the more the variable has contributed to that factor. Factor loadings are very similar to weights in multiple regression analysis, and they represent the strength of the correlation between the variable and the factor.

The third research question was tested using linear regression. The general multiple linear regression model formula was used:

$$Y = \beta_0 + \beta_1 \chi_1 + \beta_2 \chi_2 + \beta_3 \chi_3 + \dots + \beta_k \chi_k + \epsilon$$

Where

Y is the dependent variable

$\chi_1, \chi_2 \dots \chi_k$  are the independent variables

$E(y) = \beta_0 + \beta_1\chi_1 + \beta_2\chi_2 + \dots + \beta_k\chi_k$  is the deterministic portion of the model

$\beta_1$  the constant coefficients determines the contribution of the independent variable  $\chi_1$

$\epsilon_1$  is the random error with mean 0 and variance of 1 (Mc Clave 2002: 578). The summary output when all independent variables are included in the multiple regression equation leads to the Analysis of Variance (ANOVA). The F-test associated with the ANOVA table is used to test the null hypothesis that the independent variables are significant to the model of analysis.

### 3.5 Operationalization and Measurement of Variables

The dependent variable for this study was opportunity exploitation of improved eucalyptus tree varieties by entrepreneurial tree farmers. This variable was operationalised in two ways. In the first instance, the dependent variable was operationalised as the propensity to plant improved eucalyptus tree varieties. Successful exploitation of improved eucalyptus tree varieties was labelled one, otherwise zero. The second instance for assessing exploitation was by using the number of improved eucalyptus trees planted by each farmer. The independent variables were “prior knowledge on related entrepreneurial opportunities”; “individual differences in perceptions on the nature of opportunity”; and “minimum efficient scale of operation required for entry and sustenance”. These were measured as discussed below.

Three types of property-based resources, namely farm size, availability of credit and the social economic group of the farmer were assessed in this study. The size of the farm was measured in hectares. Availability of credit was labelled as one for successful access to credit in the last three years, otherwise, zero.

Maturity, gender, education attainment, experience, cognition, extension, networks and interactions was used to assess knowledge-based resources. Maturity was measured as the age of the farmer in years. Gender took two values; males were labelled one and females zero. Prior knowledge was assessed through experience of the farmer and the levels of education attained. Education was measured in two ways. In the first, the highest level of formal education attained was sought while in the second, the number of trainings (workshops, seminars, conferences) attended by the tree farmer in the last three years was solicited. Three measures of experience were considered in this study. These include industry experience, entrepreneurial experience and breadth of experience. Industry experience was measured as the total number of years a farmer had in tree farming. The total number of previous start-ups was used to measure entrepreneurial experience. The total number of previous jobs held will be used to assess breath of experience.

Individual Differences in perceptions on the nature of opportunity was assessed to cognitive approaches. Cognition was assessed using self-assessment by the tree farmers. The farmers were requested to assess their level of creativity using a five point likert question that ranges from 1 = poor through 5 = excellent. Extension was assessed as the number of contacts with extension agents in the last twelve months. Farmers were required to state the number of visits they have received from extension agents in the last twelve months where issues of tree farming were highlighted. Networks were assessed as the total number of voluntary organization a farmer belongs to. Farmers were required to list all the voluntary organizations they belong to.

Three types of interactions were assessed. The first one, interaction in local scientific innovation system was assessed using a composite dummy variable for collaborations on innovation between the tree farmer and research institutes. The second assessed

interactions in the local vertical innovation system. A composite dummy variable for collaboration with suppliers and customers were used. The third assessed interaction in the local horizontal innovation system. A composite dummy variable for collaboration with competitors and consultants were used. Organizations of the tree farmers were proxied by entrepreneurial orientation. The Covin and Slevin (1986) scale was used to measure entrepreneurial orientation. This is a five point (1 = strongly disagree to 5 = strongly agree) scale made up on nine items. Its psychometric properties are well established and measures innovativeness, proactiveness and risk-taking propensity. The summary operationalization of the research variables used in the study is as shown in Table 3.1 below.

**Table 3.1: Operationalization of variables used in the models**

<b>Individual explanatory Variable</b>			
	<b>Variable Name</b>	<b>Operationalization</b>	<b>Measurements</b>
1.	Gender	Male or Female	1 for male or 2 for female
2.	Age	Age since birth	Years
3.	Education Level	Primary, Secondary, College and Degree	Scale 1-4 for primary to Degree
4.	Prior knowledge entrepreneurship	Training	Years in Agro-forestry
5.	Prior experience	Past employment	Yes=1 and No=0
6.	Risk averseness	Engagements in new ideas last two years	Yes= 1 and No=0
7.	Passion for environmental conservation	Involvement in conservation activities	Yes =1 and No=0
8.	Locus of control	Control of production process in tree planting	Yes=1 and No=0
9.	Entrepreneurial orientation	Tried new means of production on the farm	Yes=1 and No=0
<b>Factors explanatory variables</b>			
1.	Access to fiancés	Sources of finances to support the exploitation	Scale 1 to 4
2.	Government Interventions	Supportive forestry policies for improved tree varieties	Yes=1 and No=0
3.	Collaboration with research institutions	Contacts with KEFRI	Yes=1 and No=0
4.	Support by extension services	Visits by extension staff	Number of visits
5.	Size of the land owned by respondent	Area of land	Number of acres
<b>Technological Innovation explanatory variable</b>			
	Opportunity by product differentiation	I Identification of improved eucalyptus trees varieties	Yes=1 and No=0
	New ideas tried on the farm	Other varieties planted or tried	Number of varieties tried
	Opportunities in Life cycle of product	Number of products or services during the production process	Numbers
<b>Dependent variable: Opportunity exploitation response variable</b>			
	Planting of improved varieties	Participation in planting of improved varieties	Decision to plant
	Number planted	Number planted	Total planted

### 3.6 Target Population

The target population for the study was the farmers who have planted improved varieties of eucalyptus trees in Lari District and may be used to make inferences. Thus, the target population defined the units for which the findings of the study are meant to generalize. This study was conducted in Lari District hived off the larger “Kiambu District” now being the County, of the Central Province in Kenya. The old Kiambu District had an estimated population of about 812,535 people in the year 2001, more than half of whom were said to be less than 24 years old (GoK, 2001). Using the United Nation’s annual population growth rate for Kenya (2005 – 2010) as 1.45%, the current population of Kiambu County would thus be estimated as close to 930,350. Out of the districts total land area, 97 percent is arable of which 90 percent is under small holder farming. The average land holding is about 0.8 hectares (GoK, 2001). Tree growing is an income generating activity that is attracting renewed interest in this area particularly with the introduction of improved trees varieties seedlings (Wakhusuma *et al.*, 2003).

By 2002 it was estimated that 2,500 farmers were involved in improved eucalyptus trees planting activities in Lari District (Wakhusama *et al.*, 2003). The District has potential for the production of timber and wood fuel. It is estimated that 78 percent of the all households in the district use wood as the main source of energy.

### 3.7 Sampling Design

Considering that these were preliminary estimates by TBTK as at then and current official figures are not yet published, the researcher applied the snowball sampling technique to select the target respondents. This use of snowballing is a type of purposive sampling. In trying to recruit people who are difficult to identify or have to meet certain criteria to participate, then snowball sampling can be used to ease data collection. Find one person

who qualifies to participate, ask him or her to recommend several other people who have the traits of interest and participant list can grow from there. Snowballing method yields a study sample through referrals made among people who share or know of others who possess some characteristics that are of interest to the researcher (Blernackl and Waldorf, 1981). The method is well suited for a number of research purposes and is particularly applicable when the focus of study is on a sensitive issue, possibly concerning a relatively private matter, and thus requires the knowledge of insiders to locate people for study. This method uniquely designed for sociological research because it allows for the sampling of natural interactional units.

According to Kothari (2008), snowball sampling is a technique for getting a research sample where existing study subjects recruit future subjects from among their acquaintances. Thus the sample group appears to grow like a rolling snowball. As the sample builds up, enough data is gathered to be useful for research. The farmers that were initially identified were requested to provide leads to their counterparts from across the district. Following Saunders *et al.* (2003) the minimum sample size for this criterion was calculated as:

$$n = \frac{p \times q \times (z^2)}{d^2} = \frac{(0.5) \times (0.5) \times (1.96)^2}{(0.05)^2} = 384 \text{ Smallholder tree farmers}$$

Where:

- n = the desired sample size,
- p = the proportion of tree farmers who undertake entrepreneurial activities.

Since this proportion is not known an estimate of 0.5 is made.

- q = 1 - p,
- $z^2$  = the standard normal deviate and
- d = the error of margin allowed (0.05 in this study).

The inclusion criteria for this study was any smallholder tree farm that employs less than fifty people operating in Lari District, and voluntarily agrees to participate in the study. Consequently, any smallholder tree farm that does not fulfil these criteria was excluded from this study.

### **3.8 Data Collection Instruments**

The focus during the field survey was on gathering primary data. This is factual data collected for the first time to address the problem at hand. The questionnaire was the principal tool in collecting primary data. The questionnaire contained structured, semi-structured and open-ended questions. According to Kinoti (1998), semi-structured questions may elicit adequate qualitative and quantitative data. The questionnaire was structured into five sections. The first section requested the general information of the respondent, the second sought to establish the opportunity exploitation of improved eucalypts tree varieties opportunities, the third section assessed the critical factors that influences the exploitation of improved eucalypts varieties opportunities among tree farmers and the fourth section sought to determine the minimum efficient scale of operation that is required for entry and sustenance of opportunity exploitation by entrepreneurial tree farmers.

### **3.9 Validity**

The validity of the research tools was tested in two steps. First, variables for this study were extracted from previous literature. Second, experts in entrepreneurship and forestry helped in the validation of variables for this study. The extracted variables were given to two groups of experts as suggested by Mugenda and Mugenda (2003). One group was asked to assess what concepts the research instrument is trying to measure while the other

was asked to determine whether the selected items accurately represent the concept under study. A pilot study was conducted with 20 small scale tree farmers in the study area before the final survey. These enterprises did not form part of the final sample size. The major purpose of the pilot study was to check the face and content validity of the research tools. It also helped to estimate the completion time for administering the research tools. Responses from this exercise were only be used to improve the quality and administration of the research tools for this study. The pre-tested questions were then be compiled into a structured questionnaire.

### **3.10 Reliability**

The reliability of the questionnaire was assessed using the internal consistency technique (Mugenda and Mugenda, 2003). In this approach, a score obtained in one item was correlated with scores obtained in other items in the instrument. Cronbach's Coefficient Alpha was calculated with results of 0.76 this determined how well items correlate with each other. Following Kothari (2008), alpha levels of above 0.80 was considered as acceptable in this study.

### **3.11 Data Collection Procedures**

Pre-testing was performed to ensure validity and reliability of research instruments (Mugenda and Mugenda, 2003). The researcher recruited and inducted three research assistants to aid in data collection. These were at minimum diploma graduates with past experience in tree farming systems research. The research assistants were oriented on the purpose of the study, the objectives, structure of the tools, and the approaches to be applied in sampling as well as the actual data collection. Data was collected using interviews with smallholder farmers in their farmyards. The pre-tested questionnaire was

administered by the researcher with the help of three experienced research assistants. The research assistants were supervised closely by the researcher during data collection.

### **3.12 Data Analysis**

After the fieldwork, before analysis, all the questionnaires were adequately checked for completeness. The information was coded and entered into a spreadsheet and analyzed using SPSS (Statistical Package for Social Sciences). The data was checked to ensure that the output is free from outliers and the effect of missing responses is at minimum. The survey data was initially summarized using frequencies, percentages, means and standard deviation (SD). It was presented using graphs, charts and contingency tables.

