

An evaluation of the effects of land tenure security in on-farm investment and on-farm productivity: A case of the smallholder farmers in the Amathole District of the Eastern Cape Province of South Africa.



University of Fort Hare
Together in Excellence

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DEDICATIONS

I would like to dedicate this study to my wife, Nomtha and my children Bayolise, Akhalomzi and Onjengaye as a way of motivating and encouraging them to study and emulate me. Furthermore I want to thank them for their constant support and encouragement throughout the study.

DECLARATION

I hereby declare that this thesis is my original work, and has not been submitted in partial or entirety for degree purposes to any other university. All the works that was written by other authors and used in the thesis are fully acknowledged.

Submitted for the Master of Agriculture Degree (Agricultural Economics) at the University of Fort Hare.

.....
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.....
Date

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ABSTRACT

Smallholder agriculture contributes to poverty alleviation through food price reduction and employment creation. Smallholder farmers have the potential of creating employment because they are labour-intensive. Most small holder farmers in the Amathole District practices dual farming system i.e. crops and livestock production. However these farmers are faced by a number of constraints amongst these are land tenure security, lack of capital, drought, diseases, lack of access to markets and production inputs. The objectives of this study were: to investigate land tenure security impact on-farm investment and on-farm productivity by the smallholder farmers; to assess constraints encountered by the smallholder farmers, to identify factors influencing on-farm investment by the smallholder farmers and to identify factors influencing on-farm productivity by the smallholder farmers.

Eighty smallholder farmers were interviewed using a structured questionnaire. The data was analyzed using descriptive statistics (frequency, percentages) and regression analyses. Data was for coded and processed for analysis using Statistical Package for Social Sciences (SPSS). The results revealed that generally, the household demographic characteristics have an influence on the decision to investment in the farm thus on farm productivity. These included age, gender, marital status, educational level and household size of the smallholder farmers. However the findings revealed that smallholder farmers were not much concerned with the land tenure security of the land as they see themselves as owners of these lands. The reason being that they always had access to their land and there were no perceived tenure insecurity threats. The majority of the smallholder farmers were not worried that they might lose their land in the future as they felt that their land tenure was secured. Although, the majority of farmers had some sense of security they still preferred a freehold tenure system as form of land tenure security. This suggests that there was a sense of insecurity among some of the smallholder farmers caused by their current tenure forms. Majority (66%) of the farmers held their land under freehold whilst leasehold and communal hold farmers constituted 5 % and 29 % respectively. Even though majority had freehold tenure system, they could not use their land as collateral when required for funding from the lending institutions because the title deeds were not registered in their names but those of deceased family members. As a result the majority was constrained by lack of credit and had low income. Lack of cash suggests that the farmers have difficulties in purchasing farm

inputs and making necessary improvements and investments in their lands. Generally, the results of the survey suggest that the household demographics and socio-economic variables may have an influence on the on-farm investment and on-farm productivity by the smallholder farmers. Furthermore, besides the challenges with land tenure, there are other factors that are likely to influence on-farm investment and on-farm productivity.

The results of the survey revealed that smallholder farmers were faced with lot of challenges. These included lack of access to markets, grazing land, credit, farm implements, productions inputs and irrigation water. In addition to this the smallholder farmers were faced with both crops and livestock production constraints. Crop production constraints included lack of access to labour, transport, capital, storage facilities, pests, diseases, lack of management skills and severe drought. Livestock production was constrained by diseases, theft, attack by wild animals, lack of fence in the camps, labour, vaccines, dipping facilities too far and severe drought. For both crop and livestock production diseases and drought were major concerns for smallholder farmers since they were dependent on rainfall for their farming activities.

With regards to improvements and investment there was little or not much investment that has been made by the smallholder farmers. One of the reasons mentioned by the farmers as the main cause for little or no investments is the lack of capital to make such improvements or investments. The study also employed empirical analysis through employing on-farm investment and on-farm productivity models of the study on the factors influencing the on-farm investment and on-farm productivity by the smallholder farmers in the study area. In both models, the independent variables were tested for their significance and it was found that some variables were significant whilst others were not. With regards to the dependent variable on-farm investment, household socio-economic factors such as household size, educational levels and farm size, had a positive influence in on-farm investment and were also statistically significant. On the other side, factors such as land tenure security, age, gender, household income and access to markets did not have any influence and were not statistically significant. From the perspective of on-farm productivity variables such as farm size, access to credit and access to extension services had a positive influence. However, variables such as land tenure security, age,

household income, educational levels, access to implements, were negatively influencing on-farm productivity by the smallholder farmers.

Key words: Land tenure security, smallholder farmers, on-farm investment & on-farm productivity.

TABLE OF CONTENTS

	PAGE NO
DEDICATIONS	i
DECLARATION	ii
ACKNOWLEDGEMENTS	iii
ABSTRACT	iv
TABLE OF CONTENTS	vii
LIST OF TABLES	xiv
LIST OF FIGURES	xvi
LIST OF ACRONYMS	xvii
CHAPTER ONE	1
1.1 Introduction.....	1
1.2 Problem statement.....	5
1.3 Objectives of the study	7
1.4 Research questions	7
1.5 Hypothesis.....	8
1.6 Justification of the study.....	8
1.7 Delimitations.....	9
1.8 Outline of the thesis.....	9
CHAPTER TWO	10
2. LAND TENURE AND ECONOMIC DEVELOPMENT IN RURAL AFRICA.....	10
2.1 Introduction.....	10
2.1.1 Historical overview	11
2.1.2 The concept of land tenure.....	15
2.1.3 Definition of land tenure.....	15
2.1.4 Background information about land tenure system.....	16
2.1.5 Land ownership within mainstream development	17
2.1.6 Land tenure “the concept of bundle of rights”	18
2.2 Overview of land tenure systems in the world.....	19
2.3 Forms of land tenure systems in South Africa.....	29
2.3.1 Communal tenure system.....	29

2.3.2 Leasehold tenure system.....	31
2.3.3 Freehold tenure system.....	31
2.4 The concept of land tenure security	32
2.4.1 Breaths of rights	33
2.4.2 Duration and assurance.....	33
2.4.3 Tenure security and investment	34
2.4.3.1 Property rights to land, access to credit and on-farm investment	37
2.4.4 The effects of tenure security on investment	38
2.4.4.1 The assurance effect	38
2.4.4.2 Land titling.....	39
2.4.4.2.1 Informal individual tenure	39
2.4.4.3 The collateralisation effect.....	39
2.4.4.3.1 Demand failures.....	40
2.4.4.3.2 Supply failures.....	40
2.4.5 Tenure security and agricultural productivity.....	41
2.4.5.1 Property rights and agricultural productivity	43
2.4.5.1.1 Benefits of secure property rights.....	44
2.4.5.1.2 Implications of insecure property rights.....	45
2.4.5.2 Land rights and credit use.....	47
2.4.5.3 Land rights and land improvements.....	48
2.4.5.4 Land rights, input use and agricultural productivity.....	48
2.5 Economic benefits of exclusive and secure property rights to land.....	48
2.5.1 Exclusive and secure property rights to land, land transfers and land use efficiency...	49
2.5.2 Exclusive and secure rights to land and access to credit	49
2.5.3 Exclusive and secure rights to land and investment and conservation.....	49
2.6 The economic constraints imposed on smallholder farmers in the former homelands....	50
2.6.1 Economic constraints on government investment in development.....	52
2.6.2 Constraints to private sector.....	52
2.7 Some major factors agricultural productivity	53
2.7.1 Shortage of land irrigation water.....	53
2.7.2 Ownership, control and access to land	53

2.7.3 Limited control and decision making over productive resources	53
2.7.4 Unavailability of credit	54
2.7.5 Other impediments to agricultural production	55
2.7.5.1 Rural landless and land tenure	55
2.7.5.2 Farm size relationship and technology	56
2.8 Summary	56
CHAPTER THREE.....	57
3. SELECTION AND DESCRIPTION OF STUDY AREA	57
3.0 Introduction.....	57
3.1 Selection of the study area.....	57
3.2 Description of the study area	58
3.2.1 Keiskammahoek area.....	58
3.2.2 Nkonkobe Municipality	60
3.2.3 Population	61
3.2.4 Geophysical aspects.....	62
3.2.4.1 Topography.....	62
3.2.4.2 Climate and rainfall	63
3.2.4.3 Land use and settlement patterns.....	64
3.2.4.4 Vegetation and soil	65
3.2.5 Infrastructure.....	66
3.2.6 Agricultural potential of the study areas.....	67
3.2.7 Economic activities	69
3.2.7.1 Economic activities in the Keiskammahoek area.....	69
3.3.7.2 Economic activities in the Nkonkobe Municipality	70
3.4 Land tenure systems in the study areas.....	71
3.5 Summary.....	72
CHAPTER FOUR.....	73
4. RESEARCH METHODOLOGY	73
4.0 Introduction.....	73
4.1 Research design.....	73
4.2 Units of analysis.....	73

4.3 Sampling procedure.....	74
4.4 Sampling size	75
4.5 Research design.....	76
4.5.1 The orientation stage	76
4.5.2 The survey.....	76
4.6 Data collection	77
4.6.1 Primary data.....	77
4.6.2 Collected data.....	77
4.6.3 Secondary data	79
4.7 Data analysis	79
4.7.1 On-farm investment model	80
4.7.2 On-farm productivity model	80
4.7.3 Multiple regression model	81
4.7.3.1 Expected regression outcomes on-farm investment model	85
4.7.3.2 Explanatory variables and priori expectations	85
4.7.3.2.1 Land tenure security	85
4.7.3.2.2 Age.....	86
4.7.3.2.3 Gender.....	87
4.7.3.2.4 Household size	87
4.7.3.2.5 Household income	88
4.7.3.2.6 Educational levels.....	88
4.7.3.2.7 Farm size	89
4.7.3.2.8 Access to credit	89
4.7.3.2.9 Access to production inputs	91
4.7.3.2.10 Access to farm implements	91
4.7.3.2.11 Access to grazing land	91
4.7.3.2.12 Access to markets	92
4.7.3.3 Expected regression outcomes on-farm productivity model	92
4.7.3.4 Explanatory variables and priori expectations.....	93
4.7.3.4.1 Land tenure security	93
4.7.3.4.2 Age.....	94

4.7.3.4.3 Gender.....	95
4.7.3.4.4 Household size	95
4.7.3.4.5 Household income	95
4.7.3.4.6 Educational levels.....	96
4.7.3.4.7 Farm size	97
4.7.3.4.8 Access to credit	97
4.7.3.4.9 Access to production inputs	99
4.7.3.4.10 Access to farm implements	98
4.7.3.4.11 Access to grazing land	99
4.7.3.4.12 Access to markets	100
4.7.3.4.13 Access to extension services	100
4.7.3.4.14 Farming experience	101
4.7.3.4.15 Membership to farmer organisations	101
4.7.3.4.16 Irrigation.....	101
4.8 Summary.....	102
CHAPTER FIVE	103
5. RESULTS AND DISCUSSION OF THE DESCRIPTIVE ANALYSIS	103
5.0 Introduction.....	103
5.1 Land tenure systems.....	103
5.1.1 Tenure effects on-farm investment.....	105
5.1.2 Tenure effects on-farm productivity.....	108
5.1.3 Preferred land tenure system.....	109
5.2 Demographic characteristics of sampled farmers	110
5.2.1 Age distribution of interviewed farmers.....	111
5.2.2 Gender distribution of respondents	112
5.2.3 Marital status of respondents	113
5.2.4 Educational levels of respondents	115
5.2.5 Household size	117
5.3 Agricultural production of smallholder farmers	118
5.3.1 Farm size.....	119
5.3.2 Crop production	120

5.3.2.1 Constraints in crop production	123
5.3.3 Livestock production	123
5.3.3.1 Constraints in livestock production	127
5.4 Socio-economic factors likely to affect on-farm investment and productivity	129
5.4.1 Access to credit	130
5.4.2 Access to production inputs	131
5.4.3 Access to farm implements	133
5.4.4 Access to grazing land	134
5.4.5 Access to markets	136
5.4.5.1 Marketing constraints	137
5.4.6 Access to extension services	139
5.4.7 Household income	141
5.4.8 Farming experience	143
5.4.9 Membership to farmer organisations	145
5.4.10 Access to irrigation water	146
5.5 Improvements and investments	149
5.6 Summary	152
CHAPTER SIX	154
6. RESULTS AND DISCUSSION OF THE EMPERICAL ANALYSIS	154
6.0 Introduction	154
6.1 Empirical models	154
6.1.1 Econometric analysis of variables through the multiple regression model	154
6.1.2 Empirical results of the regression model	158
6.1.2.1 Multiple regression results on-farm investment model	158
6.1.2.1.1 Household size	160
6.1.2.1.2 Educational levels	161
6.1.2.1.3 Farm size	162
6.1.2.2 Multiple regression results on-farm productivity model	162
6.1.2.2.1 Investment	165
6.1.2.2.2 Farm size	166
6.1.2.2.3 Access to credit	166

6.1.2.2.4 Access to extension services	167
6.2 Summary	167
CHAPTER SEVEN.....	169
7. SUMMARY, CONCLUSION AND RECOMMENDATIONS.....	169
7.0 Introduction.....	169
7.1 Summary and conclusion of results	169
7.2 Recommendations	182
7.2.1 Future research design	187
References	189
APPENDIX 1.....	227

LIST OF TABLES

Table 2.1 Categories of land tenure systems	21
Table 2.2 Land tenure systems in selected Southern African countries	24
Table 2.3 Land tenure systems for individuals and group ownership in Southern Africa.....	26
Table 2.4 Communal tenure systems in South Africa.....	27
Table 4.1 Sampled respondents from each study areas in relation to land tenure systems...75	
Table 4.2 Summary of the variables that were collected.....	78
Table 4.3 Variables used in the on-farm investment model.....	85
Table 4.4 Variables used in the on-farm productivity model.....	93
Table 4.5 Summary of the research objectives and analytical tools.....	102
Table 5.1 Preferred land tenure systems by respondents.....	110
Table 5.2 Gender distribution of respondents	113
Table 5.3 Marital status of respondents	114
Table 5.4 Household size distribution.....	117
Table 5.5 Distribution of farm sizes of respondents.....	120
Table 5.6 Different types of crops and vegetables grown by smallholder farmers	122
Table 5.7 Distribution of yield obtained from maize and potatoes by respondents	123
Table 5.8 Constraints faced by the smallholder farmers.....	124
Table 5.9 Livestock production of the smallholder farmers.....	127
Table 5.10 Constraints in livestock production	129
Table 5.11 Distribution of access to credit.....	132
Table 5.12 Access to production inputs	133
Table 5.13 Access to farm implements.....	134
Table 5.14 Marketing constraints experienced by respondents.....	139
Table 5.15 Access to extension services	141
Table 5.16 Distribution of total household income	143
Table 5.17 Farming experiences of respondents	145
Table 5.18 Membership to farmer organisations.....	146
Table 5.19 Access to irrigation water by respondents	147
Table 5.20 Improvements and investments made by the smallholder farmers	150
Table 6.1 Multiple regression results applied on-farm investment.....	159

Table 6.2 Multiple regression results applied on-farm productivity..... 164

LIST OF FIGURES

Figure 3.1 Map showing district municipalities in Eastern Cape Province	57
Figure 3.2 Map showing location of Keiskammahoek	59
Figure 3.3 Map showing location of study sites in Nkonkobe Local Municipality.....	61
Figure 3.4 Average rainfall (mm) for Keiskammahoek per annum.....	64
Figure 5.1 Distribution of land tenure systems of respondents	104
Figure 5.2 Tenure effects on-farm investment	107
Figure 5.3 Tenure effects on-farm productivity	108
Figure 5.4 Age distribution of respondents	111
Figure 5.5 Educational levels of respondents.....	115
Figure 5.6 Keeping of livestock by the smallholder farmers	126
Figure 5.7 Distribution of access to grazing land	135
Figure 5.8 Access to markets by respondents.....	136
Figure 5.9 Distribution of sources of income of respondents.....	142

LIST OF ACRONYMS

ADM	Amathole District Municipality
ARDRI	Agricultural and Rural Development Research Institute
CPA	Communal Property Association
CTO	Certificate to Occupy
DWAF	Department of Water Affairs and Forestry
ECDC	Eastern Cape Development Corporation
FAO	Food and Agriculture Organisation
FSC	Farmer Support Centre
GDP	Gross Domestic Product
GGP	Gross Geographic Product
IDP	Integrated Development Plan
KWT	King Williams Town
MAFISA	Micro Agricultural Finance Institutions of South Africa
PD _o A	Provincial Department of Agriculture
PTO	Permission to Occupy
SA	South Africa
SADT	South African Development Trust
SDI	Spatial Development Initiatives
SPSS	Statistical Package for Social Sciences
TFP	Total Factor Productivity
TRAC	The Rural Action Committee
WRC	Water Research Commission

CHAPTER ONE

1.1 Introduction

Land is an important economic asset in almost all societies and can contribute to economic development and sustainable growth. Therefore this means that land has a potential to contribute to poverty reduction, especially in the developing countries (Van Asperen, 2007). Providing poor people with access to land for ownership or possession and improving their ability to make effective use of the land they occupy is central to reducing poverty and empowering poor people and communities (Deininger, 2003). It is for this reason that land and labour constitute the major inputs used in production by overwhelming majority of smallholder farmers in most African countries (Falusi & Olayide, 1980). In support of this view, Tshoni (2010) indicated that land is the most important agricultural input in food production process and it is a determining factor in production. This means that if there is no land, food production will not take place, but if there is arable land food crop production will occur. Olayemi (1980) was also of the view that land continues to be the most important traditional farm input in production, since increases in farm output come primarily through bringing additional land into cultivation.

According to Adedipe (1991), land is usually taken to include not only the physical soil, but also everything beneath and everything up to the sky above. Odii (1998) argued that land is the basic resource which supports the production of all agricultural commodities including livestock which depend on land to produce forage and grain they consume. The concept of land has remained of considerable importance since the creation of man. Man has depended on the land for his food, raw materials for clothing and shelter (Odii, 1998). Famoriyo (1980) is of the opinion that, land is the fundamental basis or the social and economic existence of man and society. According to Olayiwola and Adeleye (2006), no nation, city or rural area can survive as an entity without land hence it is considered as the most fundamental resource to the poor that is essential to lift themselves out of poverty. Furthermore land as a factor of production is associated with property ownership. This implies that enjoyment of certain rights to land and the system whereby persons gain these rights to land is called land tenure system (Umthiza Development Centre, 1997).

Eze *et al.*, (2011), as cited Adams (2001) defined land tenure system as the rights and institutions that govern access to and use of land. The term “land tenure” refers to the institutions governing

the rights to use and transfer land, to the fruits derived from land and to the duties that go with those rights (Ali, 1979). According to Brinkman *et al.*, (1979), the term land tenure is used to express legal relationship between persons, groups and classes that regulate the use of land transfer and thereof enjoyment of the products and duties that go with those rights. Land tenure means the manner in which land is held. It can therefore be considered as a reflection of power relationships between persons and groups in the use of land (Nompozolo, 2000).

The land tenure system can be defined as the system whereby persons gain rights to land, accepting that rights are fragmented in time, space and over multiple uses. Tenure system of land involves a system of rights, duties and responsibilities concerning the use, transfer, alienation of ownership security of land and its resources (Eze *et al.*, 2011). Land tenure is further defined as the terms and conditions under which land is held, used and transected and is one of the principal factors determining the way in which resources are managed and used and the manner in which benefits are distributed (Economic Commission for Africa, 2003).

More than 60 % of the active population in Southern Africa is dependent on land for livelihood (Economic Commission for Africa, 2003). According to IFAD (2009), land is fundamental to the lives of the poor rural people and therefore a source of food, shelter, income and social entity. Secure access to land reduces vulnerability to hunger and poverty but for many of the world's poor rural people in developing countries, access is become more tenuous than ever (IFAD, 2009). In the context of African development, the question of access to land and other resources are key to basic livelihood and therefore an issue of fundamental human rights. The domination of agriculture in most African economies suggests the importance of land as a basic tool of development and a significant determinant of income earning power (Blackden & Bhanu, 1998).

Since land is one of the pillars of any economy, land tenure is related to livelihood, social, economic, legal and religious relationships. One of the main requirements for an individual to use land economically and willing to invest is the assurance of the land right for a period of time and this is referred as tenure security (Deininger, 2003). According to Hanstad (1998), a landholder has security of tenure if she/he perceives little or no likelihood of losing physical possession of the land within some future time period. This refers to the degree of confidence

held by the people that they will not be deprived of their land rights enjoyed and or of the economic benefits derived from those. In support of the above argument there are two major issues related to land tenure system that are important for the process of development, namely access to land and security of tenure.

According to Bembridge, (1991), the most important factor in the land tenure arrangements is the security of tenure irrespective of the land tenure system. Roth and Haase (1998) defined land tenure security as the individual's perception of his/her right to a piece of land on a continual basis, free from imposition or interference from outside sources, as well as the ability to reap the benefits of labour or capital invested in land, either in use or upon alienation. This definition contains three components i.e. breadth, duration and assurance with legal and economic dimensions as follows (Place, Roth and Hazell, 1993):

- Breadth refers to the quantity or bundle of rights held, or possession of key rights if certain ones are more important than others.
- Duration is the length of time that a given right is legally valid.
- Assurance implies that right (s) and duration are known and held with certainty.

The legal dimension defines the composition (breadth) and duration of rights in the bundle, and it implies that one holds with complete assurance all rights embodied in his or her tenure, even if tenure is of short duration and confers meager rights. The economic dimension defines the value of economic benefits derived from de facto tenure in the land resource (Place, Roth and Hazell, 1994).

Twerefou *et al.*, (2011), argued that land tenure security is essential in stimulating the development of land since many local and foreign investors are hesitant to invest in land when tenure is insecure. Tenure security has a potential of increasing credit use through greater incentives for investment, enhancing the collateral value of land, facilitating land transfer from less efficient to more efficient users, reducing the incidence of land disputes and raising productivity through increased agricultural investment. There is a long standing debate on the

extent to which more secure land rights increase incentives to invest in agriculture (Cotula & Polack, 2007).