The Covin and Slevin (1986) entrepreneurial orientation scale was subjected to factor analysis. Correlation quantifies the extent to which two quantitative variables, X and Y, “go together.” When high values of X are associated with low values of Y, a negative correlation exists. This study embraced correlation in objective one and two. In research question one the study sought to measure whether tree farmers demonstrate entrepreneurial personality traits in their decision to plant improved eucalyptus trees varieties. While research question two was on factors influence opportunity exploitation by tree farmers who have planted improved eucalyptus varieties.

The multiple regression analysis was used to test significance of variables. The summary output when all independent variables are included in the multiple regression equation leads to the Analysis of Variance (ANOVA). The F-test associated with the ANOVA table is used to test the null hypothesis that the independent variables are significant to the model of analysis.

## CHAPTER FOUR

### RESULTS AND DISCUSSION

#### 4.1. Introduction

This chapter presents the analyses and interpretation of the data gathered through the semi-structured interviews and observable evidence. The data was obtained from smallholder tree farmers on improved eucalyptus varieties in Lari district. It is a fundamental chapter in research because it classifies the raw data into some purposeful and usable information (Kothari, 2004). The importance of this chapter is therefore enormous and cannot be understated as it gives the research the impetus it needs. The study sought to address three research objectives namely to identify the entrepreneurial personality traits of tree farmers in Lari District who have planted improved varieties of eucalyptus varieties, examine the factors that influence the exploitation of opportunities by entrepreneurial tree growers of improved eucalyptus varieties and analyze the effects of technological innovations on the intensity of opportunity exploitation by entrepreneurial tree farmers of improved eucalyptus trees.

#### 4.2 Demographic Data

This section presents the demographic characteristics of individual farmers. They include; gender, age in years, level of education and whether they had been employed before. The rationale behind inclusion of these attributes in the analysis is that they help to shed some light on the type of farmers the research is dealing with.

#### 4.2.1 Gender of Respondents

The respondents were asked to indicate their gender first. The results are as shown in Table 4.1.

**Table 4.1: Distribution of farmers their gender**

	<b>Frequency</b>	<b>Percent</b>
Male	254	66.0
Female	125	32.5
No response	6	1.6
<b>Total</b>	<b>385</b>	<b>100.0</b>

*Source: Field Data, 2011*

Majority of the farmers (66.0%) were male and 32.5% of them were female. The result shows there are more male farmers involved in farming of trees than their female counterparts in this region. The researcher also asked the farmers to indicate their age. It also indicates that the data show that the numbers of women tree growers are lower than men's. This agrees with the finding of Bosmas et al. (2009) who explained it as a result of the difference between "necessity" and "opportunity" entrepreneurship, with necessity entrepreneurship found to be more prevalent among women in poor countries, thus pointing to the role played by inequality and exclusion in women's entrepreneurial inferiority. This is clearly evident in the General Entrepreneurship Monitor (GEM) Report on Women and Entrepreneurship (Allen et al. 2007) that examined the rates of entrepreneurship in 43 countries and showed that in all these countries the rates of women's entrepreneurship were lower than men's. Women in poor countries, it seems, are more influenced by "push" than by "pull" factors. These findings reinforce the

explanation for women's entrepreneurial inferiority as resulting from social and economic exclusion and lack of equality.

#### 4.2.2 Age of farmers

Age of farmers is important in this study. Hence the study sought from the respondents to indicate their age. The results are as shown in Table 4.2.

**Table 4.2: Distribution of farmers by their age**

	Frequency	Percent
Below 25 years	9	2.4
26-35 years	49	12.7
36-45 years	163	42.3
Above 45 years	164	42.6
<b>Total</b>	<b>385</b>	<b>100.0</b>

*Source: Field Data, 2011*

From table 4.2 it is clear majority of the farmers (84.9%) were aged between 36 years and above while 12.7% of them were aged 26-35 years and 2.4% were aged below 25years. This shows that there are farmers of all ages in the area of study. This promoted the researcher to enquire from the farmers to indicate their level of education. The results agrees with those of Levesque and Minniti (2006) who noted that age has been shown to be a triggering factor of entrepreneurial behaviour as it is a crucial characteristic in the thought decision-making process. Not only the age distribution of a population may be an important issue for the rate of potential entrepreneurs, but also how such age distribution interact with individuals' perception of desirability and feasibility towards entrepreneurship. It also agrees with Sequeira et al (2007) who found that individuals' age to have a significant and positive relationship with start-up intention. Some authors have

found that younger workers' technology usage decisions were more strongly influenced by attitude toward using the technology, while older workers were more strongly influenced by subjective norm and perceived behavioural control. Indeed, changes in individuals' characteristics due to their ongoing lifespan development should influence their attitudes, abilities and motivation towards entrepreneurship.

#### 4.2.3 Level of education of the farmers

According to Lazear (2005), entrepreneurship requires general knowledge and the formal education system normally increase this, particularly at the lower levels that are most common in developing countries. As generally, success of entrepreneurship increases with education but this might stem from the fact that more talented individuals are both more successful and more educated (Van der Sluis et al (2007). This study sought to identify the level of education the farmers had attained. The results are as show in Table 4.3.

**Table 4.3: Level of education of the farmers**

	<b>Frequency</b>	<b>Percent</b>
Primary	129	33.5
Secondary	180	46.8
Tertiary college	63	16.4
University graduate	6	1.6
None	2	.5
No response	5	1.3
<b>Total</b>	<b>385</b>	<b>100.0</b>

*Source: Field Data, 2011*

Most of the respondents had attained (46.8%) secondary level of education, while 33.5% of them had primary level of education, 16.4% of them had tertiary college while 1.6% of them University graduate and 0.5% had no education. The researcher observes that the direct impact of education might also differ across occupations and therefore influence the initial choice of occupation. If education has a higher impact on the productivity in business activities compared to other occupational choices, more talented persons become entrepreneurs. When education improves the entrepreneurial ability, but not the productivity of an individual employee, education will increase both the likelihood of becoming an entrepreneur and the performance of the entrepreneur. The results concurs with those of van der Sluis et al (2005) in their review of studies from developing countries, they found that more educated individuals are more likely to become wage earners and/or entrepreneurs and those women are more likely to become wage earners when education increases.

#### **4.3 Personality traits of entrepreneurial tree farmers in Lari District**

Coon (2004) defines personality traits as stable qualities that a person shows in most situations. Several personality factors are associated with entrepreneurial opportunity exploitation, and therefore they emergence and success of entrepreneurs (Cismariu & Mocan, 2010; Zhao, Seibert, & Lumpkin, 2010). Identified traits associated with entrepreneurial orientation include risk aversion, prior knowledge, prior experience, international locus of control and extrovert (Covin & Wales, 2011; Lumpkin & Dess, 1996; McElwee, 2008).

### 4.3.1 Prior Experience

Employment of farmers before venturing into agro forestry means that they had lived another life as professionals. This would then mean that this may have been as a result of what they either did before or their passion for becoming farmers. Hence this study sought to establish from the farmers whether they had been employed before venturing into agro forestry. The results are as shown in Table 4.4.

**Table 4.4: Responses of farmers on whether they had been employed before venturing into agro forestry**

	Frequency	Percent
Yes	119	30.9
No	266	69.1
<b>Total</b>	<b>385</b>	<b>100.0</b>

*Source: Field Data, 2011*

Majority of the farmers (69.1%) had not been employed before venturing into agro forestry and 30.9% of them said they had been employed before venturing into agro forestry. This shows that they were still farmers hence since they had been farming coffee, tea and others were practicing mixed farming. For those who were employed when asked to indicate their profession, some were doctors, librarians, secretaries, teachers, self-employment, and others were already farmers. They had worked for between 1- above 30 years in their careers and then turned to be agro farmers. This made the researcher enquired from the farmers the number of years they had been practicing agro-forestry.

### 4.3.2 Number of years in Agro forestry

Number of years in agro forestry would mean that farmers had gained experiences while practicing. All farmers are unique in what lead them to become farmers. They also made their decisions different to invest in agro-forestry. Hence this study sought from the respondents the number of years they had been in agro forestry. The results are as shown in Table 4.5.

**Table 4.5 Number of years in agro forestry**

	<b>Frequency</b>	<b>Percent</b>
1-5years	159	41.3
6-10 years	170	44.6
11-15years	24	6.2
16-20years	18	4.7
21-25 years	14	3.6
<b>Total</b>	<b>385</b>	<b>100.0</b>

*Source: Field Data, 2011*

Most of the farmers (44.6%) had been practicing agro-forestry for the last 6-10 years and 41.3% of them had 1-5 years. About 6.2% of them had 11-15years, 4.7% of them had 16-20years and 3.6% of them had 21-25 years if agro-forestry. This shows that majority of the farmers had been in farming for between 1-10years. Hence the number of years are also as shown in the number of years they had worked elsewhere since there were farmers they may have started practicing agro-forestry earlier enough. The researcher's general assumption in the perspective of previous employment is that individuals develop different stocks of knowledge throughout their careers, and that results agree with Shane (2000) who noted that the knowledge gained influences their ability to recognize and

exploit particular entrepreneurial opportunities. The experiences gained from previous career experiences can be expected to be a significant determinant of both the ability to better recognize and act on opportunities as well as to organize and manage new ventures (Shane and Khurana, 2003). The empirical findings indicate that different types of career experience lead to different types of entrepreneurial knowledge, and that the knowledge developed also depends on the entrepreneurs' preferred mode of transforming experience into knowledge, i.e., whether they prefer to put their emphasis on exploring new possibilities or exploiting their pre-existent knowledge. This implies that the simple participation in an event is not sufficient for entrepreneurial learning to occur, as something must be done with this experience. Literature provides some empirical support for that the gaining of new experiences and the development of knowledge should be understood as a process where experiences become transformed into knowledge (Shane and Venkataraman, 2000). This supports the importance of taking the transformation process into account for explaining the development of entrepreneurship.

#### **4.3.3 Prior Knowledge**

Prior knowledge on tree farming has proven to increase the likelihood that people will exploit opportunities. It seems that people with prior knowledge are more likely to see new venture opportunities. The farmers were asked to indicate whether they had prior knowledge on agro forestry. The results are as shown in Table 4.6.

**Table 4.6 Knowledge in agro forestry**

	Yes		No	
	Frequency	Percent	Frequency	Percent
Had knowledge in agro-forestry	289	75.1	96	24.9
As a farmer has been in innovative and implementation of new technology and knowledge	300	77.9	85	22.1

*Source: Field Data, 2011*

Majority of the farmers (77.9% agreed that they had been frontrunners in the past, hence had a higher probability to be frontrunners at the present and farmers that were laggards in the past are likely to remain hence had the aggression to invest in improved eucalyptus tree varieties. About three quarters of the farmers had the knowledge in agro-forestry. The researcher observes that the people who had work related to forestry and others who had been trained on agro-forestry were likely to embrace new innovation and technology. The result agrees with Freeman (1992) who noted that nature of these experiences seems to provide easier access to new knowledge and technology. Knowledge is related to knowing and refers to the more rational part of entrepreneurship.

#### **4.3.4 Risk aversion**

Risk-taking propensity can be defined as an individual's tendency to take or avoid risk. Hence this study sought to know from the farmers why they had planted the improved eucalyptus tree seedlings and other improved varieties. The results are as shown in Table 4.7.