The debate on the links between land tenure security and farmer's investment in their land is based on the assumption that the nature and enforceability of land rights will affect farmer's propensity and ability to make such investments. There is empirical evidence to suggest there is some existence of some relationship between land rights and investment. For an example farmers were found to be more likely to invest in their own land than in borrowed fields (Gavian & Fafchamps, 1996). Farmers with long term access to land have a greater incentive to sustain the land and develop ways of preserving and regenerating it (Quisumbing *et al.*, 1999). Land tenure and property rights affect the application of technologies for agricultural and natural resource management (Tenaw *et al.*, 2009).

According to Tenaw *et al.*, (2009), secure property rights provide sufficient incentives to the farmers to increase their efficiencies in terms of productivity. It is natural that without secured property rights farmers do not feel emotional attachment to the land they cultivate, do not invest in land development and will not use inputs efficiently. Tenaw *et al.*, (2009), indicated that there exists a close relationship between land tenure and property rights. This main justification for secure property rights to land is it providing the incentives for investment in land and sustainable development. Arokoyo & Chikwendu (1993) stated that land is a major productive resource, and lack of control over it is a major limiting factor for agricultural productivity.

A major theme in land tenure research is the relationship between the security of land tenure and agricultural productivity (Quisumbing *et al.*, 1999). Agricultural productivity can be defined as the index of the ratio of the total value of total farm outputs to the value of inputs used in farm production (Olayide and Heady, 1982). Mundlak (2007) said that output is usually measured as market values of final output, which excludes the intermediate products such as corn feed used in meat industry. This output value may be compared to many different types of inputs such as land and labour. According to Mundlak (2007), agricultural productivity may also be measured by what is termed Total Factor Productivity (TFP). This method of calculating agricultural productivity compares an index of agricultural inputs to an index of outputs.

Providing security of tenure is often seen as a precondition for intensifying agricultural production and is now increasingly stressed as a prerequisite for better natural resource management and sustainable development (Economic Commission for Africa, 2003). Rural people generally need both secure individual rights to farm land and secure collective rights to common pool resources upon which whole community depend. The security of tenure is required for agricultural production and poverty eradication (Economic Commission for Africa, 2003). Tenure security is important not only for agricultural production but allows people to diversify their livelihoods by using their land as collateral, renting it out or selling it (IFAD, 2008). Tenure issues affect every day choices of poor rural women and men, such as which crops to grow and whether crops are grown for subsistence or commercial purposes. According to IFAD (2008), tenure security influences the extent to which farmers are prepared to invest in the long term well-being of their land or to adopt new technologies and innovations. Lack of secure land tenure exacerbates poverty and has contributed to social instability and conflict in many parts of the world (IFAD, 2008).

Land tenure problems remain unresolved, and constrain the efforts of the farmers in adopting innovations and investments in agriculture, which are intended to improve their productivity (Eze *et al.*, 2011). Bembridge (1984) indicated that smallholder farmers have been victims of a system of land tenure, which militated against the effective use of land due to unsecured land rights thus discouraging investment and agricultural productivity. Recognition of the importance of the role of agriculture in the development process has led to a search for factors which affect agricultural development, and the land tenure system has been identified as one of the major barriers to rural development (Vink, 1986).

1.2 Problem statement

Issues relating to land tenure in Southern Africa have attracted considerable research following increasing attention to the development of smallholder agricultural sector (Moor & Nieuwoudt, 1996). The land tenure particularly in developing countries was considered an important motivational factor for agricultural development (Bembridge, 1991). The important factor in land tenure arrangements was the security of tenure, irrespective of land tenure system. Traditional

land tenure systems are severe constraint upon irrigation development, because farmers were unable to install irrigation equipment in the fields they do not own (Bembridge, 1991).

In Southern Africa the situation has been complicated through different land tenure systems. Grigg, (1970) and Arnon (1981) as cited by Williams (1986) who stated clearly that system of land tenure in many developing countries is one of the main obstacles towards agricultural development. A number of studies i.e. Bembridge, (1984), Steyn, (1988) and Van Averbeké *et al.*, (1998) have shown that land tenure system can act as a barrier to development. However, De Beer (1983) contradicted this by stating that a land tenure system does not have significant effect on agriculture. Williams (1986) did not completely agree with De Beers, (1993) opinion and argued that land reform has had significant effects in some overseas countries such as Taiwan (as cited by Bembridge, 1983) especially if tied to other institutional supporting factors.

Without secure property rights smallholder farmers cannot investment freely in the farming thus increasing agricultural production. If there land rights are not secured it means that benefits of reaping fruits of investments cannot realised by the farmers. For farmers to be productive in their lands they need to put all the necessary investments in their lands. The literature review suggests that without secure land rights farmers cannot even use their land as collateral in order to acquire capital from lending institutions. This therefore means that farmers cannot purchase productions inputs, put necessary investments and improvements in order to enhance productivity. This suggests that land tenure security is likely to be a key determinant on whether the farmer will invest or not in the farm. This can mean that the lesser the investment in the farm, the poor the productivity of the farmer.

This study attempts to evaluate effects of land tenure security on on-farm investment and on-farm productivity of the smallholder farmers. The economic theory suggests that improvements in tenure security are expected to increase credit use, on-farm investment and land transactions, while reducing the incidence of land disputes. The land tenure debate is regarded as sensitive and somewhat controversial, since some argue strongly for communal ownership (Van den Brink, Bromley & Cochrane, 1994), others support individual ownership (Feder & Noronha, 1987; Feder & Onchan, 1987) while others contend that land tenure has limited impact on investment

and productivity (Place & Hazell, 1993, as cited by Moor & Niewoudt, 1995). This issue is of great importance to agricultural production in South Africa. The relationship between land tenure security and agricultural productivity remains a hotly debated issue hence a need for in depth study. The purpose of the study will be to investigate the relationship between the land tenure security, on-farm investment and on-farm productivity by the smallholder farmers.

1.3 Objectives of the study

The main objective of the study is to investigate whether land tenure security has a negative or positive impact on-farm investment and on-farm productivity by the smallholder farmers. It has been argued that most of the tenure systems are insecure and most of the farmers under these tenure systems have insecure property rights or their property rights are not clearly defined. Therefore the aim of the study is to investigate if these insecure property rights do affect the decision making towards on-farm investment and on-farm productivity. The specific objectives are as follows:

- i) To assess constraints encountered by the smallholder farmers under different forms of land tenure systems.
- ii) To identify factors influencing on-farm investment by the smallholder farmers.
- iii) To investigate factors influencing on-farm productivity by the smallholder farmers.

1.4 Research questions

The study aims to answer the following research questions:

- i) What are the constraints encountered by the smallholder farmers in their farming activities under the different forms of land tenure systems?
- ii) What are the factors influencing on-farm investment by the smallholder farmers under the different forms of land tenure systems?
- iii) What are factors influencing on-farm productivity of the smallholder farmers under the different forms of land tenure systems?

1.5 Hypothesis

- i) The main hypothesis to be investigated in this study is that land tenure security affects both investment incentives in agricultural production and the availability of resources to finance on-farm investment. The following are sub - hypothesis:
 - Lack of land tenure security has serious effects on-farm productivity of the smallholder farmers.
 - Land tenure security affects both incentives to invest and the availability of resources to finance on-farm investment.
- ii) Smallholder farmers are faced with both production and institutional constraints.

1.6 Justification of the study

Agriculture plays a significant role in production in the rural areas, with livestock contributing to the household income. The main problem is limited access to resources that can be developed to increase farmer production and activity level. Land as one of the factors of production, is important to clearly understand constraints imposed to farmers, which make it difficult for them to use land resources available effectively. It is for this reason that the study will investigate the effects land tenure security on on-farm investment and on-farm productivity of smallholder farmers. The study is important because it will come up with clear guidelines or development policies aimed at sustaining use of resources available, thus resulting in on-farm investment and on-farm productivity. There is a dialectical relationship or interface between land tenure security on one hand and on-farm productivity on the other hand. The study will come up with guidelines to improve and maintain this relationship on the long term basis. This study is undertaken in the belief that it will provide useful information about ways in which the different farmers make use of their lands for agricultural production and how they make decisions to continue invest their resources on land. It is also believed that through this study variability among the farmers may be identified. Finally at the end of the study recommendations will be drawn as tools for policy improvement.

1.7 Delimitations

The study will focus on investigating the relationship between land tenure security in on-farm investment and on-farm productivity of the smallholder farmers in the Amatole District of the Eastern Cape Province. The study will not cover other regions of the Eastern Cape Province. The aim of the study is to evaluate the effects of land tenure security on-farm investment and on-farm productivity of these farmers. The study will not cover impact of land tenure security and on food security and gender imbalances in terms of secure access to land. The study will provide a platform to do an in depth assessment of the farming practices of these farmers and how these affect on-farm investment and on-farm productivity. Due to financial and time constraints the study will not cover all similar farmers in the region.

1.8 Outline of the thesis

The thesis is organised into seven chapters. Chapter two provides literature review on the relationship between land tenure and agricultural development in rural Africa with emphasis on opportunities and constraints. Chapter three will describe the study area while Chapter four discusses the methods of data collection and data sources, the sampling and analysis techniques, and develops a conceptual framework used to analyze the empirical data. Chapter 5 will present and discuss the descriptive results; and, Chapter six comprises the empirical results of the study and interpretation. The final chapter will provide a summary, conclusions and recommendations.

CHAPTER TWO

LAND TENURE AND ECONOMIC DEVELOPMENT IN RURAL AFRICA

2.1 Introduction

This chapter will present a review of literature on the land tenure and economic development in rural Africa, effects of land tenure security on on-farm investment and productivity, opportunities and constraints for smallholder farmers. The chapter also reviews literature from South Africa and other developing countries. The importance of land for the rural economics of Africa cannot be overemphasized. The concept of land tenure involves the whole social relations of the rural people to one another. Land tenure has many facets for Black Africans and for others in that it includes the question of poverty, lease, inheritance, accessibility and land use rights (Letsoalo, 1987). However at social level it also includes questions of race and social class. There are few economic factors more important than the land, its ownership and tenure. The reason for this is because land tenure determines the right of access to key factors of production in an agrarian economy. (Letsoalo, 1987; Deininger, 2003 & Van Asperen, 2007). It further influences both the macro-economy and the distribution of income among individuals. The importance of land has been clearly spelt out Yudelman as cited by Letsoalo, 1987, page 47):

It is not a coincidence that rights to land have played a prominent part in social, political, and economic upheavals in countries with large peasant societies. Peasants rarely have anything other than land and labour to sustain them. Without capital, with limited mobility and few alternatives opportunities for making a livelihood, they are tied to the land; threats to their position vis-à-vis the land are threats to their securities.

Because of the importance of land as a source of life, social status and political power, land tenure has been and remains an important topic of development planning (Letsoalo, 1987 & Van Asperen, 2007). In support of this view, Toulmin & Quan (2000) indicated that land remains an asset of great importance to African economics as a source of income, food, employment and export earnings. One of the important components of any land use or farming system is the land tenure system. The institutional arrangements under which a farmer gains access to land largely

determines *inter alia*, what crops he can grow, how long he can till a particular piece of land, his rights over the fruits of his labour and his ability to undertake long term improvements on the land (Benneh, 1987). Land tenure can be briefly defined as the way people are holding the land. To be more specific, land tenure is the perceived institutional arrangement of rules, principles, procedures and practices whereby a society or community defines control over access to, management of, exploitation of, and use of means of existence and production (Dekker, 2005). It can be further defined as the terms and conditions under which land is held, used and transacted and is one of the principal factors determining the way in which resources are managed and used and the manner in which benefits are distributed.

This chapter deals with historical context, overview of land tenure systems in world, definition of land tenure system, brief outline of the concept of land tenure, types of land tenure systems, (e.g. communal, leasehold and freehold tenure systems) interface between land tenure security and investment, interface between land tenure security and agricultural productivity, land rights and agricultural productivity, benefits of secure property rights and implications of insecure property rights to land; economic benefits of exclusive and secure land rights, economic constraints imposed by lack of secure land rights on government and private sector investment, effects of land tenure security on-farm investment and major factors affecting agricultural productivity.

2.1.1 Historical overview

In a South African context, any debate or discussion with land related matters will not be complete without referring to the history of land dispossession as a result of the past colonialism and apartheid policies of the then Government of South Africa. Government policies of the past resulted in skewed development and resource allocation (Eastern Cape Government Policy, 1997). State intervention resulted in flawed economic development. There are some people needing help who live in rural communities in what used to be called reserves or Bantustans. Their quest is for more land, development, tenure security that is recognised by law (Didiza, 2004). The nature of land holdings and tenure arrangements remain a constant reminder of our colonial and apartheid legacy. The issue of landlessness of the majority of black people in South Africa arises from the scale and scope of land dispossession of African people that has taken place since 1652 (Phillip, 1974; Didiza, 2004 and Mayende, 2004). This dispossession was based

on the control and dominance exerted by a white minority over black majority in this country (Claasens, 2000 and Didiza, 2004). According to Roth & Yates (2004), the colonial dispossession of land centralized the ownership in the hands of white minority population and precluded black South Africans from secure land ownership, created a complex of land tenure issues.

By the end of the 19th century, millions of African people were displaced into ever smaller and poorer patches of land, resulting in overcrowding and environmental degradation (Didiza, 2004 & Mayende, 2004). These areas became known as native reserves which served as pools of cheap migrant labour for white-owned farms and mining companies (Didiza, 2004 & Mayende, 2004). According to Mayende (2004), people either owned land, or had access to certain rights in land in terms of customary law, but who were outlawed virtually overnight as landowners after the promulgation of the 1913 Native Land Act and other subsequent colonial legislation. The Natives Land Act, of 1913 was the first policy to attempt to divide the Union of South Africa into areas where Africans could own land and areas where they could not. According to Philip, (1974), the Native Trust and Land Act in 1936 were eventually carried with representation of Natives Act, and the principle of territorial and political segregation thereby extended. The segregation policy had in fact influenced policy making with regards to African land tenure. The impact of the 1913 Land Act on African farming in South Africa was fundamentally disabling. In the latter part of the nineteenth century, smallholder farming was viable and successful in responding to the increased demand for agricultural products from the mining towns (Bundy, 1988). These farmers supplied the major towns of the colony of Natal with grain and exported the surplus to Cape Town.

In 1860, over 83% of the nearly half million hectares of white - owned land was farmed by African tenants. African owner-operated or tenant farming proved to be as efficient as large-scale settler farming based on hired labour. African farmers adopted new agricultural technologies, entered new industries and out competed large-scale settler farming in some of the emerging agricultural markets. Settlers urged that because of labour shortages, they could not compete with their African counterparts who had lower costs. Competition from black transporters of agricultural produce was also deemed unfair by white transporters (Adams *et al.*, 1999). During

this period, the accumulation of capital and wealth by African farmers caused the Native Affairs Commission to comment that Africans were becoming wealthy, independent and difficult to govern (Adams *et al.*, 1999; van Averbeke *et al.*, 1997 and Bundy, 1988). Critical to this success was the inability of a weak state to intervene in factor markets and the implicit support for African farming from land companies and big landowners who earned rents from African tenant farmers. All this changed when on June 20, 1913, the Native Land Act segregated Africans and Europeans on a territorial basis of designating about 8% of the country's farmland as reserves, which became the only areas that could legally be farmed by African (Adams *et al.*, 2000). Immediately the Government of the day had created surplus labour for the mines and the white agricultural sector. This resulted in the elimination of the competition from black farmers.

Although farming survived in the so-called native reserves, its viability was steadily eroded by over-crowding, ill-judged betterment schemes and increasing uncertainty over land rights. Studies by the Agricultural and Rural Development Research Institute (ARDRI) in the Eastern Cape have shown that productive small farmers have faced increasing difficulties in leasing unused land (van Averbeke *et al.*, 1997). Furthermore rights holders are no longer willing to lease arable land for fear of not getting it back. The limitation imposed by segregation policy has destroyed the efficiency of peasant farming by depriving it of the broad areas of land which it needed to and might otherwise have acquired.

Since the 1950's the Government of South Africa propagated the improvement of then homelands by introducing legislation to planned locations and divided into residential, grazing and arable areas (Trollope & Coetzee, 1975; De Beer, 1983). This system was commonly called "Betterment Planning" and it was regulated by the Proclamation R188 of 1969, which still applies in the former Republic of Ciskei (De Beer, 1983). The policy of Betterment Planning was applied through the Black areas of South Africa, imposing the same land use patterns across the board. Moor & Nieuwoudt, (1996) indicated that the policy of Betterment Planning was not unique to South African homelands. The principles of this policy have been applied to other African countries as policy to create progressive farmers. Examples are found in colonial Kenya (The Swynnerton Plan) and colonial Zimbabwe (The Native Land Husbandry Act). The result of this strategy in these countries has been the displacement of rural population and the creation of

landless proletariats (Moor & Nieuwoudt, 1996). The European annexation of land in South Africa, and the various laws governing the creation of reserves and tribal homelands deprived blacks of their former lands (Moor & Nieuwoudt, 1996). This reduction of land for Black occupation and survival led overstocking and overgrazing as the carrying capacity of land was reduced.

During the late 19th and 20th century the Magisterial Districts of Middledrift, Victoria East, Zwelitsha, Keiskammahoek and several others located within the former Ciskei homeland had a prospering African agriculture (Bundy, 1988). The Land Act and several other policies contributed in a major way to the transformation of Ciskei Region into labour reserve for the South African mining and industrial complex where agriculture and other rural based economic activities were of secondary importance (Van Averbeke *et al.*, 1997). Several recent studies clearly demonstrate that rural people in the areas of former Ciskei homeland were and still heavily dependent on external sources of income for survival. Some research results showed the rural areas of former Ciskei to be essentially residential areas where livelihoods were derived mainly from welfare, remittances and urban employment (Van Averbeke *et al.*, 1997). It is clear that, at the present urban based economic sectors of the Eastern Cape and other provinces are not able absorb the labour force available. Furthermore retrenchment of people by urban based economic sectors has caused a greater impact on pressure for land, for arable use, residential purposes and grazing land when they return back to rural areas (Van Averbeke *et al.*, 1997).

There is evidence that the state has difficulty in meeting the demand for the range of welfare services currently available. Research results show that land was not intensively used by its holders; that among the landless in rural areas were people with keen interest in extending their agricultural activities and that the existing institutions governing access to land by landless were inadequate to create an active land exchange market (Van Averbeke *et al.*, 1998). The increase in land holdings provides one of few possibilities of increasing income (Fraser, 1991; Stoeckel & Sirinema, 1988; Hobart - Houghton & Walton, 1952; Mills & Wilson, 1952). According to Whittemore (1981), a serious difficulty faced by some farmers is a lack of security of tenure. Inadequate security of tenure was found to be a source of conflict at some irrigation schemes (Van Averbeke *et al.*, 1998). Patterns of land use will differ under different tenure institutions

because property rights gives rise to economic incentives (Moor & Nieuwoudt, 1996). It is imperative that policy makers in South Africa understand land & tenure reform on tenure institutions and on economic incentives which influence agricultural productivity and allocation of resources (Moor & Nieuwoudt, 1996). There is a need for an in-depth study on land tenure security effects as related to land use, investment and production by the smallholder farmers in the Amathole District of Eastern Cape Province. A concept of land tenure is briefly discussed in the next section.

2.1.2 The concept of land tenure

According to Adams, Sibanda and Turner (1999) the word “tenure” is derived from the Latin word “*tenere*” meaning “holding or possession”. Land tenure is therefore defined as the terms and conditions under which land is held, used and transacted. Wadie and Appah (1981) and Moor & Nieuwoudt (1995) added that land tenure system refers to customary or legal rights which regulate ownership and control relating to land use. The land tenure system therefore involves a bundle of rights which covers both the obligations and entitlements of the holder i.e. what to do and what not to do with land. It is therefore clear that one may have tenure or a right to the land, but may not have taken possession of it (Bruce, 1988). In support of Bruce’s view, de Villiers (1996) and Kishindo (1995) define land tenure as the type of access, use or occupation arrangement one has on land and conditions attached thereto. Based on the above definitions, there is a widespread agreement (Moor & Nieuwoudt, 1995) that land tenure is defined in terms of the functioning of three elements, these being: breadth, duration and assurance of property rights with regard to their legal and economic dimensions. Land tenure is accompanied by set of value systems attached to culture and these affect the way land is used. Land tenure is defined in the next section.

2.1.3 Definition of land tenure

Land tenure is the system of legal rights and obligations governing the holding, acquisition, use and disposal of land, it is an important factor affecting the present utilisation of land in the world and it also serves as a legal instrument through which land reforms can be started or assisted (Nothale, undated). In many parts of the world, the sale of traditional land rights has not been sufficiently guarded and restricted by law and this has resulted in many problems of unrest and

low productivity because of changes in tenure systems which have subjected the small farmers to exploitations by landlords or moneylenders (Nothale, undated). Place *et al.*, (1994) also defined land tenure system as the systems of rights, rules, institutions and processes, under which land is held, managed and transacted.

Land tenure can be briefly defined as the way people are holding the land. More specific, land tenure is the perceived institutional arrangement of rules, principles, procedures and practices, whereby a society or community defines control over, access to, management of, exploitation of, and use of means of existence and production (Dekker, 2005). As land is one of the pillars of any economy, land tenure is related to livelihood, social, economic, legal, religious relationships. Studying land tenure requires good knowledge of the local situation, the people and their beliefs. People might have different views on land and those are based on long traditions in society. One might think of migration, urbanization, economic changes, religious influences, interference from outside. Besides that, the political system has an important role to play, as land is treated different in a market economy than in, for example, a socialist setting (Van Asperen, 2007). One might argue that the political system imposes the tenure on its subjects, whatever they might believe themselves. Background information about land tenure system is discussed in the next section.

2.1.4 Background information about land tenure system

Arokoyo & Chikwedu (1993) stated that land is a major productive resource, and lack of control over it is a major limiting factor for productivity. For a long time, traditional land tenure systems in Africa have made black people little more than temporary custodians of their land. Existing legal systems pertaining access to and use restrict them from exercising full authority over their land, as the state still holds the land in trust for people. Migot-Adholla *et al.*, (1991), as well Potgieter & Heunis (1995) added that until recently, indigenous African land rights systems have been incorrectly presented by foreign anthropologists, colonial masters, and nationalist idealists as static polar contrasts to western property rights systems. These scholars believed that since the indigenous land tenure systems assign rights to the entire community, long term investment and land improvements are discouraged as the system is susceptible to all forms of malpractice such as corruption and nepotism. On the basis of experiences in Ghana, Kenya and Rwanda, Morgan

(1969), Hill (1963), Jones (1980) and Bates (1986) as cited by Migot-Adholla (1991) stated that indigenous land tenure systems had demonstrated remarkable flexibility in adapting to new farming technology or methods of exchange long before the colonial period. They made an assertion that this situation has been caused by the fact there has been a large emphasis upon research and extension in order to boost farming in rural areas under communal land tenure systems. Land ownership within mainstream development is discussed in the next section.