**Table 4.7 Risk aversion**

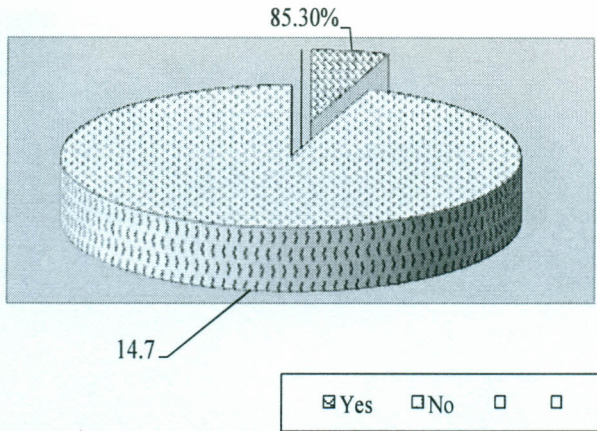
				Yes		No	
				Frequency	Percent	Frequency	Percent
Planted improved eucalyptus tree seedlings				385	100	0	0
Planted other improved varieties				185	58.1	200	51.9
Improved farm income				280	72.7	100	27.3

N=385 *Source: Field Data, 2011*

All the respondents indicated that they had planted improved eucalyptus tree seedlings while 72.7% indicated that this had improved on their farm income and 51.9% of them indicated that they had not planted other improved varieties. The researcher observes that for those farmers who had planted other improved varieties had planted tissue cultured bananas, mangos, apples and other food plants. This had given them the courage to venture into planting the improved eucalyptus tree seedlings. The results agree with Begley & Boyd, 1987; Caird, 1991) who noted that compared to the general population; entrepreneurs are more likely to exhibit levels of risk taking behaviour.

#### 4.3.5 Internal locus of control

Entrepreneurs are usually oriented towards the internal locus of control (Korunka et al., 2003; Shane et al., 2003; Vecchio, 2003) because of their desire to have a direct impact on results (Shane et al., 2003). Thus, internal locus of control is significantly related to venture growth (Lee & Tsang, 2001). With this in mind the study sought to establish the skills and knowledge possess were able to control production process of improved eucalyptus tree varieties. The results are as figure 4.1.



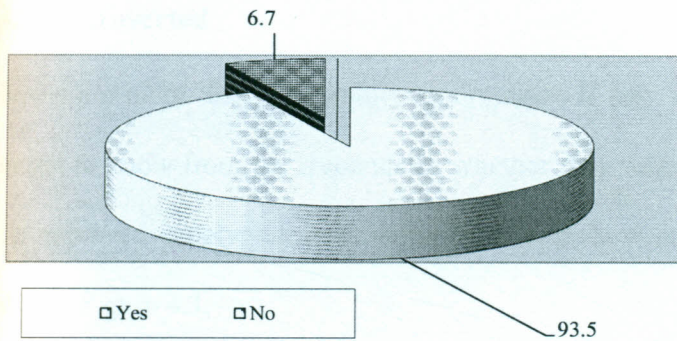
**Figure 4.1 Skills and Knowledge possess were able to control production process**

*Source: Field Data, 2011*

Majority of the respondents (85.3%) indicated that they had skills and knowledge that they possessed and were able to control production process of their eucalyptus trees while a small percentage of 14.7% did not possess the knowledge and skills to control production process of their eucalyptus trees. The researcher observes that knowledge and skills in important to possess as an entrepreneur since this enables one to enhance what know best to the betterment of their business venture. The results agrees with Cromie (2000, Ho and Koh 1992) who noted that the internal locus of control is an entrepreneurial characteristic have been reported in the literature. It also agrees with Bonnett and Furnham (1991) who noted that internal locus of control was found to be positively associated with the desire to become an entrepreneur.

#### **4.3.6 Need for independence**

The need for independence is simply an aspect of personality that drives people to undertake actions alone rather than involving others. The study sought to find out whether the farmers had a self-actualization drive. The results are as shown in Figure 4.2.



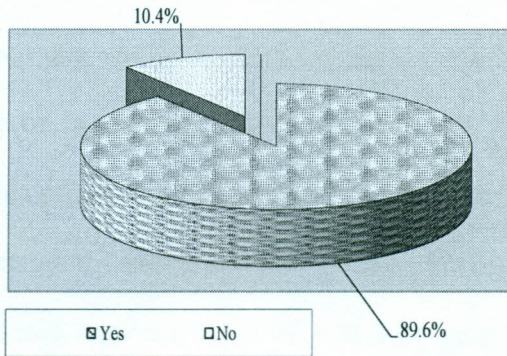
**Figure 4.2 The farmers had a self-actualization drive**

*Source: Field Data, 2011*

Majority of the respondents (93.5%) indicated that they were driven by self-actualization while 6.7% of them had no self-actualization drive. The results agree with Burke, Fitzroy and Nolan, 2000) who noted that entrepreneurship requires the trust in one's own judgment versus the judgment of others. Some empirical evidence suggests that entrepreneurs' desire for independence is the most common reason they give for starting their own businesses.

### 4.3.7 Extroverted

People are more likely to exploit opportunities if they are more extroverted. This study sought to know from the respondents whether they were able to evaluate the potential of the improved eucalyptus trees varieties as compared to other trees. The results are as shown in Figure 4.3.



**Figure 4.3 Evaluate the potential of the improved eucalyptus trees varieties as compared to other trees**

*Source: Field Data, 2011*

Majority of the respondents (89.6%) noted that they evaluated the potential of improved eucalyptus trees varieties as compared to other trees before planting and 10.4 did not evaluate. The researcher observes that farmers who are able to evaluate will always be able to identify the advantage of planting improved eucalyptus tree varieties before venturing in to farming. The results concurs with those of Shane 2003 who noted that compared to introverts, extroverts are more likely to exploit opportunities because they are better able to assemble resources and organize under conditions of information asymmetry and uncertainty.

### 4.3.8 Probit analysis on the relationship between personality trait and planting

improved eucalyptus trees varieties.

The Probit analysis procedure is designed to fit a regression model in which the dependent variable  $Y$  characterizes an event with only two possible outcomes. Two types of data may be modeled: data in which  $Y$  consists of a set of 0's and 1's, where 1 represents the occurrence of one of the two outcomes and data in which  $Y$  represents the proportion of time that one of the two outcomes occurred. The fitted regression model relates  $Y$  to one or more predictor variables  $X$ , which may be either quantitative or categorical. In this procedure, it is assumed that the probability of an event is related to the predictors through the Probit function. Using a general functional form  $F(\cdot)$ , it can be write the conditional expected value of  $y$  to be a general function of the linear index function as:

$$P(X) = \Phi(\beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_k X_k)$$

The function  $P$  could be the simple linear (identity) function, Probit (normal) transformation or any other nonlinear function of the linear index function. The dependent variable is the conditional probability that the binary outcome is equal to 1. Probit analysis is used to analyze how tree farmers demonstrate entrepreneurial personality traits in their decision to plant improved eucalyptus trees varieties. The results are as shown in Table 4.8 below.

\*\*\*\*\* PROBIT ANALYSIS \*\*\*\*\*

>Parameter estimates did not converge in maximum number of iterations.

Number of iterations = 20

Optimal solution not found.

Parameter Estimates (PROBIT model: (PROBIT (p)) = Intercept + BX):

**Table 4.8 Probit Analysis**

	<b>Regression coeff</b>	<b>Standard Error</b>	<b>Coeff./S.E.</b>
Production control leads farmers to adopt new technology	.03778	.01452	2.60173
Higher level of education leads to adopt new technologies	-.10986	-.06597	-1.66537
Past employment before venturing into agro forestry	-.13998	.04602	-3.04170
Personal degree of risk aversion	.07073	.02811	2.51591
Passion for environmental conservation	-.00714	.01152	-.61944
Prior knowledge in agroforestry management	.09847	.03201	3.07596
Have ever planted other improved varieties	-.09048	.12848	-.70419
Has that improved your farm income	-.04842	.13278	-.36466
Has the skills and knowledge you possess assisted you	-.00173	.05616	-.03077
Are you driven by self-actualization	-.11051	.05407	-2.04378
Did you first evaluate the potential of the improved eucalyptus trees	-.02112	.03637	-.58078
Farmer who were frontrunners have a higher probability than laggards in the adoption	.05591	.04561	1.22580

Source: field data analysis

Intercept Standard Error Intercept/S.E. have you planted eucalyptus trees seedlings

-1.06524 .20440 -5.21145 No

-.96494 .20810 -4.63690 Yes

Pearson Goodness-of-Fit Chi Square = 444.375 DF = 308 P = .000

Since Goodness-of-Fit Chi square is significant, a heterogeneity factor is used in the calculation of confidence limits.

Source: Field Data, 2011

The goodness of fit chi-square, is the log likelihood multiplied by 2. Because log-likelihood is negative, the goodness of fit chi-square is positive, the smaller the values indicate a good prediction of the dependent variable. A small p-value (less than 0.05 if operating at the 5% significance level) indicates that the model has significantly reduced the deviance and is thus useful for predicting the probability of the studied factors. The p-value for the residual term tests whether there is significant or lack-of it, or rather whether a better model may be possible. A small p-value indicates that significant deviance remains in the residuals, so that a better model might be possible. In this case the p-value being at  $0.01 < 0.05$  means that there is no significant difference between the number of trees planted and personality traits. The positive sign on the variable's coefficient indicates that higher values of the variable increase decision to embark on planting improved tree varieties.

The indication that the farmers in the study area were mostly above the middle aged entrepreneurs with 84% above 36 years old.. The implication is that they are energetic and within the active productive work force. This finding refutes Davidson (1991) who inferred that increasing quest of an individual to be an entrepreneur stems from the general need of older individuals to earn additional income to support the cost of living.

Literacy (ability to read and write) would enable the farmers to better utilize effectively and efficiently available resources in the area and curtail frivolous spending. As expected, higher education would enhance improved business ideas, skills, innovation and managerial ability for business sustainability. This result is in agreement with Osondu et al (2014) that as an individual increases his educational attainment, his entrepreneurial quest and skill increase, thus expanding his knowledge base which makes him alert to new opportunities. This indicates a relatively high farming experience in the study area.

This could be explained by the fact that farmers were highly experienced in farming therefore prefer to depend on farming as income (Osondu, et al, 2014).

The coefficient (-0.13998) of prior experience was negative and statistically significant at 99.0% confidence level. The sign is not in conformity with a priori expectation. This implies that prior experience has an indirect influence on the decision of the farmers to embark on entrepreneurship increase in prior experience of an entrepreneur decreases her desire and quest to be an entrepreneur. This finding refutes Shane (2000) who inferred that increasing experience of an individual to be an entrepreneur stems from the general need of prior experience of individuals. This outcome may be due to the fact that prior experiences of farmers may be from employment unrelated to farming and hence the need of training. The coefficient of skills to make it work (-.00173) was significant at 5.0% alpha level and had a negative effect on farmers' decision to embark on planting of improved eucalyptus trees entrepreneurship. This indicates the farmers may not have had skills to implement the planting of the improved varieties.

The fact that prior knowledge in agro-forestry influenced participation in planting of improved eucalyptus varieties entrepreneurship implies that entry into lucrative commercial tree growing enterprise could be more difficult for the poorly informed farmers with little experience in tree farming. This could increase disparities in the adoption of the improved eucalyptus varieties where the inexperienced farmers are exposed to higher risks due to dependence on limited experience in tree farming. This outcome echoes the findings by Shane and Venkataran (2000) who reported that farmers with increased prior knowledge more likely to exploit entrepreneurial opportunities. This may then indicate that even if farmers planted improved eucalyptus trees their personality

traits may not be the only factors that influenced the farmers into planting but there may have been other factors.