2.1.5 Land ownership within mainstream development

Arokoyo & Chikwedu (1993) and Wadie & Appah (1981) defined land ownership as the land tenure system that determines the ability of individuals to gain full access to land and security over its use. Ownership of land is different from ownership of other properties in that it involves legal rights and obligations relating to the use of land. Although individuals may hold some of these rights, some may be held by groups that can include political bodies or government. In the communal land tenure system, no single individual holds land in an exclusive manner as it is the case with freehold and leasehold land tenure systems. Ega (1991) as cited by Arokoyo & Chikwedu (1993) there are three types of land rights namely rights to use, rights to transfer and rights to exclude others from the land. On the basis of the above definition, the land tenure debate has become a major source of debate. Depending on the different schools of thought, some people argue strongly for communal ownership (Bromley & Cochrane, 1994 & Van den Brink, 1994), others for individual ownership (Feder & Noronha, 1987 and Feder & Onchan, 1987) while others contend that land tenure has limited impact on investment and productivity (Place & Hazel, 1993 as cited by Moor & Niewoudt, 1995).

It is, however, significant that disputes on land tenure pose threat to national security and prosperity (Xiao-Yuan Dong, 1996). Those who argue for private land ownership and private property resource management maintain that individuals are more likely to apply best efforts under private ownership and use of natural resources, thereby maximising efficiency and productivity in their farming activities. This is not case within the context of the communal ownership and use arrangement which often results in the abuse of the resources due to the “commons syndrome” (de Villiers, 1996; Ling, 1993 and Migot-Adholla *et al.*, 1991). Despite this assertion, the individual freehold system is not necessarily the solution. The challenges

outlined above are common in the communal land holding system because it is difficult in individual freehold systems to instill institutional practices that will promote public interest such as proper land management and erosion control due to legal restrictions deriving from the property rights (Tau, 2001). The situation is even worse for women farmers. The most marginalised families in the agricultural sector are the landless farm labourers who face even greater challenges.

2.1.6 Land tenure “the concept of bundle of rights”

Land tenure reform refers to a planned change in the terms and conditions on which land is held, used and transacted (Adams *et al.*, 1999). A fundamental goal of tenure is to enhance people’s land rights and thus provide tenure security. Tenure reform may be necessary if rights holders are to manage their land resources, invest in the land and to use it sustainably. Tenure reform can include confirmation in law of *de facto* land rights in order to verify and secure these rights for people who already have demonstrable claim to the land and replace doubt and contention with positiveness and certainty and so inspire confidence and encourage investment and development (Dekker, 2005).

Adams *et al.*, (1999) argued that the nature and strength of property rights profoundly condition economic decision-making through their effects on people’s expectations of a return on their investments in labour and capital. They further argued that tenure reform in the former homelands and the South African Development Trust (SADT) areas would facilitate decisions and actions by rural households, government bodies, and the private sector. It will benefit rural livelihoods; facilitate infrastructure and service provision and economic development. However, they further indicated that tenure reform by itself would not be enough. Land redistribution and tenure reform will have positive impacts on production and investment only when accompanied by access to inputs, credit, extension services and markets and when government takes other actions to stimulate investment (Adams *et al.*, 2000). Regardless of the system of land tenure there is widespread evidence that investment in tree planting, soil conservation and other land improvements is more likely where individual family property rights are secure (Adams *et al.*, 1999). Secure rights to land are the basis of smallholder agrarian societies (Quan, 1998). An

important component of tenure security necessity for economic development is the confidence with which one can transact one's rights.

Property rights to land represent the key institutional asset on which rural people build their livelihoods. In fact in many countries, landlessness is the best predictor of poverty (Landesa, 2012). The nature of farmer's property rights to land substantially impacts their willingness and ability to adopt productivity-enhancing inputs and investments (Hayes *et al.*, 1997). While strong and secure land rights are the norm for farmers in the developed world; this is not the case for much of the developing world. Secure rights to land refer to rights that are clearly defined, long term, enforceable, appropriate transferable and socially and legally legitimate (Landesa, 2012). Unfortunately a substantial portion from smallholder farmers in developing countries is missing at least one of these key components of strong land rights. Without secure land rights, the rural poor often have few options for using land to improve their livelihoods. According to Landesa (2012) proven productivity and welfare – enhancing solutions do exist. An overview of land tenure systems in the world is discussed in the next section.

2.2 Overview of land tenure systems in the world

Land tenure issues are becoming increasingly important worldwide (De Haas & Meyer-Ruhen, 1998). Problems such as high population pressure, increases in resource degradation, food shortages, transformation of political systems and regional and supra regional resource conflicts have brought the land issues to the public's attention. Land tenure and land tenure systems are of fundamental importance for efficient agricultural production, reducing poverty and conflicts and attaining social equity (De Haas & Meyer-Ruhen, 1998). Problems of land tenure and land tenure systems demand answers to questions on control power, securing and security of fundamental and the creation of pre-requisites for long term, productive investments (Economic Commission for Africa, 2003). The form of land tenure and consistent land policies contribute towards future agricultural productivity worldwide. The different land tenure systems across the globe are examined with special emphasis on countries such as China, Bangladesh, Brazil and Fiji.

In China there are two major forms of land tenure systems i.e. individual private plots and communal land. Land in most villages is divided into two types of land tenure systems i.e. private plots (*ziliudi*) and collectively controlled land (*jitidi*) (Li *et al.*, 1998). According to Li *et al.*, (1998), during the collective period when communities control the nation's agricultural production, farmers still manage their own private plots. In most villages, people do not intervene into decisions on private plots and farmers had rights to the residual production, could swap plots with other farmers and enjoy a fairly high degree of security. In Bangladesh the situation is slightly different since there are two types of land tenure systems i.e. state owned land and private owned land. The three most common private tenure types in Bangladesh include freehold, (with exclusive land rights in a particular piece of land for an indefinite period and this is estimated to apply to 69 % of agricultural farm land); ninety nine (99) year use rights to government land (*khas*) that has been distributed to landless people and leaseholds (the right to use land owned by someone for a fixed period (Shafi & Payne, 2007).

According to Shafi & Payne, (2007), lease for agricultural land include both cash and sharecropping arrangements. The cash leasing arrangements range from one to 99 years. It is estimated that about one third of all rural households lease land, with share cropping constituting the most common arrangement (Uddin & Haque, 2009). The sharecropping arrangements must be for five (5) years and are heritable. The sharecropper and landlord each receive one – third of the crop and the remaining third is allocated based on each party's share of costs. The sharecropper has a right of first refusal to purchase the share cropped land at market prices (Uddin & Haque, 2009; Shafi & Payne, 2007 and Anwar, 2006). The government owned land may be owned by government bodies, public entities or government owned corporations.

In Brazil land tenure systems can be classified into two main categories i.e. statutory (formally registered) and non-statutory i.e. informal rights (Payne, 2004). The formal tenure system includes freehold and leasehold whilst informal tenure includes customary tenure systems such as pavement dwellers, squatters (both tenants and owners) and other unregistered and undocumented land rights. Fiji has four main types of landholdings i.e. State lands, Freehold lands, Native leases and *vakavanua* Native lands (Ministry of Lands and Mineral Resources, 1992). These landholdings can be further classified into two different types of land tenure

systems i.e. western land tenure systems and customary land tenure system. According to the Ministry of Lands and Mineral Resources, (1992), Freehold lands, State lands and the portion of Native land are leased out as “Native leases” under western land tenure system while the communally held Native lands operate under the customary or *vakavanua* land tenure system.

According to Brinkman *et al.*, (1979), there are two common types of land tenure systems in developing areas, namely individual tenure and communal tenure. Individual tenure arrangements include freehold, quitrent and leasehold. Communal tenure has its origin in the indigenous way in which local African people held land and these include permission to occupy, certificate to occupy and grazing rights (De Wet, 1987) as quoted by Nompozolo (2000). Customary land tenure system is governed by unwritten traditional rules and administered by traditional leaders. Tenure systems can be categorized on the basis of those who enjoy exclusive rights (Rukuni, 2004). According to Rukuni (2004), all land tenure systems generally fall into four broad categories i.e. open access, communal, private and state. Table 2.1 below shows some examples of broad categories of land tenure systems in the world.

Table 2.1 Categories of land tenure systems

Category	Ownership of exclusive rights
Open access	None
Communal	Defined group
Private	Individual legal entity
State	Public sector

Source: Rukuni, (2004).

Land is a primary and critical factor of agricultural production and expansion of livelihoods opportunities in Africa. Secure access to land affects production and productivity in all sectors of agricultural production. Without equitable and secure access to land by the majority of farmers in Africa it will be difficult to achieve food security. African governments have to appreciate that transforming agrarian systems into urban industrial economies invariably requires fundamental changes in many institutions, including those of land tenure. Inequitable distribution and uncertain land tenure security are leading problems of land policies in Africa. The problem of inequitable land distribution is historic in many African countries such as Uganda, Ghana,

Burkina Faso, Mali and Nigeria. The land tenure systems in Africa before the colonization were almost universal and primary based on communal use (Livula-Ithana, 2004). Land belonged to the community and was held in trust by leaders of their respective communities. Colonialism aimed at eroding the land values of African communities with European land rights philosophy founded upon individual control and ownership. According to Livula-Ithana, (2004), the land holding patterns in Africa remain skewed against indigenous majority. There are different land tenure systems that exist in African countries such as Uganda, Ghana and Nigeria and Mali and Burkina Faso and are examined in the section below.

According to Kyomugisha (2008), the Land Act of Uganda, 1998 recognizes four major systems of land tenure namely customary tenure, mailo, freehold and leasehold tenure system). Customary tenure is the most common tenure system in Uganda whereby access to land is “governed by the customs, rules, and regulations of the community.” Holders of land under the customary system do not have a formal title to the land they use, but generally have secure tenure. Mailo tenure is a quasi-freehold tenure system established in 1900 by the British colonial government to reward colonial agents who advanced British interests in many regions of Uganda and remains a relatively secure and well-defined system of tenure, particularly in the Central region. An important feature of mailo systems is that much of the land is used by tenants who are restricted in their security of tenure on the land they farm. Freehold tenure is a system whereby owners of the land have a title to their land which allows them to hold the registered land indefinitely (Eze *et al.*, (2011). The landowner is given complete rights to use, sell, lease, transfer, subdivide, mortgage and bequeath the land as they see fit, so long as it is done in a manner consistent with the laws of Uganda. Leasehold tenure is a system where the owner of the land grants the tenant exclusive use of the land, usually for a specific period of time (Kyomugisha, 2008).

According to Arua & Okorji, (1997) as cited by Eze *et al.*, (2011), in Nigeria land tenure can be broadly classified into three main types namely communal, individual (private) and public (state controlled). However in Ghana land tenure can be categorized into the following tenure systems i.e. family owned (matrilineal and matrilineal systems of ownership) and tendana system (Twerefou *et al.*, 2011). Burkina Faso is a heavily agrarian economy, with 85 % of the

population engaged in agriculture, livestock rearing, or forestry (World Bank, 2009). In the context of Burkina Faso, tenure insecurity is a significant and increasing concern for farmers as agricultural producers. Rural producers often lack formal documented rights to land in the form of titles or deeds. Even where formal rights exist, state institutions may lack the capacity to maintain accurate records of rights, adjudicate disputes and transactions (Linkow, 2012). In many contexts including Burkina Faso, traditional systems play an important role in allocating and protecting rights to land. According to Linkow (2012), the law in Burkina Faso permits private ownership, in practice agricultural land is largely governed by customary tenure systems. Rights to land are vested in traditional authorities called *chef de tere* (World Bank, 2009 & Linkow, 2012). Land is acquired either through inheritance or allocated by the *chef de tere*. According to Mathieu *et al.*, (2003), there is an active system of both short and long term loans of land between households.

According to Eze *et al.*, (2011), various forms and arrangements of land tenure and land rights exists under customary land tenure, where ownership and rights to land may be permanent, semi-permanent or temporary and these are dependent on the mode of acquisition. In Africa there are many different forms of tenure system depending on the history, politics and economic development of the region in question (Wily, 2010). According to Wily (2010), in many countries that were subjected to colonial rule, land tenure systems combine a series of statutory written laws or codes alongside a range of customary practices that govern day to day management of rural land. Tenaw *et al.*, (2009), argued that land issues and land tenure reform in sub-Saharan Africa is characterized by a range of farming systems all with the different rights under multiple forms of tenure. These include private landholding with freehold title deeds, communal lands under customary tenure, and State held land where either the State retains legal ownership upon which various forms of tenure based on leaseholds or permit systems were devised by the State, underpinned complex legal and administrative systems (Tenaw *et al.*, 2009).

There are two principal forms of land tenure systems found in Southern Africa which are customary and statutory tenure (Economic Commission for Africa, 2003). Customary land tenure is governed by unwritten traditional rules and administers by traditional authorities. In customary

tenure, access to land is contingent upon tribal or community membership controlled by the chief. According to the Ali (1979), De Wet (1987) and Economic Commission for Africa (2003) households have strong, exclusive residential rights to residential and arable land and shared rights to grazing land and natural resources. Statutory land tenure system is governed by modern law and supported by documentary evidence such as a title deed or lease certificate, and administered by the government (Economic Commission for Africa, 2003).

Land ownership under statutory tenure system is often built in freehold or leasehold entitlements to the land and offers exclusive rights to the owner, which guarantee land tenure security. Economic Commission for Africa (2003) indicated that land rights in freehold include the ability to sell the land, rent it to others and use it as collateral for a mortgage. The dominant form of land tenure system before colonization in Africa was customary. Today, almost all countries in the Southern Africa region have a dual land tenure system where customary or communal system coexists with statutory private, freehold and leasehold land rights (Economic Commission for Africa, 2003). Table 2.2 below shows some examples of land tenure systems in Southern African countries as a percentage of national territory.

Table 2.2 Land tenure systems in selected Southern Africa countries

Country	Statutory		Customary
	Private/Freehold/Leasehold	State land and other	
Botswana	5	25	14
Lesotho	44	5	95
Malawi	8	20	72
Mozambique	3	14	80
Namibia	44	13	43
South Africa	72	14	14
Swaziland	40	-	60
Zambia	3	16	81
Zimbabwe	41	16	42

Source: Adams, Sibanda and Turner, (1999).

As far as rural land ownership in sub-Saharan Africa is concerned, the situation has made it a key issue constituting a problem that has largely remained unresolved in many countries since colonial times (Rukuni *et al.*, 2006). Historical conflicts and inequities over access and ownership of land rooted in colonial land dispossession are intense in countries such as South Africa, Namibia, Malawi, Kenya and Zimbabwe. The process of apartheid and colonialism combined to create in South Africa a bipolar distribution of land, wealth, and access to economic opportunity (Roth & Yates, 2004). One of the most enduring legacies of colonialism and apartheid in South Africa is a dual system of property rights (Claassens, 2000). In South Africa, more than in many other African countries the system of private ownership of land is dominant (Claassens, 2000). The system of freehold title dominates 80 % of the country which was previously reserved for white people. However the system of state ownership and permit based occupation applies in the 13 % of the country which was formerly reserved for black South Africans. (Toulmin & Quan, 2000). The land in the former “homeland” areas and includes certain areas which were owned by the South African Development Trust (SADT) and were due to have been added to the homelands. However there are significant differences between provinces, it is largely in the ex-homelands provinces that communal and traditional systems of land rights continue to operate (Claassens, 2000).

Mayende (2004) indicated that the process of colonialism and apartheid led to the relegation of Africans to overcrowded reserves, people who until that time had been undisputed owners of the land by virtue of their indigenous heritage and occupation. According to Mayende (2004), Africans were prohibited from holding freehold title to land. The legacy of colonialism and apartheid in South Africa is profound and is manifested at multiple levels i.e. injustices stemming from a racially based land dispossession, inequitable land ownership distribution, dual land tenure systems, haphazard development and acute poverty (Roth & Yates, 2004). About 12,7 million people live in these areas which are by far the poorest parts of South Africa and land is held under trust on their behalf by Government (Claassens, 2000 & Mayende, 2004). All the land in these ex-homeland areas is state owned and there is confusion and lack of clarity about the status of occupant’s rights. According to De Wet, (1987), in the rural areas of the former homelands such as Ciskei and Transkei, the main forms of land tenure systems include freehold, quitrent, leasehold and communal tenure systems. In terms of Section 22 of the Communal Land

Rights Act of 2004, the group ownership of land will be held under commonhold form of ownership. This type of ownership vests land in the co-owners, but allow decisions in respect of the land could be made on majority rule basis (Communal Land Rights Act, 2004). In terms of the Communal Land Rights Act, 2004, the co-owners can choose or elect a structure to represent them when dealing with third parties and manage their joint asset on a day to day basis. Table 2.3 below shows some examples of land tenure systems in South African for both individuals and group ownership.

Table 2.3 Land tenure systems for individuals and group ownership in South Africa

Tenure Systems	Basis in Law	Support provided by the State
<p><i>Private ownership or freehold.</i></p> <ul style="list-style-type: none"> • Private ownership by an individual (or co-ownership). <p><i>Private ownership for entities.</i></p> <ul style="list-style-type: none"> • Trusts. • CPA's. • Public & private companies. • Shareblock schemes • Sectional Titles • Syndicates & partnerships. • Public ownership. 	<p>Common law reinforced by Deeds Registry and surveying services.</p>	<p>In respect of outside boundaries Deeds Registry Surveyor General.</p>
<p>Leasehold.</p>	<p>Commonhold law. Certain leases are capable of registration and often surveyed.</p>	<p>Deeds Registry. Surveyor General.</p>

Servitudes and notarial rights	Common law and deeds registration.	Deeds Registry.
<i>Permits and licences</i> <ul style="list-style-type: none"> • Permission to occupy (PTO's). • Certificate to occupy (CTO's) 	Ex-homeland laws and regulations. Fishing, grazing, hunting licences.	Extensive administration also represented at local level.

Source: Smith & Pienaar, (2000).

Smith & Pienaar (2000) identified the following as community tenure systems that exists in South Africa namely Commonhold, Communal Property Associations (CPA's), Trusts (Small private trusts, Community land trusts, Church land trusts, Statutory homeland trusts), Municipal commonage and Companies, private or public, co-operatives and partnerships. Table 2.4 below shows some examples of communal tenure systems in South African.

Table 2.4 Communal tenure systems in South Africa

Communal Tenure Systems	Basis in Law	Who should be responsible for what?
Commonhold	Constitution of the Republic of South Africa, Act 108 of 1996. White Paper on Land Policy, 1997. Draft Communal Land Rights Bill Fourth Draft, 2001	A chosen representative by the commonhold group which is appropriate to be a landholding institution.
Communal Property Associations (CPA's)	Communal Property Associations Act No. 28 of 1996.	Local and national deeds registries for registration of individual rights. District or local municipalities for physical and institutional infrastructure on application.
<i>Trusts</i>	Common Law of 1998.	

<ul style="list-style-type: none"> • Small private trusts. • Community land trusts. • Church land trusts. • Statutory homeland trusts. 	<p>Trust Property Control Act of 1957 of 1988.</p> <p>Development and Land Act SADT.</p>	
Municipal Commonage	Municipal by-laws, regulations and policies or by agreement.	Municipal commonage can be an appropriate ownership instrument combined with a management institution involving the user group.
Companies, private or public, co-operatives and partnerships.	Companies Act , 61 of 1973 Cooperatives Act, 91 of 91	Community development companies or cooperatives can play an important function as commercial or business adjuncts to, and parallel institutions to landholding and management institutions.

Source: Smith & Pienaar, (2000).

There are two major issues related to land tenure system that are important for the process of development, namely access to land and security of tenure. According to Bembridge, (1991), the most important factor in the land tenure arrangements is the security of tenure irrespective of the land tenure system. Roth and Haase (1998) defined land tenure security as the individual's perception of his/her right to a piece of land on a continual basis, free from imposition or interference from outside sources, as well as the ability to reap the benefits of labour or capital invested in land, either in use or upon alienation. This definition contains three components i.e. breadth, duration and assurance with legal and economic dimensions as follows (Place, Roth and Hazell, 1994):

- Breadth refers to the quantity or bundle of rights held, or possession of key rights if certain ones are more important than others.
- Duration is the length of time that a given right is legally valid.
- Assurance implies that right (s) and duration are known and held with certainty.

The legal dimension defines the composition (breadth) and duration of rights in the bundle, and it implies that one holds with complete assurance all rights embodied in his or her tenure, even if tenure is of short duration and confers meager rights. The economic dimension defines the value of economic benefits derived from de facto tenure in the land resource (Place, Roth and Hazell, 1994). The various forms of tenure that exists in South Africa are discussed in the next section.

2.3 Forms of land tenure systems in South Africa

There are different forms of land tenure in different countries of the world (Tau, 2003). The forms of land tenure forms prevalent in the Sub-Saharan Africa include but are not limited to the following:

2.3.1 Communal tenure system

This is a form of tenure land tenure whereby the land is held by a group through shared rules, and where their land administration systems are informed by and practised in terms of shared values and customary systems (Tau, 2001). The management group (the co-owners) has the bright to exclude non-members, and non members have a duty to abide by such exclusion (Anim & Van Schalkwyk, 1996). Individual members of the management group have both rights and duties with respect use rates and maintenance. This form of land tenure is characterized by a number of norms and conventions that regulate use of the land and which are important characterized by restricted access (Anim & Lyne, 1994). Baer (1990) added that an individual's right to benefit from this jointly held resource is dependent upon the membership of, or acceptance by, the group or land owners. Under this form of land tenure there are three categories of land use rights that are allocated to members i.e. residential, ploughing and grazing rights. According to Lahiff (2000) all members of the community (including tenants) have a right to a stand of residential land. This often includes enough land for homesteading i.e. for keeping of small livestock and growing vegetables. Ploughing of land is mostly reserved for influential

members of the community (Lahiff, 2000 as cited by Tau, 2001). In contrast the grazing land is used communal meaning every members of the community has livestock has right to graze the animals. This shows that there is no equity in land access and use in area where the land is communally owned.

Wadie & Appah (1981) indicated that in some instances members of the communal land observed certain principles of land use to ensure fair distribution, proper working rules and husbandry practices or restrictions of taboos, religion and superstitions as may be imposed by local traditional leaders (Tau, 2001). In this form of land tenure, there is no single individual who has a right to a particular piece of land which enables him/her to sell it or give it away outright and forever. In view of this there is a wide spread thinking that some principles associated with the communal land tenure system are so complicated that they discourage agricultural investment in land and, as such, hinder rural economic development (Potgieter and Heunis, 1995). However this view is debatable by number of scholars who have made a considerable research contribution in the area of land tenure and agricultural development.

In contrary to the foregoing assertion, The Rural Action Committee (TRAC), 1990 asserts that the communal system of black farming communities, particularly in South Africa, has never been the major factor constraining production. Instead, they see it as having used far more labour intensive methods of production than commercial white agriculture thereby creating job opportunities for local people. According to TRAC (1990) agricultural production is, instead constrained by limited access to farmer support services such as credit, farming inputs, infrastructure, marketing services, extension support, research and training. Tshatsinde (1990), added shortage of land, inadequate irrigation water, lack of management abilities, limited control over factors of production; limited education; unavailability of credit and inefficient market outlets as major constraints towards increased agricultural productivity. Tau (2003) concluded that communal land tenure system though sometimes is seen as a deterrent for productive use of the land, is not primarily responsible for the failure of the agricultural system and hence the decline rural economic welfare. Rather other factors such as lack of realistic land administration policies, extension support, infrastructure aid to farming, existence of agricultural markets, training, research and development. In the next section the leasehold tenure system is discussed.

2.3.2 Leasehold tenure system

The leasehold system is a form of land tenure under which someone other than registered owner holds land under a contractual obligation for a specified period of time only and for a specified rental amount either per month or per annum (Bruce, 1981). According to Nompozolo (2000), the leasehold system is a formal agreement between two parties to rent a land for the purposes of agricultural production for a given period of time. The agreement could be either formally registered or be an unregistered agreement between individuals. The freehold tenure system is discussed in the section.

2.3.3 Freehold tenure system

Under this form of tenure land is owned by individuals or organisations that hold a title deed registered at the Deeds Office (Nompozolo, 2000). Freehold land is obtained through purchase or inheritance, and owners in turn are generally free to sell the land. Freehold title provides the owner with a considerable degree of security of tenure in that it land does not have to be occupied or used to be retained. Freehold land is also free from many controls by administrative and government authorities who can only enforce limited conditions on land use (Nompozolo, 2000). In the former Ciskei, freehold agricultural land occurs more commonly, but in the title deed to such land it was often stated that the owner or his descendants were not allowed to alienate the land by sale or lease or in any other manner without written permission from the responsible minister (Cokwana, 1988 as cited by Nompozolo, 2000).

Bruce (1981) and Chaudhub and Allen (1997) described freehold as a form of land tenure under which land is held by individuals free of obligations to the monarchy or state. It is commonly referred to as a private form of land ownership. In this form land tenure, the working rules and sanctions are defined in the Acts of Parliament adopted by the state (Wadie & Appah, 1981). While working rules of customary tenures vary from one place to another, those of the freehold tenure system are somewhat more uniform. According to Tau (2003), the freehold land tenure system has some advantageous aspects in that it promotes productive use of the land due to fewer restrictions about land use. However, it has disadvantages emanating from the possibility of non compliance with environmental laws by the rights holders. This form of tenure only benefited the minority groupings, particularly whites in South Africa (Tau, 2001). The following section

presents the interface between tenure security and on-farm investment and agricultural productivity by the smallholder farmers.

2.4 The concept of land tenure security

Land tenure security is commonly defined by land users' level of confidence that they will not be arbitrarily deprived of the rights they enjoy over land or the benefits they derive from it. A landholder has security of tenure if she/he perceives little or no likelihood of losing physical possession of the land within some future time period (Hanstad, 1998 & Palmer and Ainslie, 2007). It refers to the degree of confidence held by people that they will not be arbitrarily deprived of the land rights enjoyed and/or of the economic benefits deriving from those. Place & Roth (1994) added by also defining security of tenure as an individual's perceptions of his or her undisturbed rights to a piece of land and on a continuous basis, and the ability to reap the benefit of labour and capital invested in the land, either in use or upon alienation. Land law and policies will determine the level of tenure security, however other factors may be important as well. It includes both 'objective' elements (nature, content, duration and enforceability of the rights, state guarantee, quality of boundary descriptions, conflict handling) and 'subjective' elements (landholders' perception of the security of their rights; Deininger, 2003; Kanji *et al.*, 2005). Tenure security is influenced by diverse factors such as legal or social recognition, enforcement mechanisms, or social or legal sanctions against those who break the rules, (Palmer and Ainslie, 2007).

Objective security is often referred to as *de jure* security of tenure, while *de facto* security corresponds with the subjective elements. *De jure* security is normally easier to determine by assessing the laws and regulations related to land issues, although *de facto* security might be more important with reference to economic growth and poverty reduction. As tenure security has objective and subjective elements, it is difficult to assess it since there are many stakeholders are involved such as formal right holders (farmers under state or customary law, investors/companies), in customary cases holders of so called secondary rights (grazing, collection of fruits and herbs), absent land holders and informal settlers (Van Asperen, 2007). Strong threats of eviction give informal settlers low levels of security, however, it may maintain a high level of security for an eventual original landowner. At this point, it is evident that

policies dealing with tenure security are highly politically motivated (Deininger, 2003). Place & Roth (1993) defined security of tenure as an individual's perception of his or her undisturbed rights to a piece of land and on a continuous basis, and the ability to reap the benefit of labour and capital invested in the land, either in use or upon alienation. It is hypothesized that farmers are more likely to improve parcels over which they have a long-term interest, both in terms of their rights to cultivate the land in ways that provide adequate compensation for the value of any improvements. These features of land control are best captured by tenure measures based on the individual use and transfer rights that farmers have over land. Security of tenure is assessed in terms of breath of rights, the duration of these rights and the formal recognition and enforceability. In essence tenure security comprises three elements namely: -

- The breath of the rights held by the individual, including the right to use, transfer and exclude.
- The length of time for which a given set of rights is legally valid.
- The assurance with which rights are held in the present and future.

2.4.1 Breaths of rights

“The breath of rights refers to the bundle of rights assigned to an individual” (Thomson and Lyne, 1995). Limited breaths of rights limits or prevent farmers from internalising the benefits of their investment, and also restrict their freedom to make decisions regarding land use. According to Thomson & Lyne (1995), in KwaZulu Natal, the Nkosi (chief) announces dates when farmers are allowed to start ploughing, planting and harvesting their crops and to attempt any of these before the specified dates could result in a fine of R1000.

2.4.2 Duration and assurance

Thomson and Lyne (1995) stated that duration is the length of time that a property right is legally valid. Duration is important especially where substantial investment can be made on the land. According to Kushido (1995), members of core lineages can engage in longer-term investment such as fish farming and tree-crop farming as well as short-term investment. The discussion of different tenure systems has shown that land tenure is not secure under almost all the tenure systems particularly because the breath and duration of property rights is inadequate and existing rights are poorly enforced. Permanent rights of exclusion would reduce the cost of producing

crops and give households more incentives to improve their land (Thomson & Lyne, 1995). It has been argued that they would also facilitate land rental transactions and improve allocative efficiency. Property rights promote or facilitate market transfers, which permit land to be used as collateral for credit and shift land to its highest use. Kushido (1995) mentioned the fact that without an efficient market, both the incentive and ability of landowners to invest are reduced. According to Van den Brink *et al.*, (1994), clearly defined rights are necessary for the allocation of resources. The absence of such rights constitutes an open access resource. Open access to resources is required to have led to the depletion of fisheries and the degradation of grazing land. To achieve efficiency in such cases, it is proposed that property rights be assigned (Van den Brink *et al.*, 1994). This also leads to a question whether these property rights in land should be individual or communal. In communal areas there are few exclusive individual rights and occupancy permits fall far short of a title or even a lease. Furthermore, land could not be sold, subdivided or inherited.

According to Nieuwoudt *et al.*, (1996), although individuals receive exclusive rights to use arable land, these rights are not assured, they are temporary and can be revoked at any time, which does not make for security of tenure. Where the transfer of rights is unlikely to occur, an efficient allocation of resources is not assured. Incentives to invest in fixed improvements are also weak, as the benefit might not be enjoyed (Nieuwoudt *et al.*, 1996). Thomson & Lyne (1995) argued that clearly defined and legally enforced rights reduce uncertainty and transaction cost, thus facilitating the exchange of rights and efficient allocation of resources. In absence of well-defined and exclusive rights mutually beneficial and they will have little incentives to invest in the land. It is clear to say that the exchange of property rights allows resources to move to their most value use. The relationship between tenure security and on-farm investment is explored in the next section.

2.4.3 Tenure security and investment

Land tenure security is essential in stimulating the development of land since many local and foreign investors are hesitant to invest in land when tenure is insecure (Twerefou *et al.*, 2011). Tenure security has the potential of increasing credit use through greater incentives for investment enhancing the collateral value of land, facilitating land transfer from less efficient to

more efficient users, reducing the incidence of land disputes and raising productivity through increased agricultural investment. Investment in land can also lead to improvement in tenure security in that, investors would like to secure the land once they have made some investments in it (Twerefou *et al.*, 2011). The lack of land tenure security could also bring about environmental degradation. The relationship between land tenure security and investment is more complex than it appears. This is because of the nature of causality. Generally many studies indicate that secure tenure increases incentive to undertake productivity enhancing land related investments. There are three main links between land rights and investment incentives and these have been explicitly identified and formally modelled in the literature (Shaban, 1987; Feder and Feeny, 1991; Besley, 1995). The first link captures the positive relationship between the tenure security and investment incentives (Jacoby *et al.*, 2002). The second link emphasizes the effect of the rights to collateralise land on the investment incentives (Feder and Feeny, 1991). The third provides a link between investment incentives and land transfer rights (Besley, 1995). Secure individual rights over land leads to higher levels of labour and management effort, which in turn encourages higher levels of investment to protect or enhance land fertility (Feder and Feeny, 1991).

Feder *et al.*, (1988), indicated that increased tenure security is expected to enhance the productivity of farmers through the intensification effect, which reflects of land tenure security on the incentives to invest, particularly in capital goods attached to land. Firstly, if the farmer believes that he/she will be allowed to reap the long term benefits of the current investments, investment level are likely to increase relatively to a situation where there is tenure insecurity. Secondly, tenure security can increase farming productivity through an increase in allocative efficiency, which reduces the problem of lack credit faced farmers allocate inputs under quantitative constraints. With secure tenure as collateral, these constraints are eliminated and farmers can borrow freely to increase their application of inputs to profit maximising levels. Several studies, for example (Bruce, 1988) have also questioned the direction of causality between tenure security and investment, arguing that tenure security may not cause investment to increase but rather investment may stimulate tenure security.

A careful look at the literature on causality between tenure security and investment reveals that many of the studies lack the approach needed to deal with the problem of causality in the tenure

security and investment nexus. Assessing the effect of tenure security on investment behaviour is a difficult task because of the causality problem (Brasselle *et al.*, 2002). A study by the World Bank (Migot-Adholla *et al.*, 1994) on Ghana concluded that tenure security has a clearly positive impact on investment in the Anloga area but a less noticeable impact in Wassa and no influence in Ejura. Besley (1995) used the same data to assess the sensitivity of the results to the estimation methodology used. Besley's study reached the opposite conclusion that better land rights facilitate investment in Wassa but not in Anloga.

Brasselle *et al.*, (2002) allowed for endogeneity between investment and tenure security in a study on Burkina Faso and found a reverse causality from investment in land tenure security as farmers use investments such as planting trees to improve their tenure rights over associated land. Place & Hazel, 1993; Sjaastad & Bromley, 1997 and De Zeeuw, 1997 argued that in Sub-Saharan Africa some land improvements, particularly the planting of trees is well recognised method of enhancing tenure security for holders of temporary or fragile claims. In areas where title acquisition and maintenance involve real expenditures, it is a priori possible that farmers tend to register land parcels that benefit from relatively high levels of investment or those with better profitability conditions justifying such expenditures (Roth & Bruce, 1994). In this case, registration does not stimulate investment but is positively related to it. A recent study on 36 villages in central Uganda concludes that investment enhances tenure security, yet the reverse is not true (Baland *et al.*, 1999). In environmental economics, a major bone of contention is which regime of property rights is appropriate for environmental resources management.

Hardin (1968) established that open-access to lands leads to the depletion of resources and environmental goods, which is he referred to as the "tragedy" of the commons. The assumption made by Hardin is that rational private owners would never knowingly exploit their resources to destruction. However, according to Clark (1973) and Afeikhena (2002), this assumption is empirically unfounded as studies have shown that individual private owners have often done exactly what Hardin assumes they would not do. Clark (1973) provides an example to support this assertion. Empirically, Heltberg (2002) found that land tenure security leads to natural resources being used in a conservable and sustainable manner, but this was contrary to the findings of Lutz (1998), that in Central America, increasing concern over deforestation and

environmental degradation has motivated renewed attention being paid to land titling and the securing of property rights. Foltz *et al.*, (2000) found for the north-western Nicaragua that formal types of land-tenure were positively related to the number of trees on the property. However, Faris (1999) established a negative correlation between land rights and the number of trees on the property in the south western Nicaraguan agricultural frontier. The explanation given is that wealthier landowners, who were found to possess formal titles, had a greater propensity to cut down trees for the purpose of raising cattle. Property rights to land, access to credit and on farm investment is discussed in the next section.

2.4.3.1 Property rights to land, access to credit and on-farm investment

Land tenure and property right can exert a significant influence over land use and land values. Most of tenure involves some form of limitations as to the ways in which land and property rights may be used (Thomson & Lyne, 1995). An efficient structure of property rights has four characteristics:

- *Universality*: All resources are privately owned all entitlement completely specified.
- *Exclusivity*: All benefits and cost accrued as a result of owning and using the resources should accrue to the owner, and the owner, either directly or indirectly by sale to others.
- *Transferability*: All property rights should be transferable from one owner to another in a voluntary exchange.
- *Enforceability*: Property rights should be secure from involuntary seizure or encroachment by others.

Property rights structures that contain the above four main characteristics are believed to result in efficient resource allocation. An owner of a resource with a well-defined property right (one exhibiting these four characteristics) has a powerful incentive to use that resource efficiently because a decline in the value of that resource represents a personal loss (Niewoudt *et al.*, 1996). The farmer has an incentive to fertilize and irrigate his land because the resulting increased production raises his income level. Similarly he has an incentive to rotate crops when that raises the productivity of his land. When well defined property rights are exchanged, as in a market economy, this exchange facilitates efficiency (Thomson & Lyne, 1995). Private land ownership permits the unrestricted exchange of land and property and the development of land and property

markets in which the balance between supply and demand is achieved through the pricing mechanism. It is also intended to ensure the most efficient use of land and normally produces the easy transformation of rural land into use, subject to statutory controls and their enforcement (Payne, 1997). Access to land with sufficient security encourage investment for its efficient use and development is a vital component in development strategies for individuals, groups, cities and nations. Whatever systems of land tenure operate in a city, it is clear that access to land is becoming increasingly market driven. This makes it attractive for all groups in a community to hold land as an investment and as a hedge against inflation. This is practical particularly in countries where there is a lack of savings institutions, limited access to alternative and equality profitable investment opportunities (Kille, 1993 and Mjonono (2000). Where land registration practices are established and uniform laws governing land transfers become operational, uncertainty is reduced and the transfer of land becomes easier. Where land registers are not accurate, or well maintained, or are not affordable because of high transaction costs, uncertainty increases making transfers more difficult (Payne, 1997). The effects of tenure security on investment are discussed in the next section.

2.4.4 The effects of tenure security on investment

The empirical evidence on the relationship between land rights and investment or productivity in African agriculture is inconclusive (Platteau, 2000). This holds true whether the level of investment is compared between lands protected by a formal title and non-registered lands, or between lands characterised by varying degrees of tenure security. Platteau (2000) have identified the effects beneficial as a result of secure tenure viz. assurance and realisability effect.

2.4.4.1 The assurance effect

According to ETLR, assurance is provided both by land titling and informal individual tenure Platteau (2000) has argued that this effect follows from the fact that when farmers feel more secure in their ability to maintain long-term use over their land, the return on long-term land improvements is higher. Farmers are better assured of reaping the future benefits of their present efforts and sacrifices, and because secure use rights; they have greater incentive to invest in soil conservation measures, land improvements and other operations in the long term (Mill, 1848).

The effects of land titling and informal individualisation of tenure with respect to incentives to invest will be examined below.

2.4.4.2 Land titling

Contradicting to what was expected, the evidence from Kenya and some other African countries where titling has been systematically implemented shows that there has been no clearly discernable impact from land titling on investment behaviour (Platteau, 2000). The theoretical assurance effect (described above) does not seem to operate under ordinary circumstances except in cases of resettlement or newly settled areas and in urban or per-urban areas. In those cases, the title granting is likely to increase the assurance that returns from an investment will accrue to those who make it and thereby promote land improvement and conservation (Alston *et al.*, 1996; Moor, 1996 and Friedman *et al.*, 1988 as quoted by Platteau, 2000).

2.4.4.2.1 Informal individual tenure

The evidence regarding the strength of informal tenure security is consistent with the evidence gathered in land titled areas. In area operating under customary tenure, basic usufruct rights seem to be sufficient to induce landholders to invest (Platteau, 2000). The adding of transfer rights does not appear to improve investment significantly with the possible exception of the right to bequeath land, (Brasselle *et al.*, 1998). Hence, there is no basis for claiming that increased individualisation of land rights will bring forth a higher level of investment. Singini *et al.*, (1992) have clearly indicated that land titling is widely believed to increase efficient land use and agricultural production by easing land transfers providing collateral for agricultural loans.

2.4.4.3 The collateralisation effect

The positive influence of land titling on investment behaviour through the credit supply or collateralization effect is far from being systematically present, since use of production credit by farmers may remain low in spite of the emergence of mortgageable land (Platteau, 2000). The ETLR predicts that organised credit source will spontaneously arise in response to land registration to meet the latent demand of credit-rationed farmers. Low credit use may be caused by two distinct types of factors (Platteau, 2000). On the one hand, it may result from supply failures that have their origin in various imperfections not only in the credit market itself, but

also in other rural factor market, particularly concerning land. On the other hand, it may be determined by demand failures that prevent farmers from tapping available credit sources. These two sets of factors are discussed in more details in the next sections.

2.4.4.3.1 Demand failures

Smallholders may fail to apply for loans because they perceive a high risk of losing their land through foreclosure, as the experience of Kenya testifies (Green, 1987; Shopton 1998; Roth *et al.*, 1989). This may be especially true of subsistence-constrained farmers who fear that their ability to repay loans taken for investment purposes is very low (Platteau, 2000). Another important reason behind the failure of farmers to respond to the availability of loanable funds is the lack of attractive investment opportunities or absence of condition critical for their successful exploitation. This may typically occurs when there is no technological package available suitable for intensification of agriculture (Platteau, 1990). Alternatively, when investments embodying technical progress are highly labour-intensive (e.g. fencing, digging of furrows and ditches, tree planting and building of anti-erosion barriers) and family labour is sufficient to supply the required effort, no capital is needed for equipment purchase or advancing wages.

2.4.4.3.2 Supply failures

Failure of credit provision in spite of titling may arise for different reasons. It may result from land market imperfections that tend to make registration ineffective (Platteau, 2000). This happens if titled land is not considered reliable collateral by credit-givers because it poses difficulties of foreclosure or because, the market being thin, it is not easy to dispose of in case of default (Okoth-Ogendo, 1976; Collier, 1983; Noronha, 1985; Bruce, 1986; Roth *et al.*, 1989) as quoted by Platteau, 2000). To sum up, as a result of glaring failure to build up and update reliable land records titles shown on the register are increasingly at variance with the facts of possession and use, creating considerable confusion over legal property rights. The impact of land registration is therefore undermined and since credit agencies are not able to rely on titles as evidence of land ownership, the collateralisation fails to materialise. The relationship between tenure security and agricultural productivity is discussed in the next section.

2.4.5 Tenure security and agricultural productivity

A major theme in land tenure research is the relationship between the security of land tenure and agricultural productivity. Empirical evidence on the two remains scattered. On the one hand, researchers such as Coase *et al.*, (2002) indicate a direct link between insecure land rights and a lower agricultural productivity. This is ascribed to the farmers' weak incentives for land maintenance and improvement, their lack of interest to invest in permanent crops, and their lack of collateral for credit which can be used to purchase improved inputs and fertilisers (Fong and Bhushan, 1996). On the other hand, research conducted by Migot-Adholla *et al.*, (1991) in Ghana, Kenya and Rwanda, did not show a clear link between tenure insecurity and a low agricultural output. According to their observations, land titling was not a major factor influencing the agricultural productivity of farming households.

Other factors such as the availability of credit, marketing opportunities, input supplies, extension services, health, education and infrastructure appeared to have a greater impact on agricultural productivity. Quisumbing *et al.*, (1999) argued that transferring ownership of land to women (e.g. through land reforms) is unlikely to increase the productivity if there are no improvements in their access to inputs for agricultural production (e.g. seed, tools, animal or motor traction), better technology, capital and/or credit, labour and agricultural services (Lastaria-Cornhiel, 1995). Similarly, the Ministry of Food and Agriculture in Ghana, acknowledges the fact that the agricultural productivity of women farmers is hampered in Ghana by their insecure access to land as well as their limited access to financial services, their limited access to labour, the lack of appropriate technologies, skewed extension services delivery, heavy workload resulting in time constraints and women's lack of involvement in decision making (Gender and Agricultural Development Strategy, 2001).