#### **4.4 Environmental factors influencing Opportunity Exploitation of improved eucalyptus seedlings by entrepreneurial tree farmers in Lari District**

Enhancing the uptake of improved tree species is therefore an option that policy makers have to consider if this demand is to be met. In order to meet future demand of forestry products in Kenya, planting rates need to be increased to between 60-200 million seedlings per year (Wakhusuma and Kanyi, 2002). Policy options that can be used to enhance the adoption of improved tree seedlings by smallholder farmers in Kenya are not clearly understood.

##### **4.4.1 Land Size of the Respondents**

Small scale farmers can plant trees when land is available and they can achieve security of land tenure. This also a long way with the size of land and type of farming one engages in. It is important to know the size of land the farmers have ventured in planting trees. This would enable the study to classify the type of farmers and whether the targeted population was captured in the study. The results are as shown in Table 4.9.

**Table 4.9 Size of land in acres**

Acres	Frequency	Percent
0.1-2	254	66.0
2.1-4	104	27.0
4.1-6	11	2.9
6.1-8	2	0.5
No Response	14	3.6
<b>Total</b>	<b>385</b>	<b>100.0</b>

*Source: Field Data, 2011*

Majority of the farmers (66.0%) had 0.1-2 acres of land, while 27.0% of them had 2.1-4 acres, with 2.9% of them had 4.1-6 acres and 0.55 of them had 6.1-8 acres. This shows that majority of the small-scale farmers have very small pieces of land hence could only practice agro-forestry in their farms. The researcher observes that the farm size land does not seem to affect entrepreneurship in Lari District size of farm. This is contrary to common belief that large farmers have more risk bearing ability compared to small farmers. Hence farm size is not necessarily a major constraint for the promotion of entrepreneurship. The results agree with those of Singh (2013) who observed that new technologies are neutral to scale/farm size but certainly not neutral to resources, even a small farmer operating 2 ha of land having higher access to irrigation facilities and improved farm practices with entrepreneurial ability can earn higher income than a small farmer with same size of holding without other facilities. Hence, the farm size per se is not a major constraint.

#### **4.4.2 Availability of information**

Access to information is vital. This enables one to know the availability of new technology, learn new skills and also learns how to implement the new information. The

farmers' knowledge of the improved tree genotypes is important. Knowledge is a familiarity, awareness or understanding of improved eucalyptus tree genotypes this may have been acquired through experience or education by perceiving, discovering, or learning. Hence this study sought to establish from the farmers whether they had knowledge of the improved tree genotypes. The results are as shown in Table 4.10.

**Table 4.10: Responses of the farmers on knowledge of the improved tree genotypes**

	<b>Frequency</b>	<b>Percent</b>
Prior experience (past employer)	165	42.9
A friend or relative	85	22.1
Mass media	24	6.3
Public baraza	106	27.6
Experimentation	2	.5
Personal idea	3	.8
<b>Total</b>	<b>385</b>	<b>100.0</b>

*Source: Field Data, 2011*

Most of the respondents 42.9% indicated that they had prior experience before venturing into farming, while 27.6% of them should be in a public baraza, 22.1% of them had a friend or relative with the knowledge of improved tree genotypes, while 6.3% of them had it over the mass media, 0.8% of them had a personal idea and 0.5% of them had experimented. This shows that there were respondents who had prior experience while others had gotten the information through public baraza where the chief had a meeting and there were extension officers who were teaching about the improved tree genotypes. This shows that some people attended the public barazas with an open mind that they would get somewhere with their life. The researcher enquired the number of improved

trees genotypes the farmers had planted to date. Slightly below half (49.8%) of the small scale farmers had 1-50 trees while 26.2% of them had 51-100 trees and 24.4% of them had more than 100 trees, to an extent of some farmers having 4000 trees in their land.

#### 4.4.3 Availability Extension officers

Agricultural extension officers are intermediaries between research and farmers. They operate as facilitators and communicators, helping farmers in their decision-making and ensuring that appropriate knowledge is implemented to obtain the best results. This study wished to establish from the farmers the number of times the extension officers had visited for the past year. The results are as shown in Table 4.11.

**Table 4.11 Number of visits by extension officers made in the last one year**

	Frequency	Percent
Once	92	23.9
Thrice	2	.5
Twice	11	2.9
Four	1	.3
None	279	72.5
<b>Total</b>	<b>385</b>	<b>100.0</b>

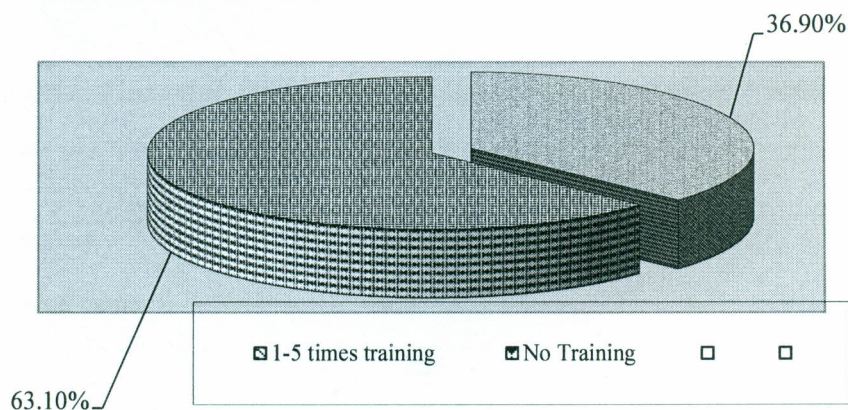
*Source: Field Data, 2011*

Majority of the small scale famers (72.5%) indicated that they were not visited by an extension officer in the past one year while 23.9% of them were visited once while, 2.9% of them were visited twice by the extension officers and 0.5% of them were visited three times and four times respectively. This means that in most cases extension officers are not available hence farmers lack to adopt new, improved methods of farming and use variety of methods since they are not able to have officers to demonstrate to them the best methods to use on the improved eucalyptus tree growing. Marginalized farmers or those

who have little access to information and extension services learn from each other hence helping themselves to become more self-reliant and independent. This can lead to mistakes from one farmer to the other.

#### 4.4.4 Training offered by extension officers

Agricultural extension service has been identified as an important part of the intended transformation of the agricultural sector. Extension services have several functions including the provision of technical advice about specific technologies, preparation of training/extension materials on those technologies, provision of secondary data on example soils, climate, prices, encouragement of farmer-to-farmer extension advice, participatory experiences and sharing of results in a wider sense and using the knowledge of farmers' situation and questions to influence extension policy (Akpalu, 2013). The study sought to establish whether farmers had attended any training on the management of agro-forestry business in the past 3 years from the extension officers. The results are as shown in Figure 4.4.



**Figure 4.4 Training by Extension officers**

*Source: Field Data, 2011*

About 36.9% of the farmers had attended training regarding management of agro-forestry for between 1- 5 times and the majority (63.1%) of the farmers had not attended any training other than the information gotten in a public Baraza initially. The result shows that there is need for the farmers to be trained on the management of agro-forestry by both the extension officers and the forestry department.

#### 4.4.5 Financing for farming improved eucalyptus tree seedlings

According to Creative Economy Programme (2006) availability of finance or business development services, rather it is the access and use made of the funding and support by creative businesses. Specifically, it is the low propensity and ability of many entrepreneurs to make full use of the available finance, advice and expertise that inhibits increased productivity and growth in the creative industries. Farmers can either finance their farming activities or be financed by other financial institutions or by the government. This study sought to establish whether the small scale farmers borrowed money for farming in the last one year. The results are as shown in Table 4.12.

**Table 4.12: Financing for farming of improved eucalyptus tree seedlings**

	Frequency	Percent
Own money	382	99.0
Borrowed money	3	1.0
<b>Total</b>	<b>385</b>	<b>100.0</b>

*Source: Field Data, 2011*

Majority of the small scale farmers (99.0%) indicated that they had not borrowed money for farming in the last one year and only 1.0% of them had borrowed money. The result shows that only a small percentage of the farmers looked for funds elsewhere while all

the others did not borrow funds. The main source of financing of improved eucalyptus trees seedlings for proper cost effective performance of the tree enterprise starting from training, production, marketing and utilisation organisational development and strengthening of the group approach would be a core element towards achieving sustainability. Insufficient planting materials, dry spells and weed control sometimes is a constraint (Mwangi Njuru, 2011).The researcher asked the respondents to indicate their main source of finance for farming improved eucalyptus tree seedlings. The results are as shown in table 4.13.

**Table 4.13: Main source of financing for farming of improved eucalyptus tree seedlings**

	<b>Frequency</b>	<b>Percent</b>
Personal savings	357	92.7
Socio-economic support groups (chamas)	2	.5
Personal savings and socio-economic support groups (chamas)	24	6.2
No Response	2	.5
<b>Total</b>	<b>385</b>	<b>100.0</b>

*Source: Field Data, 2011*

Majority of the respondents 92.7% indicate that personal saving were the main source of finance for improved eucalyptus tree seedlings while 6.2% of them noted that personal saving together with socio-economic support groups (Chamas) had been their main source of financing and 0.5% of them who purely got their finance for farming improved eucalyptus tree seedlings from Socio-economic support groups (Chamas). Hence the researcher observes that although there are many means of financing the farming of the improved eucalyptus tree seedlings, majority of the farmers in the study used personal saving. According to the Kamuchege community initiative of small growers' tree

farming, the Kamuchege sub location has a population of about 6000 people with about 1500 households in Lari District of Kiambu County. The sub-location is endowed with several farming enterprises among them Tea, Coffee, Dairy, Maize, Beans, trees (several species), dairy goats, poultry, and several other crops. Farming has been characterized by traditional systems such that it is more of a routine than a business. An event in the last decade and population pressure made farmers to look at farming more as business. To a casual observer the ground cover in terms of trees is very low and the situation is getting worse.

The current tree farming initiative in the area is a result of a workshop organized by ICRAF in Kisumu in January 29<sup>th</sup> and 30<sup>th</sup> 2002 Market Oriented Agro-forestry, from which sensitization of the farmers through the Groups, Churches and at individual level was done. The nature of the awareness was to inform the farmers on the advantages of the new eucalypts or blue gum trees, the price and then those interested to pay in full for the number of seedlings required. The same was ordered from Tree Biotechnology Trust at Karura Forest and transport free of charge the materials to the owners. This has continued for the last two years and planting has been prompt. This agrees with Mercado *et. al.* (2003) points out that in the context of timber based hedgerows the tree is an important economic component of the system. The timber yield and its by-products for example fuel wood largely influences total system productivity. Trees share the resource base (light, water, and nutrients) with the crops. The right choices of tree species and silviculture practices are required so that trees do not out-compete food crops.

#### 4.4.6 Initial capital invested

The study also wished to know the initial level of capital investment into the farming of improved eucalyptus tree seedlings the farmers had invested. The results are as shown in Table 4.14.