Roth and Haase (1998) reported that farmers are more likely to make medium to long term improvements if tenure has security rights. Property rights are important for developing countries where a risk to assets is put forth as a crucial determinant of lagging growth (Collier and Ginning, 1999). Ayalew *et al.*, (2005) argued that the perceived lack of transfer rights by farmers is the most important factor in explaining the relatively low investment in developing countries. West (2000) observed that there is varying access to land, levels of quality, levels of

individualization of rights and control by traditional authorities in Africa. However, in Swaziland, the traditional tenure rights are not well defined (Sithole and Apedaile, 1986). There is a tendency to undermine the importance of customary land tenure system which is an integral part of social, political and economic framework (Migot-Adholla *et al.*, 1994). Norton (2004) argued that customary land tenure protects the poor and vulnerable member of society and it can be more flexible to changing economic circumstances than individual tenure. Place (2006) noted that when measured in terms of possession of land, which a farming household has strong continuous use rights alongside with transfer rights, the tenure security is relatively high in Sub-Saharan Africa. Land conflicts in Southern Africa tend to emerge whenever, profitable investments arise which may be evidence that tenure security is not at its best as rent-seeking (Adams, 2001). The economic effects of property rights to land is related to the improved access to institutional credit, improved investments in land, higher productivity, higher land values and higher output and incomes (Byamugisha, 1999).

Bruce (1988) reported that tenure security may not be the cause of the high investments in land, rather it might be induced by the higher investment in the land, being the purchase price. Aw-Hassan *et al.*, (2000) observed that though the length of ownership to land is secure in customary tenure, there is lack of clear agreements and differential interpretations of some rules governing communal land. The lack of enforcement mechanisms in customary tenure creates insecurity in terms of number of absolute rights, assurance of existing rights and the costs of enforcing the rights (Fraser, 2004).

Farmers' fear of expropriation over land on which an investment would have been made deters investments in fixed assets (Goldstein and Udry, 2005). Also access to credit might be hindered if property rights are not sufficiently well defined for land to serve as collateral. FAO (1994) reported that tenure reform measures helped to change the cropping patterns in favour of certain tradable crops like sugarcane, rubber and rice. Feder and Feeny (1991) observed that the major influences of productivity are those which constrain rapid agricultural technologies, namely; lack of credit, limited access to extension, small farm size, inappropriate land tenure system, insufficient human labour and capital, absence of mechanization options to ease constraints, lack

of access and untimely farm inputs, and inappropriate transport and market facilities. The link between property rights and agricultural productivity is discussed in the next section.

2.4.5.1 Property rights and agricultural productivity

The link between access to land and agricultural productivity can be established in different ways: Firstly, the presence of property rights eliminates the anxiety and uncertainty of expropriation that encourage the farmers to make long term investment decision on land and to adopt the best cropping system. Secondly, the title of land makes it easy for farmers to use the land as collateral for credit. It is hypothesized that for farmers who have collateral can easily get access to financial market and increase the supply of credit available to them (Feder and Noronha, 1987, The Economists, 2001). As a result, agricultural investment and adaptation of modern technology will follow. Thus, access to credit enables the farmers to make durable investment in one hand and intensify the production systems in inputs in other hand and thereby boosting the agricultural productivity (Platteau, 1993).

The effect of property rights in agricultural productivity is basic consideration in the application of technology. However, simplistic analysis of efficiency may lead to distorted results. For instance, in the Njoro District of Kenya, the positive relationship between agricultural productivity and titling does not stem from improved tenure security rather than large-scale farmers having access to factors like imperfect labour market, capital, and insurance markets that small farmers do not have (Carter *et al.*, 1991). In Ethiopia, land with less secure tenure had lower total factor productivity, but this was due to low input quality rather than applying less input (Gavian and Ehui, 1999).

One study in Bangladesh reveals that net per acre output is highest in owner-cultivated farms and lowest in sharecropping farms (Hossain, 1977). For farmers cultivating their own land as well the land others, per acre output is the highest compared to the farmers of sharecropping or cash annual rental basis (Jabbar, 1977). Another study concluded that the differences in output per acre were due to the differences in the amounts of output used by different groups of farmers (Zaman, 1973). The net per acre output varies not only across different groups but also within the sharecropper or cash rental contract. Per acre output in farms rented on cash basis is higher than

that in sharecropping farms the difference between these two sub-groups is in the form of rent; in the former case, lands are leased out for a fixed amount of cash money generally for one year and, in the latter case, the owner gets a share of output, generally 50%, (SESB, 1986). Thus, the empirical evidence of the relationship between tenure security and agricultural productivity remains scattered. There is a compelling case of the linkage between the two as is observed in the case of Thailand (Feder *et al.*, 1988). They found that secured property rights increase the demand for improvements of land and the supply of credit through the possession of land as collateral. The ultimate result leads to greater-long term investments in productive and land conserving technology and short-term investments in inputs leading to sustainable production.

Thus, greater security leads to higher productivity through increased incentives of the landowner to make both long-term and short-term investments (Feeder and Noronha, 1987). In Sub-Saharan countries the results have been inclusive. In Ghana, Kenya, and Rwanda it was noted that “regression analysis indicates no relationship between cross-sectional variations in land rights and productivity” (Migot-Adholla *et al.*, 1991). However, the theoretical benefits of property rights still have profound influence on land policy among donor and African governments (World Bank, 1993; Uganda, 1993; Platteau, 1992). Benefits of secure property rights are discussed in the following section.

2.4.5.1.1 Benefits of secure property rights

Secure land rights are a foundational building block for agricultural productivity, as well as for economic and social empowerment of producer families (Feeder and Noronha, 1987). Smallholders who have more secure property rights are more likely to make productivity-enhancing investments since they are more confident they can recoup their investments over the medium and long term. This is often a blind spot for many agricultural experts in developed economies where secure land rights are typically a given (Platteau, 1993). This relationship, which makes intuitive sense, is also supported by numerous studies. In one study from 2003, researchers used a national data set in Ethiopia to examine the relationship between tenure insecurity and long-term investments such as terracing. They found that farmers are much less likely to make such investments if they cannot transfer their rights easily and if they perceive that the government might take their land to redistribute to others (Feder *et al.*, 1988). The authors

conclude that "a household with fully secure and transferable land is estimated to be 59.8% more likely to invest in terracing than one who expects redistribution within the village during the next 5 years." In India, a group of researchers studied the effects of a widely implemented program in West Bengal to give sharecroppers secure long-term rights to land and a minimum share of production. They found that the greater tenure security enjoyed by the protected tenants explains around 28% of growth in agricultural productivity during 1979 – 1993. African studies also find a strong relationship between tenure security and agricultural investments (World Bank, 1993). A study of farming communities in western Gambia, for example, found secure land tenure "to positively and significantly affect the propensity to make fixed investments." The same study concluded that land improvements were positively and significantly related to higher farm yields. India truly is the land of smallholder farmers (Platteau, 1992). According to 2003 national household surveys, 79% of rural households owned less than 1 hectare and 60% owned less than 0.41 hectares. A large proportion of landholders lack land documentation. In the Indian state of Odisha, for example, a survey of 1,059 villages revealed that 50% of village households did not have title to land they lived on, 13 while in Andhra Pradesh, a government inventory found more than 1.9 million rural households 42% of all rural lower caste and tribal households have insecure land rights (Carter *et al.*, 1991).

In addition, a great deal of farmland is held by informal tenants who cannot legally rent the land they cultivate. According to national estimates, 1,315,300 households in Bihar and 840,000 households in Odisha possess agricultural land under unrecorded leases. These tenant farmers operate in an informal economy in which they cannot access either credit or government services available to land owners (Migot-Adholla *et al.*, 1991). Because the rural poor typically have weaker property rights than any other segment of society, efforts that improve the security of those rights which in turn create incentives for productivity-enhancing investments are fundamental mechanisms for reducing poverty (Carter *et al.*, 1991). Implications of insecure property rights to land are discussed in the following section in the next section.

2.4.5.1.2 Implications of insecure property rights

In many developing country contexts, property rights over agricultural land are not fully defined or enforced. Rural producers often lack formal, documented rights to land in the form of titles or

deeds (Linkow, 2012). Even where formal rights exist, state institutions may lack the capacity to maintain accurate records of rights, adjudicate disputes, or handle transactions. In many contexts, including Burkina Faso, traditional systems play an important role in allocating and protecting rights to land. However, changing circumstances such as increasing population pressures and migration can put traditional systems under strain. Ultimately, when the prevalent property rights system fails to adequately protect the claims of producers from challenges by others, there are implications for agricultural productivity.

Research on this topic points to four main channels along which insecure property rights can affect agricultural outcomes. First, the risk of land conflict or expropriation weakens investment incentives by reducing the expected payoff for certain types of investment (Linkow, 2012). These include investments that are immobile, such as wells or buildings. In the event that the farmer's rights to the underlying land are lost, the value of these investments will be lost as well. Deininger and Jin (2006) find evidence that stronger land rights affect incentives to build terraces in Ethiopia. Similarly, incentives are weakened for investments that pay off over time, for example planting tree crops or engaging in soil conservation measures. These investments are less attractive if the cultivator cannot be certain that his or her land rights will be maintained during the time horizon over which the returns to the investment accrue. Examples include weakened incentives to plant tree crops as observed by Besley (1995) in Ghana, and higher value tobacco planting in Malawi (Place & Otsuka, 2001).

Second, insecure property rights may reduce access to credit (Besley 1995). Where property rights are not fully protected and transferable, land cannot be used as collateral to obtain loans. As these loans may be used to make productivity-enhancing investments, reduced access to credit means reduced agricultural productivity. While this issue has been argued to be particularly important in other contexts, the empirical evidence suggests that it is less important in Africa, where credit markets may be constrained for other reasons (De Soto, 2000 and Besley, Burchardi and Ghatak, 2012). Third, insecure property rights may have adverse impacts by inducing cultivators to allocate resources to defending property rights that could otherwise be put to productive use. Besley (1995), Sjaastad and Bromley (1997) and others have noted that certain types of visible investment such as tree planting are frequently made to strengthen recognition of

property rights under the informal system. Where property rights are secure, investment strategies can be instead undertaken to maximize returns. Similarly, Field (2007) finds that insecure property rights can result in re-allocation of labor to watch over property and prevent competing claims. Finally, weak property rights limit the transferability of land. Where land cannot be bought and sold, farm sizes will tend to be sub-optimal as households are unable to adjust their land endowments to match their endowments of other factors and access to capital (Deininger and Jin 2008). In addition, the value of investments in land cannot be recouped by selling the land, which Brasselle *et al.*, (2002) term “the realizability effect.” The link between land rights and credit use is explained in the following section.

2.4.5.2 Land rights and credit use

According Adams *et al.*, (1999; 2000), land rights may include one or more of the following:

- **Rights to occupy** a homestead, to use land for crops, to make permanent improvements, to bury the dead, and to graze animals have access for gathering fuel, fruits, grass and minerals.
- **Rights to transact** give mortgage, lease, rent and bequeath areas of exclusive use.
- **Rights to exclude** others from the above-listed rights, at community and / or individual levels; and linked to the above.
- **Rights to enforcement** of legal and administrative provisions in order to protect the rights holder.

Economic theory suggests that increased tenure security increases the supply of short term and longer-term credit as land can be used as collateral to secure loans. Additionally, increased tenure security increases the demand for credit as returns from investments accrue to the operator of the farm (Blarel, 1994). Consequently, there is a strong correlation between credit use and farm size and credit use and gross farm income. Reasons for this are twofold. Firstly, large farmers are more creditworthy by virtue of their larger gross farm incomes increasing the supply of credit. Secondly, larger farmers have increased investment incentives as costs are spread over a larger output, increasing demand for longer term financing. The next section is discusses the land rights and land improvements.

2.4.5.3 Land rights and land improvements

Evidence from Zimbabwe in the research that was conducted by Moor and Nieuwoudt (1995) indicates that incidence of 8 types of land improvements were made since the acquisition was collected from each household interviewed. These data were combined into investments in livestock production (fencing and establishing pastures), investments in crop production (soil lining and fencing arable lands), long-term land improvements (conservation measures and establish crops) and investments in farm building and housing. The expected theoretical relationship was found to be strong. Households with more secure property rights invested more in all land improvements than those with less secure rights in communal Areas and resettlement farmers. Investments in livestock production are greatest in areas having exclusive grazing rights. Over 90% of farmers with more property rights erected cattle fences in the grazing lands, and 58.5% has established pastures or hay crops. Due to the unrestricted access to communal grazing in the resettlement and communal areas and less than 3% of resettlement and communal areas farmers planted pastures (Moor and Nieuwoudt, 1995). Even on arable land, resettlement area and communal area households do not have the incentive to establish pastures for livestock, as arable land reverts to communal grazing in winter. It is striking that 44% of the cattle herd in the communal areas and 30% herd in resettlement areas died as result of fodder shortages in the 1992 drought, compared to only 22 per cent in the areas with more property rights. Land rights, input use and agricultural product are discussed in the next section.

2.4.5.4 Land rights, input use and agricultural productivity

For short term input use, tenure security is likely to be less of an issue as benefits can be captured by the operator at the end of the season. The next section discussed the economic benefits of exclusive and secure property rights to land.

2.5 Economic benefits of exclusive and secure property rights to land

Exclusive and secure property rights promote efficient and sustainable use of land. They facilitate market transfers, which permit land to be used as collateral for credit and shift land to its highest value use (Kille and Lyne, 1993). They also create incentives to invest in on farm improvements and to conserve resources. Without an efficient land market both the incentive and ability of landowners to invest and conserve are reduced.

2.5.1 Exclusive and secure property rights to land, land transfers and land use efficiency

When transfers of land occur through sale or leasing, farmers know the price of land and its rental value even before the production commences. A land market promotes efficient land use because an opportunity cost is imposed on non-use of land (Nieuwoudt, 1990). Land may be left idle or underutilized when the land market is inefficient (i.e. high transaction costs relative to rent), when development costs exceed benefits (i.e. land is truly unproductive), or if farmer's incentives are changed (Kille and Lyne, 1993). Land allocation provides usufruct rights and security of tenure is guaranteed provided tribal laws and customs are observed. It has been argued that inefficient use of arable land in KwaZulu stems from high transaction costs that inhibit land rental (Lyne and Nieuwoudt, 1991). The relationship between exclusive and secure rights to land and access to credit is discussed in the following section.

2.5.2 Exclusive and secure rights to land and access to credit

If the bundle of use of rights to land includes the right to transfer ownership, land can be pledged as collateral for loans and, if use rights are exclusive, the lender is assured that there are no challenges to ownership (Feder *et al.*, 1988) as quoted by Kille and Lyne, 1993). Even when land is not offered as collateral, exclusive land owners, with other things being equal, have better access to credit because they are regarded as having higher credit worthiness by virtue of their land which is implicitly regarded as collateral (Feder *et al.*, 1988) as quoted by Kille and Lyne, 1993). Collateral can increase the number of profitable lending opportunities and therefore the volume of agricultural credit, increasing landowners, ability to invest in agriculture. According to Kille and Lyne (1993), evidence from Thailand indicates that titled land provided significant advantages in obtaining credit (Feder *et al.*, 1988 as quoted by Kille and Lyne, 1993).

2.5.3 Exclusive and secure rights to land and investment and conservation

Secure rights are expected to encourage greater investment by enhancing the incentive to invest and by improving access to credit (Feder, 1987). Decreased uncertainty about future access to land positively influences a farmer's decision to invest time, effort and capital into long-term improvements on the farm, which may enhance the productive capacity of land or maintain present productive capacity (Kille and Lyne, 1993). Secure and exclusive use rights are also necessary conditions for a land market and land markets have implications for investment and

conservation. Firstly, income streams from investments in land can be captured on sale or lease and if the transfer of land is restricted, then so the transfer of fixed assets on the land. The next section discusses the economic constraints imposed by insecure land rights.

2.6 The economic constraints imposed on smallholder farmers in the former homelands

The impact of the 1913 Land Act on African farming in South was fundamentally disabling. In the latter part of the nineteenth century, smallholder farming was viable and successful in responding to the increased demand for agricultural products from the mining towns (Bundy, 1988; Mbongwa, 1996). In 1860, over 83% of the nearly half million hectares of white - owned land was farmed by African tenants. African owner-operated or tenant farming proved to be as efficient as large-scale settler farming based on hired labour. African farmers adopted new agricultural technologies, entered new industries and out competed large-scale settler farming in some of the emerging agricultural markets. Settlers urged that because of labour shortages, they could not compete with their African counterparts who had lower costs. Competition from black transporters of agricultural produce was also deemed unfair by white transporters (Adams *et al.*, 1992).

During this period, the accumulation of capital and wealth by African farmers caused the Native Affairs Commission to comment that Africans were becoming wealthy, independent and difficult to govern (Adams *et al.*, 1999; van Averbeké *et al.*, 1997 and Bundy, 1988). Critical to this success was the inability of a weak state to intervene in factor markets and the implicit support for African farming from land companies and big landowners who earned rents from African tenant farmers. All this changed when on June 20, 1913, the Native Land Act segregated Africans and Europeans on a territorial basis of designating about 8% of the country's farmland as reserves, which became the only areas that could legally be farmed by African (Adams *et al.*, 2000). Immediately the Government of the day had created surplus labour for the mines and the white agricultural sector. This resulted in the elimination of the competition from black farmers.

Although farming survived in the so-called native reserves, its viability has been steadily eroded by over-crowding, ill-judged betterment schemes and increasing uncertainty over land rights. Studies by the Agricultural and Rural Development Research Institute (ARDRI) in the Eastern

Cape have shown that productive small farmers have faced increasing difficulties in leasing unused land (van Averbeke, ARDRI, 1997). Rights holders are no longer willing to lease arable land for fear of not getting it back. Lima Rural Development Foundation (1999) reported that in former KwaZulu, up to 70 percent of available arable land might lie fallow, as the rights holders are unable or unwilling to farm it. A similar situation was reported from the former homelands areas absorbed by Northern Province and North West Province (May, 1996; Turner, 1999; Baber, 1996; DRA, 1994 as quoted by Adams *et al.*, 1999). There is also evidence that irrigation schemes in the former homelands are operating at low levels of productivity due in part to the lack of clarity on land rights. Examples include Makathini, Stockenstroom, Siloe, Keiskammahoek, Hertzog, Zanyokwe, Horsehoe, Qamata, Tyefu and Taung (van Averbeke *et al.*, 1998). Agricultural projects on state-held land are constrained by tenure problems. According to Oricho (1998), small farmer projects (on state land) are characterized by neglect of infrastructure, confusion over land rights, and under-utilization. The land market in more densely populated parts is unregulated and open to exploitation by unscrupulous administrators and chiefs who are selling off communal land bringing them into conflict with adjacent city councils. Insecurity is greatest among those using land to generate income, especially among women (Adams *et al.*, 1999). Profit making from agriculture and small business activity are not clear rights.

Another critical issue is the large area of land in South Africa as common property resources i.e. the grazing areas, forests and woodlands, water catchments and fisheries that are used jointly by members of rural communities' (Adams *et al.*, 1999). As Shackleton *et al.*, (1999a) have shown resources on the commons make very important contributions to rural livelihoods. But some commons are converted to open access (Ainslie *et al.*, 1996) and in many others management is far from optimal because of lack of clarity over land rights (Shackleton *et al.*, 1998; Cousins, 1996). The reform of tenure is needed to create a clear or legal and institutional basis for decision making in common property resources. The economic constraints on government in investment in development and constraints in private sector development are discussed in the following section.

2.6.1 Economic constraints on government in investment in development

Uncertainty regarding land ownership in the former homelands has discouraged both public and private investment in services (Adams *et al.*, 1999). This has been a major impediment for the vast majority of people living in black rural areas who, as a result, have not qualified for the national housing subsidy. The proposed land rights legislation provides for the decentralization of decision-making to rights holders and local level structures. The law would clarify who can make decisions relating to such developments on state-owned communal land.

2.6.2 Constraints to private sector investment

Investment projects (agriculture, forestry, tourism and eco-tourism), part of the Spatial Development Initiatives (SDI's) were delayed two years as a result of lack of legal clarity over land rights (Adams *et al.*, 1999). In the absence of the over-arching tenure legislation, the delays have to be resolved through time-consuming, case-by-case investigation and negotiated agreement. The SDI anchor projects were initially conceptualized as public-private partnerships founded on the expectation that the State would provide the private sector with tax concessions and / or preferential access to state assets such as land in return for the provision of infrastructure and other investment, which would lead to local employment opportunities (Adams *et al.*, 1999). This approach was based or premised on the assumption that the land was free of claims. However, in the two SDI's i.e. Wild Coast and Lubombo, consultations with local people revealed their strong claim to the State land. This claiming of land was coupled with a strong desire for investment on that land on condition that their land rights were recognised and upheld and that they would be able to enjoy some of the benefits.

Meanwhile the local communities require the recognition of their land rights, potential investors require the assurance that their investments will be secure once they commence with investment projects in the land (Adams *et al.*, 1999). The absence of an appropriate land tenure framework to encourage inward investment, have seriously stalled the SDI's and have involved lengthy and inconclusive negotiations with vested interests at various levels in the tribal authority hierarchy standards levels. Investment projects by private sector communal areas are limited to SDI's. Other projects in which shopping centres, eco-tourism ventures, forestry and agricultural production have been proposed also encounter serious impediments or stumbling blocks caused

by lack of clarity over land rights. Some major factors affecting agricultural productivity are discussed in the following section.

2.7 Some major factors affecting agricultural productivity

Major constraints towards increased agricultural productivity were identified by Tshatsinde (1990) as: shortage of land, inadequate irrigation water, lack of management abilities, limited control over factors of production; limited education; unavailability of credit and inefficient market outlets.

2.7.1 Shortage of land and irrigation water

Land is a major factor of production in agriculture especially in agrarian societies (Tshatsinde, 1990). Shortage of land is regarded as one limiting factor to increased production (Ghatak and Intersect, 1984 and Tshatsinde, 1990). In the study of Tshatsinde (1990), female farmers identified the inadequate size of their land holdings to be a limiting factor to increased agricultural production. This was coupled with inadequate supply of irrigation water; and because of that it is impossible to farm on commercial basis. According to Stoeckel and Sirinema (1988), acquisition of enough land is expected to provide greater opportunities for female farmers to actively participate in agricultural production and thus increase their incomes.

2.7.2 Ownership, control and access to land

The size of the land holding is not the only limiting factor for farmers, but also ownership, control and access to land (Tshatsinde, 1990). In South Africa, access and ownership of land are crucial issues for smallholder farmers. Tshatsinde (1990) argued that these issues are more serious among female farmers who cannot own land because they are Black and cannot have access to communally owned land because they are women.

2.7.3 Limited control and decision making over productive resources

As some farmers (especially women) cannot control or own land and property, they also have limited control over productive resources and products they produce (Tshatsinde, 1990). Decision on production and farming activities are made and controlled by men. Limited control

and decision making over productive resources is a disincentive to farmers trying to increase production (Ghatak and Ingersent, 1984).

2.7.4 Unavailability of credit

Credit is regarded as one of the crucial factors determining the availability of both production and marketing inputs. There is no shortage of literature to prove that credit plays an essential role for acquisition of capital goods (Ahmed *et al.*, 2005; Machethe, 2004; Blackman, 2001), land improvement (Amani, 2004), and to meet short term seasonal needs (Gouse, Kirsten, Jenkins, 2002; Amani, 2004). Generally, for many smallholder farmers in Africa, credit is elusive mainly because of absence of formal financial structures to finance smallholder farming (Amani, 2004). However, contrary to the former, the situation in South Africa is somewhat unique since there are many agricultural credit institutions. The South African government has established parastatals credit institutions with the mandate to provide credit in the former homelands. For instance, the establishment of the defunct Agricultural Credit Board, Land Bank, Agricultural Credit Scheme (Machethe, 2004), MAFISA (Department of Agriculture and Land Affairs, 2007), among other institutions, clearly paints this picture. However, shortcomings present themselves as a significant number of farmers find it difficult to access credit for reasons such as lack of collateral security. According to Machethe (2004), some of the parastatals credit institutions have collapsed as a result of deregulation of agriculture. Such is the case with the Agricultural Credit Board which was terminated in 1997 and the Agricultural Credit Committees were disbanded the following year (Department of National Treasury, 1999). In this case the Land Bank was expected to fill the gap by providing credit to farmers (Machethe, 2004). Indeed, the Land Bank plays an important role in credit provision since it managed for instance to assist 15 000 black farmers in 2003. However, the Land Bank could not sufficiently provide credit to most farmers and this prompted the government to establish the Agricultural Credit Scheme (Machethe, 2004). The Agricultural Credit Scheme specialises in credit provision to smallholder farmers whilst the Land Bank caters mainly for the needs of commercial farmers. To date the Agricultural Credit Scheme finds it difficult to cope with a binary objective of ensuring market access to farmers whilst financially sustaining the scheme (Machethe, 2004). Credit is also not easy to obtain, as farmers do not own the land they cultivate, and do not own property, they are unable to obtain credit from commercial banks.

2.7.5 Other impediments to agricultural production

Much has been documented in the past on impediments to agricultural modernization in third world agriculture in general and sub-Saharan agriculture in particular (Groenewald, 1993). The reasons most often cited are as follows: lack of entrepreneurship and rationality among smallholder farmers, lack of know-how, land tenure, access to product and factor markets, small farm sizes, technology and lack of funds. These impediments are clearly interrelated to each other and these included rural landless and land tenure (Morris, 1983).

2.7.5.1 Rural landless and land tenure

In a survey on African agricultural development research Eicher and Baker (1982) mention that up to some stage, many studies concluded that communal land tenure institutions were flexible enough not to be an immediate constraint on increased agricultural production. More recent research leads them to conclude, “The view that land tenure problems are not constraints on production is outdated.” According to Groenewald (1993), it has for example been shown that in South African homelands, the institutionalization of “traditional” tenure systems has reduced flexibility and in particular, the ability of tenure systems to adapt to changed socio-economic conditions (Leseme *et al.*, 1980). Land is major factor of production in agriculture especially in agrarian societies (Morris, 1983). This, however, implies that shortage of land could be seen as one limiting factor to increased productivity. As argued by Spio (1997), land can be viewed from two perspectives. Firstly, land itself may not be a limiting factor of production, but the type of tenure arrangement associated with it can affect land use. Secondly, the availability of land may be a problem in itself; this problem may not be associated with arrangements. Groenewald (1993) indicated that there appears to be a constraint interaction between communal tenure and subsistence agricultural coupled with lack of flexibility. This has increasingly stood in the path of modernization, which occurs only if the mobility of the land resources is improved.

In the rural areas of the Eastern Cape, landlessness is attributed largely to shortage and to betterment planning freezing the distribution of land (Cobbett, 1987). Arable holdings are too small (1-2) hectares to produce enough to justify the costs of inputs and to provide for family subsistence. Therefore agriculture would fail even if there were no constraints other than the size of holdings (Cross, 1985). Smallholder farmers do not have title deeds on the land they are

farming. The essence of land tenure is that it confers individual's rights without individual responsibility. Limited access to land ownership often means that farmers do not possess the collateral needed for credit (Morris, 1983) and is a serious limitation to innovation in agriculture (Cross, 1985).

2.7.5.2 Farm size relationship and technology

During earlier attempts to develop Sub-Saharan agriculture particularly in the 1960's, western advisors generally endorsed large farmers and plantation, either privately or state owned (Groenewald, 1993). Assuming large benefits from economies of size, such developments were expected to bring rapid rural development and large-scale employment.

2.8 Summary

In the preceding review of literature, the concept of land tenure, historical overview and definition of land tenure discussed. A brief overview of the land tenure systems in the world, Southern Africa and in South Africa and the major challenges to smallholder farming are reviewed. In addition, factors influencing on-farm investment and on-farm productivity of smallholder farmers were also reviewed. This will facilitate the explanation of the interface between land tenure security in on-farm investment and on-farm productivity and impact on the investment and productivity of the smallholder farmers in the Amathole District of the Eastern Cape Province to be applied on both on-farm investment and on-farm productivity models. Some of the factors hypothesized to exert the largest influence on-farm investment and on-farm productivity are discussed. They include household demographic characteristics and socio-economic factors. These factors may act as either incentives or barriers to on-farm investment and on-farm productivity of the smallholder farmers.

CHAPTER THREE

SELECTION AND DESCRIPTION OF THE STUDY AREA

3.0 Introduction

This chapter provides a spatial, socio-economic, and geophysical description of the study area, within the broader context of the district. It starts by providing spatial location for the Eastern Cape Province. The geophysical description of the study area is provided with a focus on climate, vegetation, topography and soils.

3.1 Selection of the study area

The study was conducted in the Amathole District Municipality in the Eastern Cape Province. The farmers were drawn from Nkonkobe Local Municipality from areas such as Alice, Balfour, Fort Beaufort, Middledrift and Seymour and Keiskammahoek region from Amahlathi Local Municipality. These areas were purposively selected because of their agricultural potential, farming systems, (smallholder farming i.e. crop production), land tenure systems, geographic, climatic and soil characteristics. Figure 3.1 shows the location of Amathole District Municipality in the Eastern Cape. (Map of Eastern Cape Province).



Figure 3.1: Map showing district municipalities of the Eastern Cape
Source: ECDC (2009)

3.2 Description of the study area

3.2.1 Keiskammahoek Area

The study area of Keiskammahoek refers to the town centre, including 38 rural villages serviced by the town, which is located 40 km from Stutterheim and 45km from Alice in the Eastern Cape. The town of Keiskammahoek is among 72 small towns in the Eastern Cape, and 40 in the Amathole District. One of the significant things to note about Amathole District, and its significant concentration of small towns, is its historical context – being a composition of parts of the former Ciskei and Transkei homelands. In addition to the Districts historical context, at the local level of Amahlathi there are 4 small towns, with Keiskammahoek being the vibrant second largest service centre in the municipality.

Keiskammahoek is one of the former Ciskei homeland towns situated 40 km from Stutterheim, which historically fell under the Republic of South Africa. Keiskammahoek has a total population of 37,063, which represents 27% of the total Amahlathi population (Amahlathi Local Municipality IDP 2008-2012). In the previous homeland government Keiskammahoek was developed mainly as a magisterial administrative and service centre for the agricultural/farming community (Amathole District Profile, 2006).

The town of Keiskammahoek falls beautifully into the Amatole mountain range, which is situated in the former homeland Ciskei in the Eastern Cape Province of South Africa. Geographically it is situated 45 km north west of King William's Town (KWT), 34 km south west of Stutterheim, 18 km north of Dimbaza and 43 km northwest of Alice and the University of Fort Hare (Morrison, *et al.*, 2001). Keiskammahoek region falls under the Amahlathi Local Municipality of the Amatole District. Keiskammahoek is located about 35km west of King William's Town (SA Explorer, 2009). Keiskammahoek lies in a basin at the confluence of the Keiskamma and Gxulu rivers below the Amatola Mountains. The name Keiskamma is of Khoekhoen origin, meaning either 'Puffadder River' or 'glittering water'. Keiskammahoek was established as one of a chain of military outposts, it played an important role in the Frontier Wars between 1846 and 1853. The Keiskammahoek town is an important commercial center for the timber. Keiskammahoek is one of the areas located at Amahlathi Local Municipality in the Eastern Cape Province, the second largest of the nine provinces in terms of surface area but at

the same time, the poorest province of them all in South Africa. The Eastern Cape Province is one of the poorest provinces in South Africa where poverty is aggravated by growing unemployment and limited economic opportunities. The situation is even worse in the former homeland areas of this province where very few development efforts have successful (Chirwa, *et al.*, 2008). Figure 3.2 shows the location of Keiskammahoek within Amahlathi Local Municipality.

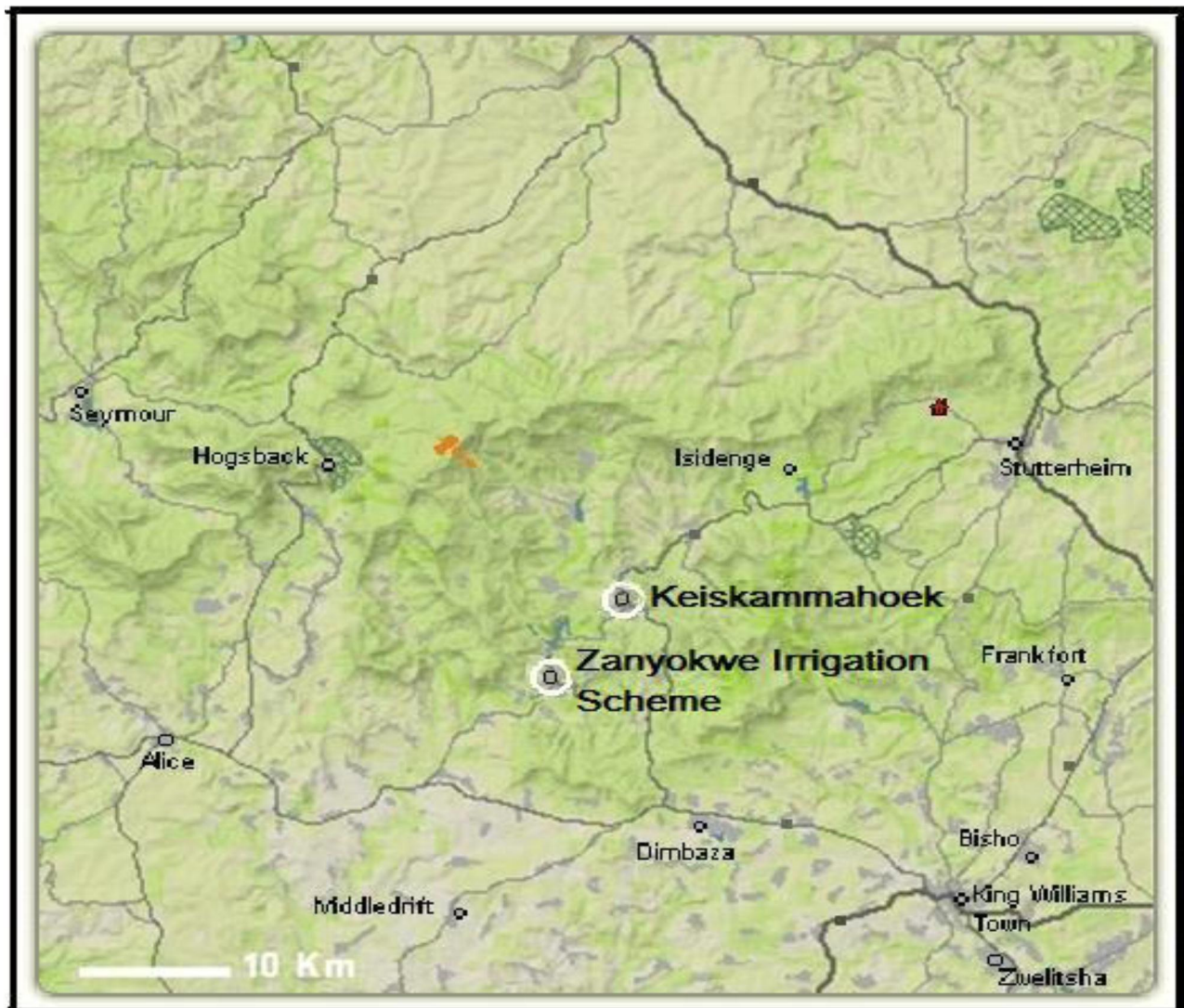


Figure 3.2: Map showing location of Keiskammahoek
Source: SA Explorer, 2009

3.2.2 Nkonkobe Municipality

Nkonkobe Municipality is located in Eastern Cape, the second largest province of South Africa (Nkonkobe Municipality, 2007). The study area Nkonkobe Municipality is located in the Eastern Cape Province of South Africa, which is located on the south east of South Africa. It is the second largest province with a population of more than 6 million inhabitants which is about 15, 5 % of South Africa's total population (Statistics South Africa, 2004). It occupies 169 580 square kilometers which is about 13, 9 % of the South Africa's total area. The province is further divided into two regions, the Western and the Eastern region. The Eastern region of the Eastern Cape Province is less developed based on the degree of urbanization and socio-economic development. The province has a high unemployment rate. Approximately 1 890 000 people, which constitutes 30 percent of the total Eastern Cape Province population, are unemployed (Statistics South Africa, 2004).

Nkonkobe Municipality as mentioned above that it is located in the Amathole District Municipality in the Eastern Cape Province of South Africa. Nkonkobe Local Municipality is an administrative area in the Amathole District of the Eastern Cape in South Africa. The municipality is bordered by the following local municipalities: Nxuba, Lukanji, Amahlathi, Makana and Ngqushwa (Nkonkobe Municipality, 2007). The municipality which covers a relatively large area is named after a mountain range (Winterberg), Nkonkobe in isiXhosa (SA Routes, Bookings and Info Systems, 2005). The municipality covers the following areas; Alice, Seymour, Fort Beaufort, Hogsback and Middeldrift. However the study will be conducted only in five areas and these will include Alice, Balfour, Fort Beaufort, Middeldrift and Seymour.

Nkonkobe Municipality is characterised by a series of impediments to human welfare due to high unemployment levels (Nel and Davies, 1999). The situation is made worse by the presence of low industrial activities (Nel and Davies, 1999). Amongst these obstacles are a high poverty rate resulting from high unemployment rate, low income and lack of basic skills required to spur local economic development, inadequate infrastructure and social services, low agricultural productivity, high dependence on government grants and inadequate and inefficient income generation strategies to improve the economic base of the municipality (Nkonkobe Municipality, 2004). De Wet (1993), as cited by Nel and Davies (1999), says income derived from agriculture

does not exceed 10% of the average rural income. Many rural people rely on gifts, state pensions and migrant labour remittances for household survival (Nel and Davies, 1999).

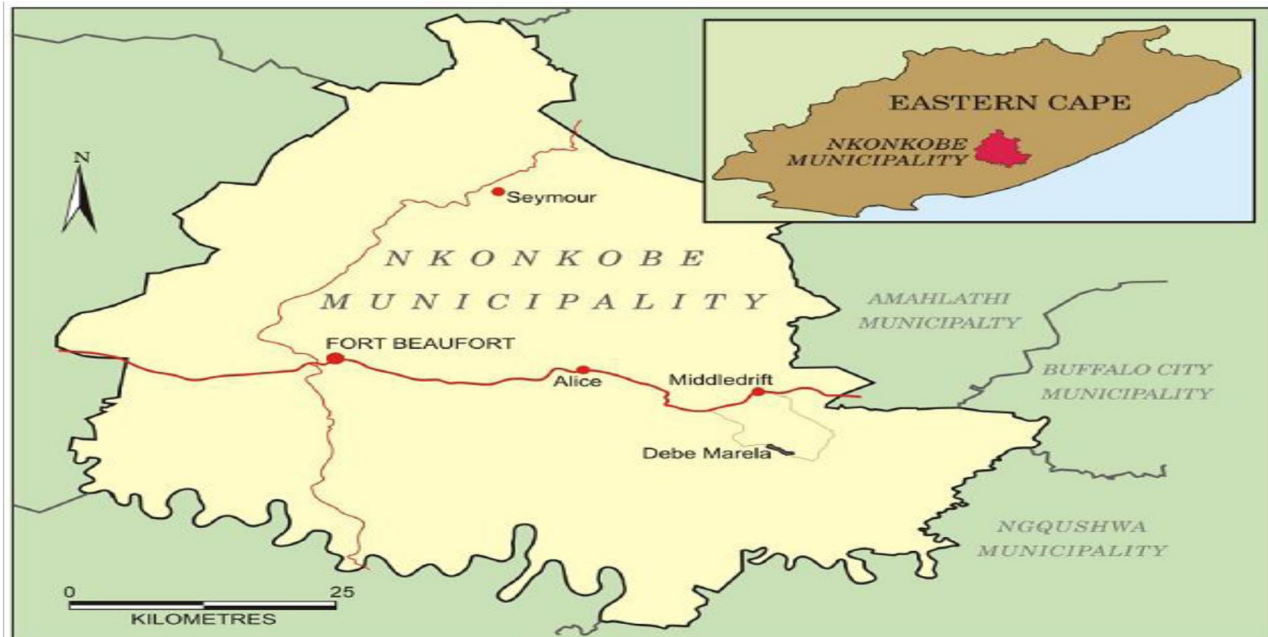


Figure 3.3 Map showing location of the study sites in Nkonkobe Local Municipality. Source: Amathole District Municipality Map (<http://ufh.netd.ac.za>).

3.2.3 Population

According to Qayi (2010), the population of Keiskammahoek increased from 18,391 in 1946 to 37,063 in 2007, thus, representing 27% of the total population of Amahlathi Local Municipality. Almost 100% of the population comprises of blacks (Wilson, 2009). The Nkonkobe Municipality has 128 660 inhabitants, which represents 8.7% of the total population of Amathole District Municipality IDP (2006). The municipality has an average population density of 43 persons per square kilometer. Children and the elderly constitutes 52% of the total municipality's population, this means that a greater percentage of the population depends on the economically active group. Nkonkobe Local Municipality has a population of 1,676,480 of which 99.53% is predominantly African; all other population groups are relatively few in this district. About 45% of the population is made up of children below 15 years of age and almost 58% of the population is below 20 years (NDMC, 2011).

The population in Fort Beaufort is composed of different races mostly Xhosa speakers followed by coloureds then lastly whites/English speakers. Nkonkobe has a population of 160311 which is

8.7 percent of the total population of Amatole District Municipality. The Municipality covers an area of 375 500 hectares (Nkonkobe Municipality, 2004). The majority of the population (61 percent) resides in villages, 20 percent on farms and 19 percent is in urban areas.

According to the 2011 Census, the Nkonkobe Municipal area has a population size of 160 311. The gender ratio indicates that 40% of the total population is male with females accounting 60%. However, there are some areas where males are the dominant component of the population. The age distribution of the area is skewed towards the youth, with children under 15 years constituting the majority of the population. These statistics validate the decision to develop special programme units focused on the youth, women and disabled. The Nkonkobe Municipal area is predominantly rural. The 2011 Census reveals that 76% of the population is located in rural areas. The Municipal area is predominantly African in terms of racial composition with the latter accounting for 96% with coloured and whites sharing only 4% of the population between them. Mujikanovic (2005) depicts that the majority of the Kat River Valley inhabitants are Africans (blacks) followed by coloureds then whites. By 2001 there was a total of about 50 000 people in the valley, a decrease from the 1996 population of about 55 000 people. Farolfi (2005), as cited by Mujikanovic (2005), attributes the population decrease to the HIV/AIDS pandemic.

3.2.4 Geophysical aspects

This section described aspects of topography, climate and rainfall, land and vegetation and soil for the study areas.

3.2.4.1 Topography

Generally, the topography of the Eastern Cape Province is steep (Somoro, 2009). According to Van Averbek, Harris, Mnkeni, Van Ranst, and Verplancke, (2006), approximately a third of the province consists of mountain ranges with large differences in local relief. About 53.3% plateaus of medium to large differences in local relief cover over half of the area (Van Averbek *et al*, 2006). Only a small part consists of relatively level plains (11.0%) and river valleys (4.6%) (Somoro, 2009). The Eastern Cape valleys are usually deeply incised, and the occurrence of level land of alluvial origin is generally limited and localized.

Agriculture activities are also facilitated by the terraced basin topography and foot slope bottom lands enclosed by the steep mountain slopes (Water Research Commission, 2003). Rainfall on the high ground is around 1000 mm per annum whereas it is much lower in the valley bottom (600 mm) and can only support limited rain fed cultivation (Water Research Commission, 2003). Due to the inconsistent climatic conditions compounded by poor grazing practices, the Valley has experienced land degradation in the form of sheet, gully and donga erosion on the foot slope areas (Water Research Commission, 2005).

3.2.4.2 Climate and rainfall

Regarding the production of crops, rainfall and temperature are the two most important climatic elements (Manona, 2005). This section describes the climate and rainfall of the study sites. Keiskammahoek has an average rainfall of about 647mm of rain per annum, with most rainfall occurring mainly during summer. Figure 3.4 illustrates the average rainfall values for Keiskammahoek per month. The district receives the least rainfall (14mm) in July and the highest (89mm) in March (SA Explorer, 2009). Average daily maximum temperatures for Keiskammahoek range from 18.3°C in June to 26.3°C in February. The region is coldest in July when the temperatures drop to 4.5°C on average during the night. Evaporation rates are 160-170 mm per month in December and January, reducing to 70mm during June and July (SA Explorer, 2009).

According to Magni (1999), Nkonkobe Local Municipality climate can be described as mild. The rainfall is unevenly distributed within the area ranging from 400mm to 1200mm, with the least rainfall being received in the inland areas of Alice and Middledrift and the highest in the mountainous region of Seymour and Balfour area (Acocks, 1988; Magni, 1999; Shackleton & Shackleton 2006). Although rainfall is relatively high in the mountainous region, much of the area in the catchment can be regarded as sub-humid to semi-arid. Nkonkobe receives both summer and winter rainfall. Approximately 75% of the mean annual precipitation is received between October/November and February/March, where the highest rainfall figures are recorded in March (Magni, 1999). The temperatures range from moderately hot summers to cool moderate winters (Acocks, 1988; Motteux, 2001).