**Table 4.14 Initial capital invested by farmers on farming improved eucalyptus tree seedlings**

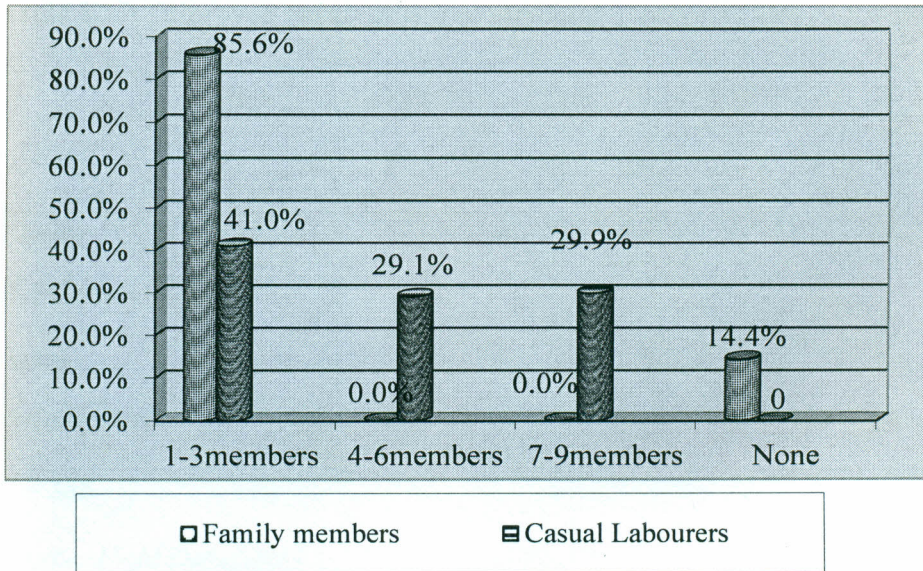
	Frequency	Percent
100-3000	234	60.8
3001-6000	46	11.9
6001-9000	46	11.9
9001-12000	29	7.5
12001-15000	9	2.3
18001-20000	14	3.6
No Response	7	1.8
<b>Total</b>	<b>385</b>	<b>100.0</b>

*Source: Field Data, 2011*

Majority of the farmers (60.8%) had initially invested between Kshs.100-3000 while 11.9% had invested between Kshs.3001-6000 and Kshs.6001-9000 another 7.5% of them had invested between Kshs.9001-12000, with another 3.6% had invested between Kshs.18001-20001 and 2.3% had invested between Kshs.12001-15000 only. Majority of the farmers had invested the amount of money they had afforded for trees growing. This is a good lesson since they have not undertaken loans so as to plant trees and this would then meant they are able to accumulate more profits when time of harvesting the trees come.

#### 4.4.7 Labour

The study established that instead of the farmers employing casual labours they had used their family members for farming. The results are as shown in figure 4.5.



**Figure 4.5 Division of labour**

*Source: Field Data, 2011*

The majority (85.6%) of the farmers were using between 1-3 members of the family while 41.0% used 1-3 casual labourers for the farming. About 29.9% of them also used 7-9 casual labourers in their farms and 29.1% of them used 4-6 casual labours in their farms. The results indicate that there are farmers who do not use casual labours at all while on the other hand another category of the farmers did not use family members at all.

#### 4.4.8 Compliance with environmental standards

Environmental standard compliance is important for eucalyptus trees. This would enable farmers to be more vigilant in maintaining policy guidelines on the type of trees that were correct to be planted in either of the regions. With this in mind the study wished to

establish from the respondents how they would rate the improved eucalyptus tree seedlings enterprise on compliance with quality, environmental safety and trade policies.

The results are as shown in Table 4.15

**Table 4.15: Improved eucalyptus tree seedlings enterprise had complied with quality**

	High		Fair		Low		Poor		No Response	
	F	%	F	%	F	%	F	%	F	%
Quality	245	63.6	81	21.0	22	5.7	3	0.8	34	8.8
Environmental safety	42	10.9	255	66.2	44	11.4	5	1.3	39	10.2
Trade policies	30	7.8	188	48.8	110	28.6	23	6.0	34	8.9

**N = 385**

*Source: Field Data, 2011*

Majority of the farmers (63.6%) indicated that the improved eucalyptus tree seedlings enterprises had complied with quality highly while 66.2%% of them indicate that the improved eucalyptus tree seedlings enterprises had complied fairly with environmental safety. The researcher observes that there are issues that need to be handled by the source of the trees before scaling up to large scale farming especially in issues of trade policies and environmental safety. The reforestation programs often disseminated through government agricultural extension workers or rural development projects attempted to address the fuel wood crisis, but to little avail. This is because most of the answers to rural problems came from the top-an extension approach that has now been abandoned. Senelwa et al (2004) noted that the NALEP initiative is a new demand driven system that has been tailored to respond to real needs in the rural areas as opposed to the previous top down approach. Hence this would take care of the environmental and safety issues. With this in mind the researcher then sought to find out if the small scale farmers started the

enterprise as a partnership with any other firms or agencies. The results are as shown in Table 4.16.

**Table 4.16: Start the enterprise as a partnership with other firms or agencies**

	<b>Frequency</b>	<b>Percent</b>
Yes	55	14.3
No	306	79.5
No Response	24	6.2
<b>Total</b>	<b>385</b>	<b>100.0</b>

*Source: Field Data, 2011*

Majority of the small scale farmers 79.5% did not start a partnership with other firms or agencies with 14.3% of them having started the enterprises with other firms or agencies.

When those who said yes were asked to indicate the firms that they had partnered with there were two firms or agencies that were involved which included NALEP and pyramids. Meanwhile when asked to indicate the type of partnership they were not able to explain it. According to Senelwa et al. (2004) the NALEP initiative is a new demand driven system that has been tailored to respond to real needs in the rural areas as opposed to the previous top down approach. This was also echoed by an extension officer and a farmer who noted that.

#### **4.4.9 Rating of the aspects of improved trees**

The research sought to rate the aspects of improved trees. The results are as shown in Table 4.17.

**Table 4.17 Rating of aspects of improved trees**

	Very good	Good	Fair	Poor	No Response
Demand of forestry products	23(6.0%)	221(57.4%)	133(34.5%)	5(1.3%)	3(0.8%)
Profit margin	36(9.4%)	217(56.4%)	126(32.7%)	4(1.0%)	2(0.5%)
The expected value of improved trees	20(5.0%)	145(37.7%)	213(55.3%)	4(1.0%)	3(0.8%)
The life cycle of improved trees technology	16(4.2%)	108(28.1%)	237(61.6%)	7(1.8%)	17(4.4%)
The cost of credit for buying improved trees	10(2.6%)	78(20.3%)	261(67.8%)	25(6.5%)	11(2.9%)
Level of competition	14(3.6%)	68(17.7%)	111(28.8)	185(48.1)	7(1.8%)
Collaboration with support organization such as KEFRI	2(.05%)	50(14.3%)	214(55.6%)	107(27.8)	7(1.8%)
Government support	16(4.2%)	108(28.1%)	237(61.6%)	7(1.8%)	17(4.4%)
Type of government regulations	10(2.6%)	78(20.3%)	261(67.8%)	25(6.5%)	11(2.9%)
Information availability	14(3.6%)	68(17.7%)	111(28.8)	185(48.1)	7(1.8%)
Individual entrepreneurial capabilities	36(9.4%)	217(56.4%)	126(32.7%)	4(1.0%)	2(0.5%)
Farmers involved in networks more likely to adopt innovations	16(4.2%)	108(28.1%)	237(61.6%)	7(1.8%)	17(4.4%)
More markets regulations the less likely the adoption of innovations	10(2.6%)	78(20.3%)	200(51.9%)	87(22.6%)	11(2.9%)

*Source: Field Data, 2011*

Majority of the respondents 67.8% of them rated the cost of credit for buying improved trees as fair, 20.3% of them rated it as good and 2.6% of them rated it very good. About (63.3%) rated the demand for forestry products as very good and good, 34.5% rated it fair and 1.3% rated it poor. This was followed by 61.6% of them who rated the life cycle of improved trees technology as fair, 28.1% rated it as good and 4.2% of them rated it as

very good. Another 61.6% of them who rated the more farmers are involved in agricultural cooperative networks the more likely is to invest in adoption of innovations as fair, 28.1% rated it as good and 4.2% of them rated it as very good. On the hand 57.4% rated demand of forestry products as good, while 34.5% of them rated it fair and 6.0% of them rated it as very good and 56.4% rated profit margin as good and 32.7% rated it as fair and 9.4% of them rated it as very good. Another 55.6% rated individual entrepreneurial capabilities as good and 27.8% rated it as fair and 9.4% of them rated it as very good.

On the other hand 51.9 % rated the more markets are regulated the less the farmer is likely to invest in adoption of innovations, while 22.3% rate it poor, 20.3% rated it good, and 2.6% rated it as very good. Only level of competition was highly rated as poor (48.1%) by the respondents. The researcher observed that the rating of the aspects of improved trees had impact on the information on the scale required. Hence this could have been reasons as to why these farmers had planted the improved eucalyptus tree seedlings. The farmers from this area had found opportunities; which include; proximity to the market sites like Nairobi (building materials), Kenya Tea Development Agency and adequate infrastructure. Shortage of firewood and building materials and prevalent poor prices of coffee and other agricultural products provides incentives for smallholder growers to venture in forest trees growing.

Another opportunity was that of women acceptance of the biotechnology applications in bananas, maize and sweet potatoes vines. The closure of government forests for over twelve years helped to stimulate commercial tree farming. If this can be achieved by an individual and community effort, how much can be done if the process is well planned and facilitated? This prompted the researcher to wish to identify the minimum size of land

required to effectively venture into profitable farming of improved eucalyptus tree seedlings. The researcher observes that from the results majority of the respondents said this was dependent on the acres of land one had. This influenced the number of trees one could plant. On the amount of money invested at the beginning of the venture, the researcher also found out that any amount of money could be used to venture into the business of eucalyptus tree planting. This is because majority of the respondents started with a minimum capital of between one thousand shillings to twenty thousand shillings. But the respondents also noted that they could venture with as a little as they could avoid.

#### **4.5.10 Factor analysis on environmental factors that influenced opportunity exploitation for improved eucalyptus tree varieties**

Factor analysis attempts to represent a set of observed variables  $X_1, X_2 \dots X_n$  in terms of a number of 'common' factors plus factors that was unique to each variable. The common factors (sometimes called latent variables) are hypothetical variables which explain why a number of variables are correlated with each other -- it is because they have one or more factors *in common*. This study sought to identify factors that influenced opportunity exploitation for improved eucalyptus tree varieties. The results for the correlations matrix are as shown in Table 4.18

**Table 4.18 Correlation Matrix(a)**

Correlation	Quality	Environmental safety	Trade policies	Did you start your enterprise as a partnership with any other firms or agencies?	Was the starting up of your agro business facilitated by any government incentives or public agencies?	Availability of ready markets	Government support	Collaborations with support organizations such as KEFRI	Type of government regulation	The main source of financing for farming of improved eucalyptus tree seedlings
Quality	1.000	.651	.525	-.045	.021	.061	.130	.191	.023	-.197
Environmental safety	.651	1.000	.757	-.135	-.075	.022	.094	.257	.152	-.295
Trade policies	.525	.757	1.000	.041	.101	-.153	.055	.218	.171	-.251
Did you start your enterprise as a partnership with any other firms or agencies?	-.045	-.135	.041	1.000	.878	-.523	.012	-.055	.142	.110
The starting up of agro business facilitated by any government incentives or public agencies	.021	-.075	.101	.878	1.000	-.500	.024	-.062	.160	.099
Availability of ready markets	.061	.022	-.153	-.523	-.500	1.000	-.014	-.020	-.105	.002
Government support	.130	.094	.055	.012	.024	-.014	1.000	.239	.050	.021
Collaborations with support organizations such as KEFRI	.191	.257	.218	-.055	-.062	-.020	.239	1.000	.257	.200
Type of government regulation	.023	.152	.171	.142	.160	-.105	.050	.257	1.000	.256
Has been the main source of financing for farming of improved eucalyptus tree seedlings	-.197	-.295	-.251	.110	.099	.002	.021	.200	.256	1.000

a Only cases for which Estimated number of improved trees planted to date in Lari = 1-500 are used in the analysis phase.