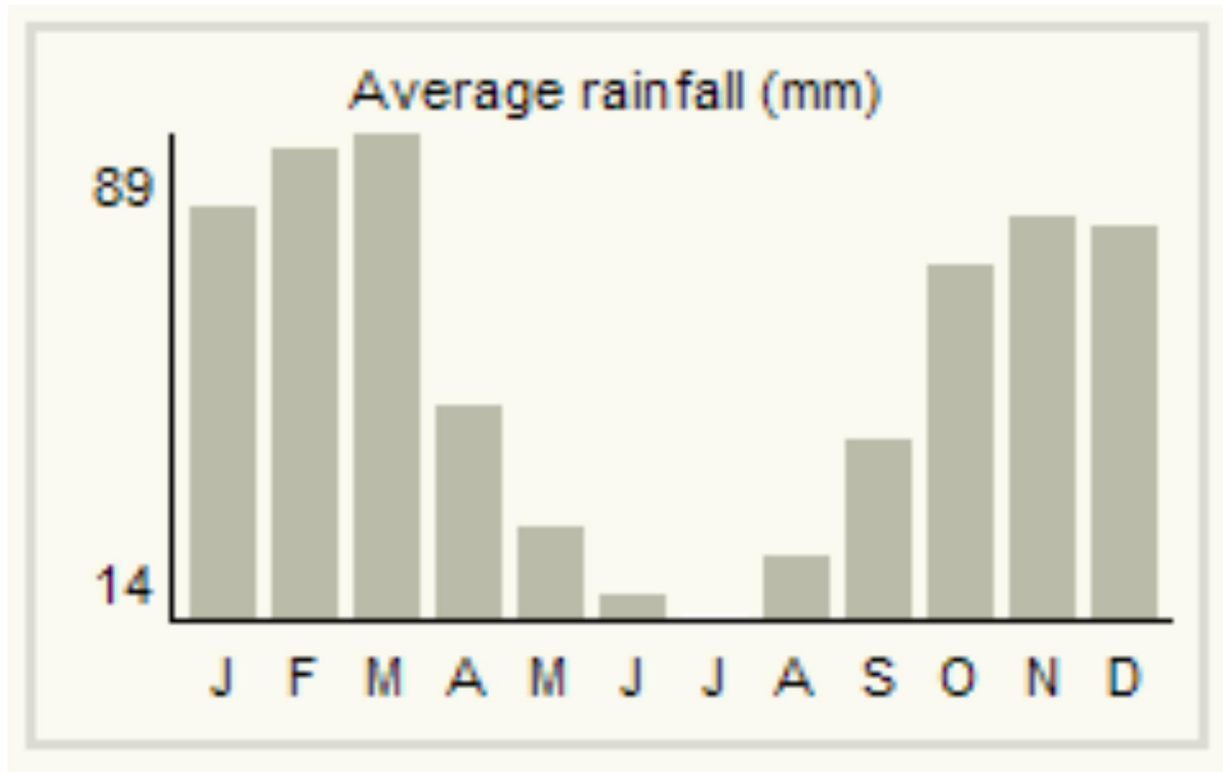


Figure 3.4 Average rainfall (mm) for Keiskammahoek per annum
 Source: SA Explorer, 2009

3.2.4.3 Land use and settlement patterns

Most of the land in Keiskammahoek is communal and used predominantly for stock grazing or dry- land cultivation. Less than 854ha is cultivated under irrigation (DWAf, undated). There is a commercial forestry (less than 1000ha) in the Hogsback and Upper Keiskamma catchment in the higher rainfall areas of the Amatole mountain range. The residential settlement pattern is mainly scattered rural villages located throughout the catchment. The main formal town in the area obtains its water from the Keiskamma River.

The Municipality covers an area of 375 500 hectares (Nkonkobe Municipality, 2004). The majority of the population (61 percent) resides in villages, 20 percent on farms and 19 percent is in urban areas. Nkonkobe extends over 3725.32ha of the former magisterial districts of Alice, Balfour, Hogsback, Fort Beaufort, Middledrift and Seymour. It consists of 21 wards and 41 municipal councils (Nkonkobe Municipality, 2004). It has an average population density of 43 persons per hectare. The urban areas of the Nkonkobe municipality account for the biggest

concentration of its population. The Fort Beaufort area is the most densely populated accounting for a population range of 3 035 to 6 719 persons per square kilometre” (Nkonkobe Municipality, 2004). “Alice Town and its immediate surrounding areas account for the second highest range of population density with a range of 1 2783 034 persons per hectare. The rural areas in close proximity to urban nodes are relatively more densely populated than the hinterlands. They are, however, less densely populated than the urban nodes: Alice, Balfour, Hogsback, Middledrift, Fort Beaufort and Seymour account for a population density range of 745 to 1 277 per square kilometre” (Nkonkobe Municipality, 2004).

Nkonkobe is generally considered as a low-income area (Nel and Davies, 1999). In this respect, a situational analysis of the area reflects that there is no noteworthy industrial or mining sector and the area is largely rural. Generally, Nkonkobe like the rest of Eastern Cape is characterised by poor shallow soils, which are not conducive for intensive farming (Nel and Davies, 1999). It is mostly an agricultural area. However, there are various agricultural activities including citrus farming, beef and dairy production. A subsistence agricultural sector, emerging commercial citrus farmers and irrigation schemes, especially in Kat River Valley, characterise the municipality (SA Routes, Bookings and Info Systems, 2005). In terms of resources, there is high potential for agriculture (in some areas), forestry and tourism in Nkonkobe Municipality. However, these resources have not been fully exploited to the benefit of the Municipality (Nkonkobe Municipality, 2004).

3.2.4.4 Vegetation and soil

Vegetation in Keiskammahoek consists of both natural and exotic (DWAF, undated). The natural vegetation consists mainly of coastal grasslands, savanna (thornveld) in the coastal areas up the escarpment, with areas of dense bush (valley thicket) in the river valleys and indigenous forest in the mountain zone. There are some invasions of black and silver wattle throughout the area with the largest concentrations in the Upper Keiskammahoek and Tyume catchments. Exotic weeds are also found in all riparian vegetation.

Nkonkobe Municipality’s landscape is extremely diverse largely being characterized by well watered, green vegetations with some predominant acacia bush vegetation type, capable of

supporting livestock and limited rain fed cultivation (Water Research Commission, 2005). Fort Beaufort, Seymour and Balfour area's social make-up encompasses an important commercial export citrus industry, stock farming and rural communities (Amathole District Municipality, 2006). Fort Beaufort is the citrus hub in the district. Generally, Nkonkobe like the rest of Eastern Cape is characterised by poor shallow soils, which are not conducive for intensive farming (Nel and Davies, 1999). However, there are various agricultural activities including citrus farming, beef and dairy production. A subsistence agricultural sector, emerging commercial citrus farmers and irrigation schemes, especially in Kat River Valley, characterise the municipality (SA Routes, Bookings and Info Systems, 2005). In terms of resources, there is high potential for agriculture (in some areas), forestry and tourism in Nkonkobe Municipality. However, these resources have not been fully exploited to the benefit of the Municipality (Nkonkobe Municipality, 2004).

3.2.5 Infrastructure

Infrastructure available include roads, fence, dipping tanks, Packing shed, broiler or egg layer structure, piggery structures milking parlour, handling facilities for animal handling purposes of animals and store rooms for chemicals and feed used by respondents. Roads are not in worse conditions, thus access to many villages and nearby villages and towns is not a setback. According to Ntsonto (2005), the Agricultural Development Trust buildings in Zanyokwe are in a state of disrepair. The building infrastructure is collapsing because support and care have since been withdrawn. This is evidenced by broken doors, defaced walls and smashed windows. The irrigation scheme is served by Sandile Dam, which is one of the three main dams on Keiskamma River and the main water storage. Sandile Dam is owned by DWAF and supplies water to Middledrift, Dimbaza and the surrounding rural villages. The irrigated land consists of a piped irrigation system with valve chambers and ancillary pipes (Yokwe, 2005). The Amatole Water Board, on behalf of DWAF, has the responsibility of maintaining the pipelines (Monde *et al.*, 2005). However, with the irrigation infrastructure, a considerable number of equipment is under deterioration and is being rehabilitated (Ntsonto, 2005). This has resulted in some parts of the scheme not receiving adequate water.

The notable infrastructure that exists is seen in key agricultural projects that exist in Keiskammahoek such as the irrigation schemes namely Keiskammahoek, Zanyokwe and Upper

Gxulu Irrigation Schemes is the irrigation and water supply systems. The water supply system in Keiskammahoek consists of a number of separate schemes. Sandile Dam supplies water to Keiskammahoek and the surrounding villages. Some of the irrigation scheme is served by Sandile Dam, which is one of the three main dams on Keiskamma River and the main water storage. Sandile Dam is owned by DWAF and supplies water to Middledrift, Dimbaza and the surrounding rural villages. The irrigated land consists of a piped irrigation system with valve chambers and ancillary pipes (Yokwe, 2005). According to the Department of Water Affairs and Forestry (DWAF, undated), these schemes are in a state of disrepair, but new efforts are being made to rehabilitate the schemes either partially or wholly through poverty alleviation schemes supported by DWAF, the Provincial Department of Agriculture (PDoA), and the Amatole District Municipality (ADM).

3.2.6 Agricultural potential of the study areas

The Keiskammahoek generally represent low rainfall patterns and soils generally tend to be shallow (less than 1m in depth), poorly drained, highly erodible, poor quality and inherently low fertility (Van Averbek *et al.*, 1997). Crop farming is under irrigation to supplement the low rainfall. In Keiskammahoek district, the major part of the land type comprises steeply sloping mountainous areas with a high rainfall making it suitable for forestation and grazing, as is the case in the Amatola and Winterburg land types (Taylor, 1999). The river valleys have a fair potential for dryland production of grain sorghums, soya beans, groundnuts and sunflowers. The production of maize is risky due to the high water deficit in January. The area has a relatively high potential for irrigation on the existing schemes and those, which are currently being developed (Marais *et al.*, 1975). Keiskammahoek are has great potential for investment in the production of fresh vegetables through the irrigation schemes. Furthermore the area has great potential milk production through investing in the establishment of the dairy schemes. The area is currently producing below it has a great potential for agricultural productivity by the smallholder farmers.

As mentioned before, some areas of Nkonkobe Municipality has a high potential for agriculture. The agricultural sector contributes only 17 percent towards the municipality's GDP (Nkonkobe Municipality, 2004). However, there are various agricultural activities including citrus farming,

beef and dairy production, in some parts of the Municipality such as the Kat River Valley. Farming in Kat River Valley is supported by the availability of natural assets such as favourable soils and adequate water supply. The Kat River Valley is the main source of water to perform the agricultural activities. Agriculture activities are also facilitated by the terraced basin topography and foot slope bottom lands enclosed by the steep mountain slopes (Water Research Commission, 2003). Rainfall on the high ground is around 1000 mm per annum whereas it is much lower in the valley bottom (600 mm) and can only support limited rainfed cultivation (Water Research Commission, 2003).

The predominant vegetation type is acacia bush capable of sustaining livestock farming and some pockets of mountain forest on the high ground of the Valley (Water Research Commission, 2003). Because of the Kat River Valley potential, smallholder agriculture and emerging commercial citrus farmers characterise the Valley (SA Routes, Bookings and Info Systems, 2005). Citrus farming involves emerging and commercial farmers practicing mainly for export purposes (Water Research Commission, 2003). Crop and livestock production is mainly practiced by small-scale communal farmers. There is also game farming in the Valley (Situational analysis) such as Double Drift Game Reserve and. Nevertheless, despite the agricultural potential, the valley is characterized by a series of impediments which include lack of title deeds for land inhabited. Due to the inconsistent climatic conditions compounded by poor grazing practices, the Valley has experienced land degradation in the form of sheet, gully and donga erosion on the foot slope areas (Water Research Commission, 2005). Despite the presence of the Kat dam and communal or yard taps, water supply is unreliable for the majority of the villagers (Water Research Commission, 2005). There are three distinctive farming systems common in Nkonkobe municipality. These are village farming where cattle are grazed on communal land while households own a piece of land for arable production; white-owned large scale commercial citrus farms, with increasing involvement in game farming and medium sized, former-government owned, citrus farms, now mainly owned by black emerging farmers producing for commercial sale (Nkonkobe Local Municipality, 2007).

All three parties face short term and long-term viability problems inherent to institutional constraints that influence the farmers' agricultural production and marketing. It is therefore of

interest to examine the effects of institutional constraints on the agricultural economical performance of the farmers. Farming or agronomical potential of the study area is high, but limited by availability of arable land due to steep slopes and hilly areas surrounding the study area with altitude ranging from 550 mm - 1.680 mm with fertile soils (Motteux, 2001). As mentioned before, some areas of Nkonkobe Municipality have a high potential for agriculture.

The agricultural sector contributes only 17 percent towards the municipality's GDP (Nkonkobe Municipality, 2004). However, there are various agricultural activities including citrus farming, beef and dairy production, in some parts of the Municipality such as the Kat River Valley. Farming in Kat River Valley is supported by the availability of natural assets such as favourable soils and adequate water supply. The Kat River Valley is the main source of water to perform the agricultural activities. The predominant vegetation type is acacia bush capable of sustaining livestock farming and some pockets of mountain forest on the high ground of the valley (Water Research Commission, 2003). Because of the Kat River Valley potential, small-scale production dominates and there is a great potential for investment by smallholder farmers thus enhance agricultural productivity by the smallholder farmers.

3.2.7 Economic activities

3.2.7.1 Economic activities in Keiskammahoek area

Keiskammahoek, Zanyokwe and Upper Gxulu Irrigation Schemes are economically deprived (DWAF, undated). The only formal industrial complex is found in the sub-area at Dimbaza. The area was established under the previous government's homelands policy to attract industries to the former Ciskei. Economic related activities are mainly based on agricultural activities. In Keiskammahoek the main agricultural activities include the cultivation of pineapples, oranges and commercial forestry. Rehabilitation of the irrigation scheme in Keiskammahoek is seen as the main catalyst for economic growth in this area. In the Upper Gxulu Irrigation Scheme, farmers produce field crops such as maize and vegetables (potatoes, pumpkins, butternut, dry beans, cabbages, tomatoes, spinach, beetroot, carrot, onion and green pepper (Zwelendaba, 2013). A study conducted by Monde *et al.*, (2005) established that most of the farmers in the Zanyokwe Irrigation Scheme produce mostly for marketing purposes as they sell about 80% of their produce and only consume the remaining 20%. However, the majority of the farming

households in the study area can be described as low-income and resource-poor (Monde *et al.*, 2005).

Employment opportunities in the former Ciskei are limited to government or government-sponsored projects, and foreign owned factories. Most factories found in the Amatole District (surrounding towns) of Keiskammahoek and Zanyokwe Irrigation Schemes are neither economically viable nor legally compliant entities in terms of labor practice (Qayi, 2010). Most of these factories and economic projects are scattered in small towns situated mainly in the Black townships of Dimbaza, Berlin, Sada and Zwelitsha. In Keiskammahoek, despite the lack of an industry based economy, there is a furniture manufacturing factory in the area due to existing forestry plantations.

3.2.7.2 Economic activities in Nkonkobe Municipality

The socio- economic profile of Nkonkobe Municipality reflects the historical legacy of the apartheid system. The municipal area is characterised by high levels of unemployment, while the educational profile also fit well within framework of the apartheid era in which black people were confined to the lowest levels of education. Nkonkobe Municipality is characterised by a series of impediments to human welfare due to high unemployment levels (Nel and Davies, 1999). The situation is made worse by the presence of low industrial activities (Nel and Davies, 1999). Amongst these obstacles are a high poverty rate resulting from high unemployment rate, low income and lack of basic skills required to spur local economic development, inadequate infrastructure and social services, low agricultural productivity, high dependence on government grants and inadequate and inefficient income generation strategies to improve the economic base of the municipality (Nkonkobe Municipality, 2004). De Wet (1993), as cited by Nel and Davies (1999), says income derived from agriculture does not exceed 10% of the average rural income. Many rural people rely on gifts, state pensions and migrant labour remittances for household survival (Nel and Davies, 1999).

Kat River Valley, like the rest of Nkonkobe, is generally considered as a low-income area (Nel and Davies, 1999). In this respect, a situational analysis of the area reflects that there is no noteworthy industrial or mining sector and the area is largely rural. The valley lacks basic services such as electricity (by 45 percent), flush toilets (60 percent), and cell phones (10

percent). Mujikanovic (2005), citing Farolfi and Jacobs (2005), indicates that the situation is aggravated by high levels of illiteracy and unemployment (80 percent unemployment). However, many of the valley inhabitants see agriculture as the dominant economic activity.

3.4 Land tenure systems in the study areas

The study areas are characterised by different tenure systems. In the Keiskammahoek area, the prominent land tenure systems include freehold, commonhold and quitrent tenure systems. Under freehold tenure, the most common tenure system is the inherited tribal lands. In addition to this in Keiskammahoek, the most common tenure form is the communal tenure where land is divided into three main uses namely residential land, arable and communal grazing land (Nyubatyha, 2013). Under this land tenure form, land rights are written under a record called the Permission to Occupy, a certificate issued under the Bantu Areas Land Regulation (Proclamation R188 of 1969), which drew its legal authority from the 1936 Native Trust and Land Act (Lahiff, 2000). In the Nkonkobe similar land tenure patterns do exist although they are slight different in certain areas. As indicated earlier on that Nkonkobe Municipality is made of Alice, Balfour, Fort Beaufort, Middeldrift and Seymour areas. The Kat River Valley area, the land tenure system included freehold, leasehold. In Alice and Middeldrift areas the dominant tenure form is the communal tenure recorded under the Permission to occupy (Makapela & Kana, 2013).

Although comprehensive data on land issues is unavailable, there is evidence of considerable land tenure insecurity, resulting from numerous land claims. In fact, land claims have been lodged on 129 parcels of land in the Seymour and Alice parts of Nkonkobe, formerly in the Ciskei homelands. There has also been an issue of boundary disputes, particularly in Middeldrift (Nkonkobe Municipality, 2004). Some of the land within the former Ciskei is still state-owned, implying that rural people have no title to their land (Nkonkobe Municipality, 2004). From focus group discussions, it has been learnt that the issuing of title deeds in Kat River Valley is now at an advanced stage (Pote, 2008). The Minister of Agriculture has approved the issuing of title deeds to farmers. The Eastern Cape provincial government has since taken over the task of securing of title deeds upon resolution of existing land claims. The main threat to investment and agricultural productivity is lack of title deeds for farmers and future uncertainty due to a number land claims for lands.

3.5 Summary

The chapter has presented a description on the study sites. It has outlined and explained the population distribution in the areas, the geophysical aspects, land patterns and uses, infrastructure and economic activities in the study areas. Physical aspects such as agro-ecological characteristics (climate, soils and vegetation types) and socio-economic and agricultural production or economy of the study areas reflected the relevance of the types of farming activities, crops and livestock farming and rain-fed maize farming. Lastly an overview of land tenure systems in the study area was discussed. This has provided an understanding of the characteristics of the study areas that are important in the interpretation s of the research outcomes from this study.

CHAPTER FOUR

RESEARCH METHODOLOGY

4.0 Introduction

This chapter presents the research methodologies applied in the evaluation of the effects of land tenure security on-farm investment and productivity of the smallholder farmers. It also describes research design, the sampling method employed, data collection, and research design and data analysis.

4.1 Research Design

The study was conducted in the Amathole District Municipality in the Eastern Cape Province. The farmers were drawn from the following areas Alice, Balfour, Fort Beaufort, Keiskammahoek and Middledrift. All the smallholder farmers were interviewed individually and were drawn from Alice (25), Fort Beaufort (8), Keiskammahoek (21) and Middledrift (26). These areas were purposively selected because of their agricultural potential, farming systems, (smallholder farming i.e. crop production), land tenure systems, geo-climatic and soil characteristics.

This study employed a cross-sectional research design. Data was collected at one point in time on several variables such as demographics, household socio-economic factors, land tenure security effects, investment and productivity of the smallholder farmers. Only a subset to represent the population thereof was selected. Both qualitative and quantitative data was gathered on demographics, household socio-economic factors, land tenure security effects, investment and productivity of the smallholder farmers.

4.2 Units of analysis

According to Trochim, (2006), the unit of analysis is the major entity that is analyzed in a study. It could be any of the following: individuals, groups, artifacts (books, photos, newspapers), geographical units (town, census tract, state), and social interactions. In this study, individual smallholder farmers who were involved in both crop and livestock production were the units of analysis and provided primary data. These farmers were drawn from the Amathole District in areas such as Alice, Fort Beaufort, Keiskammahoek and Middledrift. The data was collected

from them using a formal survey. A structured questionnaire was used and administered in person. The respondents for the study was the head of households who were directly involved in the farming activities.

4.3 Sampling Procedure

Not all the smallholder farmers in the study area were selected for the study, but a suitable sample was drawn. For the sample to best represent the total population, a complete sampling frame must be used. Bless and Smith (2000) defines a sampling frame as a list of all units from which a sample is to be drawn. In this study, active smallholder farmers who were currently involved in both crops & livestock production that held their lands under different forms of tenure systems e.g. freehold, quitrent, leasehold and communal tenure that exists in the study areas as mentioned above were selected based on their willingness to participate. However the investigation of the study included farmers who were involved in both crop and livestock since the smallholders were involved in mixed agriculture as informed by the existing farming systems.

Sampling is a process of selecting units from a population of interest, so that by studying the sample, the results obtained from the sample may be generalized to the population from which the sample had been chosen (Leedy & Ormrod, 2004). This means that, the characteristics obtained from the sample should reflect approximately the same characteristics as the population. Possible sampling methods are classified into probability and non-probability sampling methods. The probability sampling occurs when the probability of including each element of the population can be determined and when the population list is available whereas the non-probability sampling method refers to cases where the probability of including each element of the population in a sample is unknown (Bless *et al.*, 2006). When a complete population list is available probability sampling is preferable but when it is not available non-probability sampling is more suitable.