The correlation generated by the factors analysis model differ from standard estimates of the Correlations since they measure how well the model fits correlations between items, when the covariance matrix is factored, covariance residuals are generated instead to generate correlation residuals. In SPSS, the correlation factors are reproduced for the correlation matrix option of descriptive to generate a listing of residuals and these do not directly address the issue of whether the values for the items are reasonably treated as close to normally distributed or if any are outlying item residuals address this issue and such results are reported later in the last table of component transformation. Hence the

correlations inhere shows that majority of the variables are related to each other. Quality is correlated to environmental safety, trade policy, enterprise start as a partnership with other firms or agencies, start-up of agro business facilitated by government incentives or public agencies, availability of ready market, government support, collaboration with other support organizations such as KEFRI, type of government regulation and the main source of financing for farming of improved eucalyptus tree seedlings.

### The communalities

When the coefficients are correlations, i.e., when the factors are uncorrelated, the sum of the squares of the loadings for variable  $XI$ , namely  $a_{11}^2 + a_{12}^2 + \dots + a_{13}^2$ , shows the proportion of the variance of variable  $XI$  which is accounted for by the common factors. This is called the *communality*. The larger the communality for each variable, the more successful a factor analysis solution is. This study communality is presented in Table 19.

**Table 4.19 Communalities (a)**

	Initial	Extraction
Quality	1.000	.629
Environmental safety	1.000	.849
Trade policies	1.000	.764
Did you start your enterprise as a partnership with any other firms or agencies?	1.000	.869
Was the starting up of your agro business facilitated by any government incentives or public agencies?	1.000	.856
Availability of ready markets	1.000	.549
Government support	1.000	.176
Collaborations with support organizations such as KEFRI	1.000	.610
Type of government regulation	1.000	.478
What has been the main source of financing for farming of improved eucalyptus tree seedlings?	1.000	.627

*Extraction Method: Principal Component Analysis.*

*a Only cases for which Estimated number of improved trees planted to date in Lari = 1-500 are used in the analysis phase.*

This table shows the initial and final communalities for each factor. The final estimate of the communality which is given in the second column of the table is arrived at by an iterative process. To start the ball rolling, an initial estimate is used. By default, this is the squared multiple correlations obtained when each variable is regressed on all the other variables. In other words, the amount of the variance of variable such as start enterprise as a partnership with any other firm or agencies had the highest value (.869) while the second highest variable was at (.856) on was the starting up of agro business facilitated by any government incentives or public agencies. Another factors with high value was trade policies at (.849) while the least variable was government support at (.176) explaining all the other variables taken as a reasonable first estimate of the amount of  $X_{T_s}$  variance accounted for by the common factors. In this study the initial regression was equal to 1.000. The second table shows the eigenvalues and the amount of variance explained by each successive factor.

**Table 4.20 Total Variance Explained (a)**

Component	Initial Eigenvalues			Extraction Loadings	Sums of Squared			Rotation Loadings	Sums of Squared	
	Total	% of Variance	Cumulative %		Total	% of Variance	Cumulative %		Total	% of Variance
1	2.553	25.529	25.529	2.553	25.529	25.529	2.482	24.823	24.823	
2	2.374	23.736	49.265	2.374	23.736	49.265	2.343	23.427	48.250	
3	1.480	14.796	64.061	1.480	14.796	64.061	1.581	15.811	64.061	
4	.990	9.903	73.964							
5	.705	7.053	81.017							
6	.674	6.744	87.761							
7	.509	5.088	92.848							
8	.399	3.992	96.840							
9	.198	1.979	98.819							
10	.118	1.181	100.000							

*Extraction Method: Principal Component Analysis.*

*a Only cases for which Estimated number of improved trees planted to date in Lari = 1-500 are used in the analysis phase.*

The Initial Eigenvalues are for a principal components analysis, in which the communalities are one. The final communalities are estimated by iteration for the principal axis factor analysis. As a result they are somewhat less than one, and the amount of variance accounted for is reduced, as can be seen in the table in the section headed Extraction Sums of Squared Loadings. The rest of the factor analysis is based on five factors, because five factors have eigenvalues greater than one. As an aside, it has been suggested that over-extraction (retaining more than the true number of factors) leads to less distorted results than under-extraction (retaining too few factors); Wood, Tataryn & Gorsuch, (1996). The quantities at the bottom of each factor column are the sums of the squared loadings for that factor, and show how much of the total variance of the observed variables is accounted for by that factor. For Factor 1, the total is 2.553, this factor analyses shows the total amount of variance is equal to the number of observed variables (the variables are standardized, so each has a variance of one), the total variation here is eighteen, so that Factor 1 accounts for  $(2.553/18) \times 100 = 14.183\%$  of the variance. The quantities in the communality column show the proportion of the variance of each variable accounted for by the common factors resulting to high correlation between the variables. Hence this study shows that factors were over-extracted hence less distortion of the factor tested had an influence on opportunity exploitation of farmers planting improved eucalyptus tree varieties. The correlation matrix would show whether there is any relationship between the variables. The results are as shown on the component matrix Table 4.21.

**Table 4.21 Factor Matrix (a, b)**

	Component		
	1	2	3
Quality of products	.786	.033	-.099
Environmental safety	.919	.001	-.072
Trade policies	.839	.213	-.120
Partnership with any other firms or agencies	-.162	.909	-.130
Government incentives or public agencies	-.094	.910	-.138
Availability of ready markets	.026	-.726	.145
Government intervention	.211	.070	.356
Collaborations with KEFRI	.394	.070	.670
Government regulations	.183	.330	.580
Main source of finance for improved eucalyptus	-.344	.166	.694

*Extraction Method: Principal Component Analysis.*

*a 3 components extracted.*

*b Only cases for which Estimated number of improved trees planted to date in Lari = 1-500 are used in the analysis phase.*

Factor Matrix shows the coefficients in loader 1, loader 2 and loader 3 for the factor analysis model (1); for example, the results show that variable environment is highly rated in loader 1 (.919) while starting up of agro business facilitated by any government incentives or public agencies was rated higher in loader 2 (.910) and starting enterprises as a partnership with other firms or agencies is highly rated in loader 2 (.909). Trade policies highly rated in loader 1 (.839) while quality was highly rated in loader 1 at 0.786, collaborations with support organizations such as KEFRI was rated high in loader 3 (.670) and type of government regulation was loaded highly on loader 3 (.580) and. The sum of the squared loadings over factors for a given variable shows the communality for that variable, which is the proportion of the variance of the variable explained by the

common factors. The sum of the squared loadings for a given factor shows the variance accounted for by that factor. The rotated component Matrix was also presented in Table 4.22.

**Table 4.22 Rotated Component Matrix (a,b)**

	Component		
	1	2	3
Quality	.786	-.035	.100
Environmental safety	.905	-.085	.150
Trade policies	.853	.140	.132
Partnership with any other firms or agencies	-.071	.929	.032
Facilitated by government incentives or public agencies	-.003	.924	.040
Availability of ready markets	-.054	-.739	-.011
Government intervention	.116	-.023	.402
Collaborations KEFRI	.214	-.103	.744
Government regulation	.048	.190	.663
Main source of finance for improved eucalyptus tree seedlings	-.499	.066	.611

*Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization. a Rotation converged in 4 iterations.*

*b Only cases for which Estimated number of improved trees planted to date in Lari = 1-500 are used in the analysis phase.*

The idea of rotation is to reduce the number of factors on which the variables under investigation have high loadings. Rotation does not actually change anything but makes the interpretation of the analysis easier. The table on rotation component matrix shows that environmental safety in loader on Factor component 1 while start enterprises as a partnership with any other firm or agencies and was the starting up of agro business facilitated by any government incentives or public agencies on Factor component 2. The

lowest rated factors and the negatively loaded factor can subsequently be used for further research such as availability of ready market.

**Table 4.23 Component Transformation Matrix (a)**

Component	1	2	3
1	.965	-.109	.238
2	.057	.975	.213
3	-.255	-.192	.948

*Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization. a Only cases for which Estimated number of improved trees planted to date in Lari = 1-500 are used in the analysis phase.*

The Factor Score Coefficient Matrix shows the coefficients used to calculate the factor scores; these coefficients are such that if the observed variables are in standardised form, the factor scores will also have a mean of zero and a standard deviation of one. Meaning second column and third Factor Score Covariance Matrix shows that although theoretically the factor scores should be entirely uncorrelated, the covariance is not zero, which is a consequence of the scores being estimated rather than calculated exactly. Hence this concludes that some variables were omitted hence the factor analysis indicates on the variables that were related. Therefore there were factors that did not have an effect on opportunity exploitation for farmers planting improved eucalyptus tree varieties in Lari District. The factors that influenced environmental factors on opportunity exploitation included environment conservation, start enterprises as a partnership with other firm especially the TBPT who were the promoters of the improved trees varieties and government support to afforestation especially through the Ministry of Agriculture, government interventions extension and tree harvesting permits and the group financing for purchase of improved eucalyptus tree seedlings.

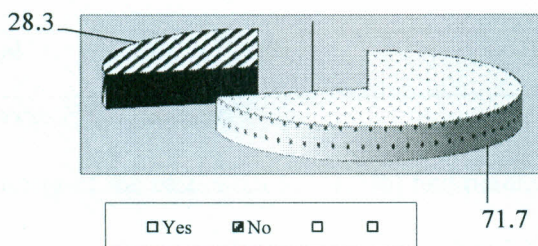
## 4.5 Influence of technological innovations on the intensity of opportunity

### exploitation by entrepreneurial tree farmers

The introduction of improved *Eucalyptus* trees varieties to Kenya in 1997 from Mondi Forests in South Africa by Tree Biotechnology Project (TBP) has rekindled tree-planting culture. Millions of seedlings have been distributed across the country. It is estimated that from 2001 to 2007, the project had distributed 13.8 million seedlings nationally with smallholder farmers taking largest percentage (Kenya Forestry Service, 2009). Tree improvement as reported by Owen and Van der Zel, (2000); Alzate et al. (2005), Oballa and Giathi, (1996) and Jiayu and Siming, (1996) has a significant increase in productivity.

#### 4.5.1 Experienced with new ideas

New ideas may either be generated by the innovating firm in the course of its innovation activities or acquired externally through various channels. The use of new ideas or the combination of existing knowledge requires innovative efforts that can be distinguished from standardized routines. The study sought to establish whether they experimented with new ideas or the use of new knowledge during the past year. Figure 4.6 experienced with new ideas.



**Figure 4.6 Experienced with new ideas**

Sources: Field data 2011

Majority of the respondent (71.7%) indicated that they experimented with new ideas and 28.3% of them had not experienced with new ideas. The results agree with those of Teece, (2007) the product, process, marketing method or organizational method must be new to the firm or should be viewed as significantly improved as compared with the existing products, processes and methods.

#### 4.5.2 Planting of Improved Eucalyptus tree Planted by Entrepreneurial

##### Farmers in Lari District

The study sought to establish the estimated number of improved trees planted to date by farmers in Lari. The results are as shown in Table 4.24.

**Table 4.24 Estimate of number of improved trees planted to date in Lari**

	Frequency	Percent
1-500	276	71.7
501-1000	29	7.5
1001-1500	26	6.8
1501-2000	36	9.4
2001-2500	13	3.4
3501-4000	5	1.3
<b>Total</b>	<b>385</b>	<b>100.0</b>

*Source: Filed data 2011*

Majority of the respondents (71.7%) had planted between 1-500 trees while 9.4% of them had planted between 1501-2000 trees, 7.5% had planted 501-1000 trees, 6.8% planted 1001-1500 trees, 3.4 % planted 2001-2500 trees and 1.3% of them had planted between 3501-4000 trees. This results indicate that majority of the farmers had at least planted 1-500 trees in the lands.

### 4.5.3 Multiple Regression Model

The general multiple linear regression model formula was used:

$$Y = \beta_0 + \beta_1\chi_1 + \beta_2\chi_2 + \beta_3\chi_3 + \dots + \beta_k\chi_k + \varepsilon$$

Where

Y is the dependent variable

$\chi_1, \chi_2, \dots, \chi_k$  are the independent variables

$E(y) = \beta_0 + \beta_1\chi_1 + \beta_2\chi_2 + \dots + \beta_k\chi_k$  is the deterministic portion of the model

$\beta_1$  the constant coefficients determines the contribution of the independent variable  $\chi_1$

$\varepsilon_1$  is the random error with mean 0 and variance of 1 (Mc Clave 2002).

The summary output when all independent variables are included in the multiple regression equation leads to the Analysis of Variance (ANOVA). The F-test associated with the ANOVA table is used to test the results of independent variables are significant to the model of analysis. The interpretation of the  $\beta$  parameters in a multiple regression model will depend on the terms specified in the model. The interpretations above are for a first order linear model only. In practice one should be sure that a first order model is the correct model for  $E(y)$  before making these  $\beta$  interpretations.

From the Model summary R explains multiple correlation coefficients between all the predictors in the model and the dependent variable. The dependent variable is the estimated number of improved trees planted to date in Lari. Hence the R squared .068 or 68% of the proportion of variance in the dependent variable predictable by the predictor variables.

#### 4.5.4 Model Summary (b)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.246(a)	.061	.043	1.339

a Predictors: (Constant), the more opportunities for product differentiation a market offers, the more likely is a farmer to invest in innovation adoption, Have you ever experimented with new ideas or the use of new crop variety or farming techniques, New ideas tried on the farm, the life cycle of improved trees technology, availability of learning opportunities on improved trees, new products from the firm

b Dependent Variable: Estimated number of improved trees planted to date in Lari

#### 4.5.5 ANOVA(b)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	43.047	7	6.150	3.432	.001(a)
	Residual	666.490	372	1.792		
	Total	709.537	379			

a Predictors: (Constant), the more opportunities for product differentiation a market offers, the more likely is a farmer to invest in innovation adoption, Have you ever experimented with new ideas or the use of new crop variety or farming techniques, New ideas tried on the farm, the life cycle of improved trees technology, availability of learning opportunities on improved trees, new products from the firm

b Dependent Variable: Estimated number of improved trees planted to date in Lari

#### 4.5.6 Coefficients (a)

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error			
(Constant)	1.838	.440		4.174	.000
Experiment with new ideas or other improved crop varieties	.387	.155	.126	2.488	.013
Tried new ideas on the farm	-.088	.071	-.064	-1.241	.215
New products from the farm	-.294	.134	-.144	-2.196	.029
Learning opportunities on improved trees technology	-.099	.120	-.052	-.829	.408
Life cycle of improved trees technology	.293	.095	.169	3.083	.002
Product differentiation	.038	.106	.019	.358	.721

a Dependent Variable: Estimated number of improved trees planted to date in Lari

The summary output of the independent variable indicators explain for only 24.6% of the estimated number of improved eucalyptus trees planted in Lari District. From the

ANOVA table above, the  $p\text{-value} = 0.01 < 0.05$  level of significance hence there is no significance difference between the two variables. This means there is no relationship between the estimated number of improved trees planted in Lari and the influence of technological innovations on the intensity of opportunity exploitation by entrepreneurial tree farmers who have planted improved varieties of eucalyptus trees. There were other factors that could have influenced the farmers in planting the improved eucalyptus tree variety especially the presence of one of the local farmers acting as the supplier of the improved eucalyptus seedlings and information on their expected performance.

Farmers are becoming more entrepreneurial by experimenting with new ideas or the use of new crop variety or farming techniques. They are also engaged in learning opportunities on improved eucalyptus trees varieties, and have been involved in the life cycle of improved tree technology. The more the opportunity for product differentiation a market offers, the more likely is a farmer to invest in innovation adoption this was highest rated factors among all the others. The results agrees with those of Atuahene-Gima & Murray, (2007) who noted that developing product offerings that contain new, emergent ideas and distinct features is likely to result in product differentiation that being independent will make them more adoptive to the market. March (1991) also noted that Opportunity exploitation involves experimenting, searching and testing. This represents a significant rupture with what is currently being done and are associated with risk taking, creativity, and flexibility. Exploitation capabilities involve new technological knowledge and the development of completely new products to customers.

## CHAPTER FIVE

### SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

#### 5.1 Introduction

This chapter contains the summary, conclusions and recommendations of the study. It also contains recommendations for further research. This study was primarily designed to critically analyse the entrepreneurial characteristics of smallholder forest growers who are planting improved eucalyptus trees varieties in Lari District of Kiambu County.

#### 5.2 Summary of findings

##### 5.2.1 Entrepreneurial personality traits of tree farmers

On prior experience majority of the farmers (69.0%) had not been employed before venturing into agro forestry. Most of the farmers (44.6%) had been practicing agro-forestry for the last 6-10 years. This implies the employment would enable farmers gain experience and also get finances that would enable them venture into planting improved eucalyptus tree varieties. It also meant that the number of years they had practiced agro-forestry would also enable help venture into the entrepreneurial of planting improved eucalyptus tree varieties. The results agrees with Shane (2000) who noted that the perspective of previous employment is that individuals develop different stocks of knowledge throughout their careers and that the knowledge gained influences their ability to recognise and exploit particular entrepreneurial opportunities.

On the prior knowledge the majority of the farmers (77.9%) agreed that they had been frontrunners in the past, hence had a higher probability to be frontrunners at the present and farmers that were laggards in the past are likely to remain hence had the aggression to

invest in improved eucalyptus tree varieties. The result agrees with Freeman (1992) who noted that nature of these experiences seems to provide easier access to new knowledge and technology. Knowledge is related to knowing and refers to the more rational part of entrepreneurship.

On risk aversion the results revealed that all the respondents indicated that they had planted improved eucalyptus tree seedlings while 72.7% indicated that this had improved on their farm income. The results agree with Begley & Boyd, 1987; Caird, 1991) who noted that compared to the general population; entrepreneurs are more likely to exhibit levels of risk taking behaviour.

On the internal locus of control, 85.3% of the respondents indicated that they had skills and knowledge that they possessed and were able to control production process of their eucalyptus trees. This implies that after gaining experience and knowledge then they possessed control on the production process. The results agrees with Cromie (2000, Ho and Koh 1992) who noted that the internal locus of control is an entrepreneurial characteristic.

On the need for independence, the study revealed that majority of the respondents (93.5%) indicated that they were driven by self-actualization. The results agree with Burke, Fitzroy and Nolan, 2000) who noted that entrepreneurship requires the trust in one's own judgment versus the judgment of others.

On the extroverted farmers the majority of the respondents (89.6%) noted that they evaluated the potential of improved eucalyptus trees varieties as compared to other trees before planting. The results concurs with those of Shane 2003 who noted that compared to introverts, extroverts are more likely to exploit opportunities because they are better

able to assemble resources and organize under conditions of information asymmetry and uncertainty.

The study revealed the p-value being at  $0.01 > 0.05$  there is a significant difference between the number of trees planted and personality traits. This may then indicate that it is clear that other factors may have influenced the farmers into planting improved eucalyptus trees other than the personality traits.

### **5.2.2 Environmental factors influencing opportunity exploitation of improved eucalyptus seedlings by entrepreneurial tree farmers in Lari District**

Majority of the farmers (66.0%) had 0.1-2 acres of land. The results agree with those of Singh (2013) who observed that new technologies are neutral to scale/farm size but certainly not neutral to resources, even a small farmer operating 2 ha of land having higher access to irrigation facilities and improved farm practices with entrepreneurial ability can earn higher income than a small farmer with same size of holding without other facilities. Hence, the farm size per se is not a major constraint.

Most of the respondents 42.9% indicated that they had prior experience before venturing into farming, while 27.6% of them should be in a public baraza, 22.1% of them had a friend or relative with the knowledge of improved tree genotypes. This implies that while some farmers were able to get information from other sources there are those farmers who had prior experience and knowledge.

Availability Extension officers, 72.5% of the small scale farmers indicated that they were not visited by an extension officer in the past one year. This implies that although extension officers may be employed by the government to help farmers in adopting new technology and new improved varieties available they are not available to offer the same

service to the farmers. Training was with about 36.9% of the farmers had attended training regarding management of agro-forestry for between 1-5 times in the past year. Financing for farming improved eucalyptus tree seedlings 92.7% of the respondents indicate that personal saving were the main source of finance for improved eucalyptus tree seedlings.

Farmers had used their personal saving to venture into farming of improved eucalyptus tree varieties. The initial capital for majority of the farmers (60.8%) being between Kshs.100-3000. On labour 85.6% of the farmers were using between 1-3 members of the family and 41.0 % used 1-3 casual labourers for the farming. This show that majority of the farmers preferred to engage family members in offering cheap labour. On the start the enterprise as a partnership with other firms or agencies with majority of the small scale farmers 79.5% did not start a partnership with other firms or agencies.

Factor Matrix shows the coefficients in loader 1, loader 2 and loader 3 for the factor analysis model (1); for example, the results show that variable environment is highly rated in loader 1 (.919) while starting up of agro business facilitated by any government incentives or public agencies was rated higher in loader 2 (.910) and starting enterprises as a partnership with other firms or agencies is highly rated in loader 2 (.909).

### **5.2.3 Influence of technological innovations on the opportunity exploitation by tree farmers**

Influence of technological innovations on the intensity of opportunity exploitation by entrepreneurial tree farmers, experienced with new ideas, majority of the respondent (71.7%) indicated that they experimented with new ideas. The results agree with those of Teece, (2007) the product, process, marketing method or organizational method must be

new to the firm or should be viewed as significantly improved as compared with the existing products, processes and methods.

Planting of Improved Eucalyptus tree Planted by Entrepreneurial Farmers in Lari District

Majority of the respondents (71.7%) had planted between 1-500 trees. This results indicate that majority of the farmers had at least planted 1-500 trees in the lands. The intensity of opportunity exploitation by entrepreneurial tree farmers had experienced with new ideas. Hence they had planted about 1-500 improved eucalyptus tree varieties in their farms. From the multiple linear regression formula, the summary output of the independent variable indicators explain for only 24.6% of the estimated number of improved eucalyptus trees planted in Lari District. From the ANOVA table above, the  $p\text{-value} = 0.01 < 0.05$  level of significance hence there is no significance difference between the two variables. This means there is no relationship between the estimated number of improved trees planted in Lari and the influence of technological innovations on the intensity of opportunity exploitation by entrepreneurial tree farmers who have planted improved varieties of eucalyptus trees. The results agrees with those of Atuahene-Gima & Murray, 2007 who noted that developing product offerings that contain new, emergent ideas and distinct features is likely to result in product differentiation that being independent will make them more adoptive to the market.

### 5.3 Conclusions

In conclusion some of these farmers who had been in agro-forestry had experience in other improved varieties that were available in the market. The farmers also had prior knowledge since they were frontrunners in the past and had maintained to the present. Hence they risk takers. On the hand the internal locus of control is an entrepreneurial characteristic which these farmers possessed. The farmers had an inner drive to reach

self-actualization. The farmers were keen on evaluation of the potential of improved eucalyptus trees varieties as compared to other trees before planting hence were aware of the challenges they to experience and how the handle them when venturing into farming of improved eucalyptus tree varieties. The p-value being at  $0.01 < 0.05$  means that there is no significant different between the number of trees planted and personality traits.

However, the Probit analysis revealed that prior knowledge in agro-forestry, control on production, personal degree of risk aversion and farmers who are front runners had an influence at varied levels on farmers' decision to embark on planting of improved trees. This may then indicate that even if farmers planted improved eucalyptus trees the personality traits may not be the only factors that influenced the farmers into planting but there may have been other factors.

On environmental factors influencing opportunity exploitation of improved eucalypts seedlings by entrepreneurial tree farmers in Lari District. Land size proved to be one of the most crucial factors since with small size of land one can venture in to agro-forestry and this would improve the life of the farmer. The other factor is when farmers have information on new improved varieties in the market it is easier for them to venture. This information can be through hand on experience, friends, public baraza and even the mass media. Extension officers also come in handy although in most cases they were not available. Farmers who got information from one another and other were visited by the extension officers once a year. Training was offered by a few farmers attended training frequently while others did not attend any training at all on agro-forestry.

From the factor analysis the study concludes that some variables were omitted hence the factor analysis indicates on the variables that were related. Therefore there were factors that did not have an effect on opportunity exploitation for farmers planting improved

eucalyptus tree varieties in Lari District. The factors that influenced environmental factors on opportunity exploitation included environment conservation, start enterprises as a partnership with other firm especially the TBPT who were the promoters of the improved trees varieties and government support to afforestation especially through the Ministry of Agriculture, government interventions extension and tree harvesting permits and the group financing for purchase of improved eucalyptus tree seedlings.

#### **5.4. Recommendations**

A deliberate training programme in entrepreneurship for tree farmers needs to be instituted to unlock the entrepreneurial potential and enhance the influence of the personality traits possessed by farmers. This would be best undertaken by government agencies in the forestry sector and the NGO's working with the farming communities.

Access to information on improved tree varieties need to be enhanced through partnership and government interventions especially collaboration with KEFRI and extension service agents. Research institutes as the main sources of innovations especially improved varieties need to develop outreach with tree farmers to ensure flow of information.

Market information and access through farmers' networks, association and cooperatives needs to be strengthened to enhance influence on perceived returns from entrepreneurial opportunity exploitation. The draft forestry policy 2014 needs to be enacted speedily to provide a platform for private commercial forestry and promote formation and strengthening of tree farmers commodity association.

### **5.5 Limitation of the study**

One limitation of this study related to its nature of being a survey. Adoption of innovative forestry technologies is a process that occurs in time implying that a longitudinal approach may be more appropriate. To address this concern, data on adoption of improved tree seedlings was collected from two periods. Initial adoption and socio-demographic data was collected for the period ending in year 2008 while subsequent data was related to the activities of the year 2009. Then the causal relationship between the independent and dependent variables was investigated using statistical techniques and theoretical arguments.

### **5.6 Recommendations for Further Research**

From the study postulates that the presence of role models may have contributed to the planting of the improved eucalyptus trees in Lari and especially in availing the improved tree seedlings and prerequisite information on their efficacy. Hence further researcher should be carried out on the influence of role models in entrepreneurship in forestry context particularly for small scale tree farmers.

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## APPENDICES

### APPENDIX I: LETTER OF INTRODUCTION

6<sup>th</sup> February 2011

Dear respondent,

I am a postgraduate student at the School of Business of Kenyatta University and pursuing a degree of Doctor of Philosophy (PhD) in Entrepreneurship Development. As part of partial fulfilment, I am conducting a research project on: **FACTORS INFLUENCING THE OPPORTUNITY EXPLOITATION BY ENTREPRENEURIAL TREE FARMERS IN LARI DISTRICT OF KIAMBU COUNTY, KENYA**. For this reason, I would appreciate if you would kindly spare a few minutes of your time to fill in the blanks in the attached list of questions to the best of your knowledge as they apply to yourself or your enterprise (farming) activities.

The information in this questionnaire will be treated with confidentiality and in no instance will your name be mentioned in this research. In addition, the information will not be used for any other purpose other than for this research. Your assistance in facilitating the same will be highly appreciated.

**Thank you in advance.**

**Yours Faithfully**

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**BENSON KANYI**

**PhD Student**

## APPENDIX II: QUESTIONNAIRE FOR SMALLHOLDER FARMERS

Serial No.....Location:.....; Sub-Location.....

Farm size (Acres):..... Main crop/activity:.....

Kindly indicate with an **X** or **tick (✓)** your appropriate choice:

**DATE**        /        /       

### **Section 1: Personality Traits of the farmers**

Your Gender            Male                                    Female

What is your age? (select appropriate category)

- Below 25 years            26 – 35 years  
    36 – 45 years            Above 45 years

What is your level of education?

- Primary                                    Secondary  
    Tertiary College            University Graduate  
    University Postgraduate

Other than agro-farming, what is your profession? (Teacher, doctor, clerk etc)

\_\_\_\_\_

Have you ever been employed before venturing into agro forestry?

- Yes                                    No

If YES, Number of years in past employment \_\_\_\_\_ years

Number of years in agro forestry \_\_\_\_\_

### **Section 2: Information on Opportunity Exploitation**

Size of land in acres \_\_\_\_\_

Which year did you start planting improved eucalyptus tree seedlings? \_\_\_\_\_

How did you come to know about the improved tree genotypes?

- Prior experience (past employer)
- A friend or Relative
- Mass media
- Public Baraza

Others (Specify) \_\_\_\_\_

Number of visits by extension officers in the last one year \_\_\_\_\_

Number of trainings attended in regard to management of your agro-forestry business in the past 3 years \_\_\_\_\_

Have you borrowed money for farming in the last one year?

- Yes
- No

If yes, state the amount borrowed in Kshs. \_\_\_\_\_

What has been the main source of financing for farming of improved eucalyptus tree seedlings? (Tick all that apply)

- Personal savings
- Bank loans
- Family or friends contributions
- SACCO loan
- Social security savings e.g. pension benefits
- Shareholders funds/ Partners contributions
- Socio-economic support groups (*Chamas*)

Others (Specify) \_\_\_\_\_

What was your estimated initial level of capital investment into the farming of improved eucalyptus tree seedlings? Kshs. \_\_\_\_\_

What is the number of family members who are available for farming

Have you employed casual labourers in your farm(s)?

- Yes
- No
- If YES, how many \_\_\_\_\_

Have you experimented with new ideas or the use of new knowledge during the past year, for example, new crop variety or farming techniques?

Yes  No

If YES, How did it experiment?

---

To what extent has your improved eucalyptus tree seedlings enterprise complied in regard to the following?

			High	Fair	Low	Poor	Not at all
Quality	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Environmental safety	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Trade policies	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Workplace safety	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
Sanitation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		

Did you start your enterprise as a partnership with any other firms or agencies?

Yes  No

If YES, which ones? \_\_\_\_\_

What kinds of partnerships? \_\_\_\_\_

How will you rate the following aspects of improved trees

	Poor	Fair	Good	Very Good	Excellent
The expected value of improved trees	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Demand of forestry products	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Profit margin	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The life cycle of improved trees technology	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The cost of credit for buying improved trees	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Level of competition	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Availability of learning opportunities on improved trees	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Section 3: Technological Innovation Factors' on the Intensity of Opportunity**

**Exploitation**

21. Estimated number of improved trees planted to date \_\_\_\_\_
22. Was the starting up of your agro business facilitated by any government incentives or public agencies?  Yes  No

Briefly specify \_\_\_\_\_

23. To what extent did the following factors influence your decision to start up farming in improved eucalyptus tree seedlings?

	High	Fair	Low	Poor	Not at all
Opportunities for product differentiation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
New ideas tried on the farm	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
New products from the farm	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Collaborations with support organizations such as KEFRI	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Government support	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Type of government regulation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Information availability	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Individual entrepreneurial capabilities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

24. To what extent do you agree (or disagree) to the following aspects in regard to farming in improved eucalyptus tree seedlings?

	Strongly Agree	Fairly Agree	Uncertain	Fairly disagree	Strongly disagree
The more opportunities for product differentiation a market offers, the more likely is a farmer to invest in innovation adoption.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The more production can be	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

controlled, the more likely a farmer is to adopt new technologies.					
The more markets are regulated, the less a farmer is likely is to invest in adoption of innovations	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The higher the level of education a farmer has attained, the more likely he is to adopt innovations early.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The more farmers are involved in agricultural co-operative networks, the more likely they are to adopt innovations early.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If a farmer is young or if he is elderly but has a successor, he is more inclined to invest in innovations than if he is old and without successor.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Persistence: farmers that were frontrunners in the past, have a higher probability to be a frontrunners at present, and farmers that were laggards in the past are likely to remain so	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

What do you see at present as the main impediments to improved productivity of your business? \_\_\_\_\_

**THANK YOU FOR YOUR RESPONSE**



## APPENDIX IV: BENEFICIARIES OF TREE PLANTING GROUPS

Names of beneficiaries of Tree planting groups

No	Name	No of trees	Remarks
1	Kihanya Mwaura	200	Extensionist (clone)
2	Mwangi Njuru	350	E.Grandis and Clones.
3	Muiruri Njuru	1050	Clones.(replaced coffee)
4	Mary Wanjiku	300	Clones and EG replaced coffee
5	Mrs. Joyce Kairu	240	Clones and EG
6	Kibata Kairu And Nyokabi	1560	EG and Gravillea
7	Mburu Richard	150*	Clones and EG came to Karura
8	Cllr Nganga	20	EG
9	Nyumu Njoroge	333	EG
10	Keneth Kairu	700	EG
11	Mary Wairimu Wataku	10	EG
12	Edward Gachuri	50	EG
13	Kimani Kago	20	EG
14	Mary Wanjiru kamau	10	EG
15	Keziah Kimani	10	EG
16	Hildah Wanjiku	10	EG
17	Migwi Gatura	420	EG and clones (a lot of mature Grevillea)
18	David Thairu	10	EG
19	Ndungu Njueni	48	Has requested for more.
20	Margaret Wanjiru	8	EG
21	Jedidah Ngugi	16	EG
22	Benson Kinuthia Kihanya	150	Clones and EG. Urgently requires planting two acres.
24	Nganga Appolo	166	EG. Urgently requires to plant three acres
25	Wanjiku Gakomo	10	EG
26	Nyina wa boy	18	EG

27	Francis Maina	15	EG
28	Regina Gathoni	20	EG
29	Anthony Mburu	166	EG
30	Pastor Thumbi	50	Clones
31	Keziah Wangui	20	EG
32	Kariuki Kinuthia	1200	Needs to plant 3 acres
33	Gachoiria Primary School	200	

Community trained on a one-hour sensitization forum by Rose Makena (from Karura forest). From the findings of the study Mwani Njuru came up with the following;

Remarks;

They include; the average age of most farmers is above 45 years. All the women who were sensitized for planting the trees had to consult their husbands. Young farmers who do not have real ownership of the land are hesitant to plant the trees. The cash requirement on collection was a big limitation. There is need to have a technical package. More farmers have now planted through their friend. Mr. Ngugi Njihia is now supplying seedlings and with support could offer private extension.