In this study, non probability sampling method was used to sample the farmers for three reasons; firstly a complete population list of the study population was not available, secondly, the study focus on unknown respondents who might or might not be willing to be interviewed, thirdly,

because of the limited budget and time constraints. Bless & Smith (2000), define non – probability sampling as a situation in which the probability of including each element of the population in a sample is unknown. In this study, farmers were categorized into groups inline with the different forms of land tenure systems that exist in the study area i.e. freehold, quitrent, leasehold and communal tenure systems. However this was depended on the representation of each form of land tenure system, for an example each form of land tenure system should have at least a minimum of 30 farmers or more to be included in the study. These forms of tenure systems were used to stratify the smallholder farmers accordingly. This enabled the researcher to do a comparative analysis of the on-farm investment and on-farm productivity of individual farmers in the study areas. For the purpose of this study, the different forms of land tenure systems that exist in the study area are defined and explained in detail in chapter two i.e. the literature review.

4.4 Sampling size

When sampling, it is important to deal with an adequate sample size in order to collect accurate information about a group (Bless & Higson, 1995). A large sample is more representative but very costly, while a small sample is less accurate but more convenient (Singh & Chaudhary, 1986). In total a sample of about 200 farmers across all study sites was targeted and this was in line with different forms of land tenure systems that are found in the study area. In order to come up more accurate and reliable results or findings, it was expected to target at least a minimum of 50 smallholder farmers under each land tenure system. Although the farmers were informed and prearrangements were made but only few farmers were available for the interview during the data collection exercise. As a result of this only 80 smallholder farmers were available for the interview during the data collection exercise. Table 4.1 shows the number of sampled respondents from the study areas in relation to land tenure systems.

Table 4.1 Sampled respondents from the study areas in relation to land tenure system

Land tenure system	Nkonkobe		Keiskammahoek		Total
	No	%	No	%	%
Freehold	41	51	12	15	66
Communal	15	19	8	10	29

Leasehold	3	4	1	1	5
Total	59	74	21	26	100

4.5 Research design

This study employed a cross-sectional research design. The data was collected at one point in time on several variables such as demographics, household socio-economic factors, investment and productivity data, different forms of tenure systems, access to land, employment sources, sources of income, access to credit in the study area. Both qualitative and quantitative data was gathered on demographics, household socio-economic factors, and investment and productivity data, different forms of land tenure systems, access to land (arable and grazing land), size of land (arable and grazing), access to credit, access to production inputs, access to farm implements, access to grazing land, access to markets, access to extension services, farming experience, membership to farmer organisations and irrigation. The study was carried out in two phases: orientation and a survey.

4.5.1 The orientation stage

The orientation stage involved a visit to the study area in 2013. During this phase, informal discussions with project participants (farmers) were done. The main objectives of the study were outlined to the farmers through assistance of the extension officers. The aim of this phase was to familiarize the researcher with the study area, and to preliminarily interact with farmers to identify key issues and where possible do some direct observations.

4.5.2 The survey

The second stage was the actual survey being conducted whereby data was collected. A structured questionnaire will be developed as a data collection instrument or tool. The farmers will be then interviewed individually. A structured questionnaire was used to interview respondents for the study so as to standardize the order in which questions were asked to respondents, and to ensure that questions were answered within the same context.

4.6 Data collection

In order to achieve the objectives of the study, both primary and secondary data were used. Secondary data was used for the description of the study area, literature review and background information.

4.6.1 Primary data

Structured, interviewer-administered questionnaires were used to acquire information. The questionnaire was interviewer-administered so as to alleviate misinterpretations or misunderstandings of words or questions. Structured interviews standardize the order in which questions are asked, so the questions are always answered within the same context (Kvale, 1996). Interviewer-administered questionnaires also ensure that information can be obtained from illiterate respondents (Levy & Lemeshow, 1991). The questionnaire consisted of both open ended and closed questions. Open ended questions are important as they allow respondents to freely express their views. Most of the questions had closed end to make the coding of responses easier and to extract as much information as possible from the respondents without taking too much of their time. All the farmers were interviewed individually.

4.6.2 Collected data

At the beginning of each questionnaire, factual questions such as the respondent's background and related demographic data such as gender, educational level, marital status and age were asked. This section was followed by socio-economic questions related to effects of land tenure security on-farm investment and on-farm productivity of the smallholder farmers. The questionnaire generated data were used to assess the relationship between land tenure security and on-farm investment and on-farm productivity of these farmers. The data collected included land tenure security, age, gender, household size, household income, educational levels, farm size, access to credit, access to production inputs, access to farm implements, access to grazing land and access to markets, access to extension services, farming experience, membership to farmer organisations and irrigation and improvements and investment . Table 4.1 summarizes the variables likely to influence on-farm investment and on-farm productivity of smallholder farmers.

Table 4.2 Summary of the variables that were collected

Variable	Description
Land tenure security	Degree of confidence held by people that they will not arbitrarily deprived of the land rights enjoyed and /or economic benefits derived from those rights. (Measured by security of rights based on the individual land tenure system e.g. freehold, leasehold and communalhold).
Age of the head of household	Years of household head.
Gender	Whether household head is male/female to ascertain whether it has any bearing towards on-farm investment & productivity.
Household size	Number of people living together in one household (house).
Household income	Household income levels to ascertain whether it has any bearing towards on-farm investment & productivity.
Educational levels	Total number of years into formal education.
Farm size	Total size of the farm (ha).
Access to credit	Household access to credit to determine if it has an influence on household decision to do improvements and investment resulting in increased productivity.
Access to production inputs	Access to seeds, fertilizers, herbicides, pesticides to determine if they have influence on on-farm investment & on-farm productivity.
Access to farm implements	Refers to agricultural implements used by farmers during production process, for example ploughs, harrows, disc, cultivator and others.
Access to grazing land	Proportion of land used for grazing animals.
Access to markets	Availability of places, opportunities and buyers to sell produce of the smallholder farmers.

Access to extension services	Farmer access to extension services.
Farming experience	Number of years of farming.
Membership to farmer organisations	Member to any farming organisation either cooperative, association or commodity group.
Irrigation	Access to irrigation water and infrastructure.
Improvements and investments	Upgrading and renovations of existing infrastructure and acquiring of new capital assets and equipment.

4.6.3 Secondary data

Secondary data were obtained from the following sources Department of Agriculture, Forestry and Fisheries, Department of Rural Development and Agrarian Reform, Statistics South Africa. In addition to this library based research was conducted in order to explore what other research has been done in the same field. Sources of such information included journals, books, internet and government documents.

4.7 Data analysis

After collecting data, it was captured and encoded in the form of spreadsheets in Microsoft Excel exported to Statistical Package for Social Science (SPSS) software. The study used graphs, tables (including cross-tables) and descriptive statistics (mean, frequency and percentages) to analyse data. Descriptive statistics were also be used for the interpretation of household demographics and socio-economic variables that are likely to influence on-farm investment and on farm productivity of the smallholder farmers. Interpretive analysis, simple statistics, tables, pie charts and graphs were also used. Interpretive analysis provides intensive descriptions of characteristics, processes, transactions and context that constitutes the phenomenon being studied (Durrheim & Terre Blanche, 2006). Descriptive statistics was used to address objectives 1, 2 and 3 whilst empirical analysis was used to answer objectives 4, 5 and 6.

More advance quantitative techniques were used e.g. multiple regression analysis. Multiple regression analysis was be used to analyse the data and explain the relationship between several independent variables and dependent variables. These techniques were to present the results on

the relationship between security of tenure, on farm investment and on-farm productivity of the smallholder farmers. Data were entered and analyzed using excel in Microsoft office and also statistical computer software program SPSS (Statistical Package for Social Sciences) version 20.0. In addition to this, two models were formulated i.e. on-farm investment and on-farm productivity models in order to test the influence of independent variables (socio-economic factors) on dependent variables i.e. on-farm investment and on-farm productivity.

4.7.1 On-farm investment model

It has been found that improvements enhance the productive capacity of the land and make it possible to maintain the productive capacity by preventing degradation of resources. Based on the literature it has been found that besides land tenure security there are other factors that influence on-farm investment. The investment decisions by the smallholder farmers are largely conditioned by the expected returns on investment. These returns are largely influenced by the socio-economic factors such as land tenure security, age, gender, household size, household income, educational levels, farm size, access to credit, access to production inputs, access to farm implements, access to grazing land and access to markets. The following model was adopted from Kille (1993) and Mjonono (2001). The on-farm investment model is specified as follows in equation 1:

$$I_i = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \beta_9 X_9 + \dots + \beta_{12} X_{12} + \dots + \mu_i \quad (1).$$

Where:

I_i = Value of improvements made in the farm,

X = a matrix of designed of socio-economic factors influencing on-farm investment, (Examples of these factors are mentioned in section 4.7.1 above)

β is a parameter to be estimated,

ϵ is a stochastic error term.

4.7.2 On-farm productivity model

Productivity measures the increase in outputs that are not accounted for by the growth in production inputs and this is a closely monitored economic performance indicator because of its contribution to healthy and thriving economy (Eze *et al.*, 2011). According to

Eze *et al.*, (2011) increased productivity can result into increased farm income in a short term whilst in the long term more farmers can adopt more productive inputs and practices. However, this might lead to increased output supply and possible lowering of farm output prices and farm income. According to Mundlak (2007) the output is usually measured as market values of the final output whilst at the same time it can be measured by Total Factor Productivity (TFP). In this case, the TFP approach was used to measure the productivity of the smallholder farmers. Several factors have been identified in the literature as the most important sources of productivity change in agriculture. These factors include a number of socio-economic factors such as land tenure security, age, gender, household size, household income, educational levels, farm size, access to credit, access to production inputs, access to farm implements, access to grazing land and access to markets, access to extension services, farming experience, membership to farmer organisations and irrigation. The anticipated level of output by smallholder farmers after an investment has been done was used as a proxy for farm productivity. The following on-farm productivity model was adopted from Kille (1993) and Mjonono (2001); Dlamini & Masuku, (2011) and Eze *et al.*, (2011). The on-farm productivity model is specified as follows in equation 2:

$$AP_i = \beta_0 + \beta_1 Z_1 + \beta_2 Z_2 + \beta_3 Z_3 + \beta_4 Z_4 + \beta_5 Z_5 + \beta_6 Z_6 + \beta_7 Z_7 + \beta_8 Z_8 + \beta_9 Z_9 + \dots + \beta_{17} Z_{17} + \dots \mu_1 (2).$$

Where:

AP_i = Productivity post on-farm investment,

Z = a matrix of designed of socio-economic factors influencing on-farm productivity, (Examples of these factors are mentioned in section 4.7.2 above)

β is a parameter to be estimated,

ε is a stochastic error term.

4.7.3 Multiple regression model

The previously explained on-farm investment and on-farm productivity models employed a multiple regression model. Gujarati (1992) defined multiple regression model as a statistical technique that allows the prediction of scores of a dependent variable on the basis of scores on several other variables (independent variables). A multiple regression model is important

because it tests whether a dependent variable in this case (**I**) and (**AP**) is related to more than one independent variable for example: $X_1, X_2, X_3, \dots, X_n$ and $Z_1, Z_2, Z_3, \dots, Z_n$) respectively. This model is an important statistical analysis tool in most fields because of its power and flexibility (Gujarati, 1992) as cited by Sibanda (2012). The literature revealed that multiple regression analysis can be used to predict a dependent variable based on more than one independent variable. The researcher chooses this model because it allows one to predict the impact of independent variables on a dependent variable. In order to explain the relationship between several independent variables and a dependent variable, the study will use multiple regression model. Multiple regression analysis refers to a group of techniques which allow for measurement of the degree of relationship between a dependent variable and independent variables (Rigney and Associates, undated). The multiple regression allows the simultaneous testing and modeling of multiple independent variables. Partial regression coefficients (such as beta values $\beta_1, \beta_2, \beta_3, \dots, \beta_n$) will also be obtained and these measure how strongly each independent variable influences the dependent variables (**I**) and (**AP**). Thus, the higher the beta value the greater the impact of the independent variable on the dependent variables (Gujarati, 1992). In this study, the first dependent variable is (**I**) is on-farm investment, and the independent variables which are ($X_1, X_2, X_3, X_4, X_5, X_6, X_7, X_8, X_9, \dots, X_{12}$) which include socio-economic factors. In this case β will be a parameter (regression coefficient) of socio-economic factors. The socio-economic factors include land tenure security, age, gender, household size, household income, educational levels, farm size, access to credit, access to production inputs, access to farm implements, access to grazing land and access to markets.

$$I_i = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \beta_9 X_9 + \dots + \beta_{12} X_{12} + \dots + \mu_1 \quad (1).$$

Where:

I_i = Value of improvements made in the farm,

X = a matrix of designed of socio-economic factors influencing on-farm investment,

β is a parameter to be estimated,

ϵ is a stochastic error term.

By fitting the variables into the on-farm investment model, it will be presented as shown in equation 1:

$$I = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \beta_9 X_9 + \dots + \beta_{12} X_{12} + U.$$

I_i = Value of improvements made in the farm.

Where:

I = Value of improvements made in the farm

X_1 = Land tenure security (LTS)

X_2 = Age (AGE)

X_3 = Gender (GEN)

X_4 = Household size (HHS)

X_5 = Household income (HHI)

X_6 = Educational levels (EDCL)

X_7 = Farm size (FS)

X_8 = Access to credit (ACR)

X_9 = Access to production inputs (API)

X_{10} = Access to farm implements (AFI)

X_{11} = Access to grazing land (AGL)

X_{12} = Access to markets (AM)

U = Error term,

β_0 = the intercept and

β is the partial regression coefficient

The second dependent variable is on-farm productivity (AP) i.e. agricultural productivity and the independent variables which are ($Z_1, Z_2, Z_3, Z_4, Z_5, Z_6, Z_7, Z_8, Z_9, \dots, Z_{17}$) include socio-economic factors. In this case β will be a parameter (regression coefficient) of socio-economic factors. The socio-economic factors include land tenure security, age, gender, household size, household income, educational levels, farm size, access to credit, access to production inputs, access to farm implements, access to grazing land and access to markets, access to extension services, farming experience, membership to farmer organisations and irrigation.

$$AP_i = \beta_0 + \beta_1 Z_1 + \beta_2 Z_2 + \beta_3 Z_3 + \beta_4 Z_4 + \beta_5 Z_5 + \beta_6 Z_6 + \beta_7 Z_7 + \beta_8 Z_8 + \beta_9 Z_9 + \dots + \beta_{17} Z_{17} + \dots + \mu_1 (2).$$

Where:

AP_i = Productivity post on-farm investment,

Z = a matrix of designed of socio-economic factors influencing on-farm productivity,

β is a parameter to be estimated,

ε is a stochastic error term.

By fitting the variables into the on-farm productivity model, it will be presented as shown in equation 2:

$$AP_i = \beta_0 + \beta_1 Z_1 + \beta_2 Z_2 + \beta_3 Z_3 + \beta_4 Z_4 + \beta_5 Z_5 + \beta_6 Z_6 + \beta_7 Z_7 + \beta_8 Z_8 + \beta_9 Z_9 + \dots + \beta_{17} Z_{17} + \dots \mu_1(2).$$

Where:

AP_i = Productivity post on-farm investment.

Z_1 = Land tenure security

Z_2 = Investment

Z_3 = Age

Z_4 = Gender

Z_5 = Household size (Family size)

Z_6 = Household income (HHI) (includes both off farm and on farm income)

Z_7 = Educational levels (EDCL)

Z_8 = Farm size (FS)

Z_9 = Access to credit (ACR)

Z_{10} = Access to production inputs (API)

Z_{11} = Access to farm implements (AFI)

Z_{12} = Access to grazing land (AGL)

Z_{13} = Access to markets (AM)

Z_{14} = Access to extension services (AES)

Z_{15} = Farming experience (FEX)

Z_{16} = Membership to farmer organisations (MFO)

Z_{17} = Irrigation (IRR)

U = Error term,

β_0 = the intercept and

β is the partial regression coefficient

4.7.3.1 Expected regression outcomes on-farm investment model

Factors which influence the on-farm investment by the smallholder farmers were analysed using the multiple regression model. Table 4.3 shows variables used in the regression model and the expected outcomes.

Table 4.3 Variables used in the on-farm investment model

Independent variables	Type of measurement	Priori expectations (+/-)
Land tenure system	Categorical	-
Age	Continuous	+/-
Gender	Dummy	+/-
Household size	Continuous	+/-
Household income	Continuous	+
Educational level	Continuous	+
Farm size	Continuous	+
Access to credit	Dummy	+
Access to production inputs	Dummy	+
Access to farm implements	Dummy	+
Access to grazing land	Dummy	+
Access to markets	Dummy	+

(+/-) Expected outcome direction of the variable based on literature.

4.7.3.2 Explanatory variables and a priori expectations

This section explains the variables and the expected outcome directions based on literature. The explanatory variables explained here are thought to have influence on the on-farm investment. These include household's demographic variables and socio-economic variables. These explanatory variables are defined as follows:

4.7.3.2.1 Land tenure security

Earlier on it has been stated that land tenure security improves on-farm investment and improvements. Secure property rights are expected to encourage greater on-farm investment by enhancing the incentive to invest on by improving access to credit (Feder, 1987). Investment also

requires exclusive use rights otherwise the benefits of any investment in the land are not internalized. It was expected then to see all respondents with secure tenure made improvements on their land. The less certain property rights are, the higher the discount rate for future returns, the lower the value of all investment on the land and the smaller the volume of investment undertaken.

Diminished uncertainty about future access to land positively influences a farmer's decision to invest time, effort and capital into long term improvements on the farm which may enhance the productive capacity of land (e.g. fencing, irrigation and improved pastures) or maintain present productive capacity (e.g. conservation). Evidence from Thailand indicates that possession of secure property rights has a significant effect on investment in on-farm improvements (Feder and Onchan, 1987). Massell and Johnson (1966) found that in the former Purchase Areas of Zimbabwe, who had individual land titles, invested more money and effort into their land than farmers in communal areas. Based on the literature it is expected that land tenure security will negatively influence on-farm investment.

4.7.3.2.2 Age

Age of the household head is an important variable because it determines experience one has in a certain type of farming. A measure of work experience as age is highly correlated with experience (Feder, 1987). Managers with more experience would have accumulated more wealth and experience and therefore in a better position to make improvements. Thus, older farmers are believed to be more experienced compared to younger farmers. Household head's experience further influences household members' farming activities since they usually get guidance from the head.

However on the side, older people might be lazy to invest more due to old age and physical capability whilst younger farmers would still have lot of energy and more years to invest in the farm. In addition to this older farmers are likely to suffer from health conditions that are associated with older people. Based on literature the influence of age on-farm investment by the smallholder farmers can either be positive or negative depending on the age and experience of

the farmer. In the case of the smallholder farmers it is expected that age will negatively influence on-farm investment.

4.7.3.2.3 Gender

The gender variable is a categorical variable where 1 represents male and 0 represent female. It is expected to influence the perception of farmers since it is normally believed that male farmers are more engaged in farming activities than female farmers and are more likely to invest in improvements. The gender of the household head is important as it influences the ability of the household to source income. Gender also influences access to assets such as land and capital that have a direct bearing on-farm investment thus resulting in more improved agricultural productivity. The general notion is that most households in rural areas are headed by females due to male migration to urban areas. This will obviously have serious implications for household's participation in key rural economic activities. It is there expected that gender will have either a positive or negative influence on-farm investment by the smallholder farmers.

4.7.3.2.4 Household size

Household size is treated as a continuous variable and is expected to influence on-farm investment by the smallholder farmers positively or negatively. A larger family size means that a variety of labour capacity is available in the form of young, middle aged and elderly members used for production and more people will be engaged in the farming. This variable was measured by the actual number of people who stay together in a particular household and subjected to the decision making of the household head in respect to contributing to the labour supply and sharing in the rewards of the farming activities. A hypothesis that is testable is that the larger households are more likely to have more available labour than smaller households as they can do division of labour than their counterparts.

On the other hand, the larger the household size the more likely is the household to come under pressure to make more land available for residential houses and that may lead to negative relationship with on farm investment by the smallholder farmers. Similarly, although a larger family size puts extra pressure on farm income for food and clothing and other household necessities, it most certainly ensures availability of enough family labour for the labour-intensive

farm operations to be performed when necessary and without the family's direct cash commitment (Parikh *et al.*, 1995). Therefore, household size is expected to have a positive influence on-farm investment as there would be more labour to execute the farming activities.

4.7.3.2.5 Household income

The variable reflecting total income is a continuous variable, and was measured in rand. Household income measures relative material well-being and it illustrates the degree of dependence on farm and non-farm resources (Bembridge, 1987). But the precision of the data on household income is doubtful because of the reluctance of many farmers to provide all the information required to compute comprehensive income statistics. During data collection each component of income was considered. But, household income is derived from various sources that are rarely recorded (Galang, 2002). Sources of income for the purposes of this study household income were calculated on the basis of a summation of all sources of income, including on farm and off income. Most South African households, particularly in the rural areas, are poverty stricken (Rwelamira *et al.*, 2000). Household income can influence its decision on purchasing seed inputs because the purchasing frequency and purchasing power of smallholder farmers is low since they are poor (Pixley and Banziger, 2001). It was expected that the more income a household have, the more the probability of that household will investing in the farm.

4.7.3.2.6 Educational levels

According to Bembridge (1984), education is very important in the decision-making process with important practical implications for resource allocation decisions and adoption of improved practices. Education is important to farmers because it determines the ability of a farmer to adjust to new innovations. Education catalyses the process of information flow and leads the farmers to explore as wide as possible, the different pathways of getting information about agriculture and technology (Berry, undated). People with more education are likely to be better informed and are likely to interpret information more correctly than the uneducated. Particularly in a study where farmers' perception is a central element, education level of the respondent will be an important consideration because the ability of the farmers to perceive the advantages and to efficiently utilise new technology is often measured by education as well as farming experience and exposure to extension services.

Illiteracy has been noted as one of the factors that limit the extent to which households adopt practices designed to improve their livelihoods and the attitude towards on farm investment is most likely to be among such practices where decision may be strongly influenced by perceptions one way or the other. Educational considerations generally influence the adoption by new behaviour of farmers. (Ghosh *et al.*, 2000). According to Mather and Adelzadeh (1998) households who achieved a higher level of education have higher chances of being more informed because they can read and are more able to interpret information than those who have less education or no education at all. Thus, education levels affect economic decisions made by farmers, especially those related to marketing of produce. The educational level of a farmer is expected to positively influence on-farm investment by the smallholder farmers.

4.7.3.2.7 Farm size

The variable reflecting the farm size is a continuous variable, and was measured in hectares. It was expected to positively influence on-farm investment by the smallholder farmers because more land is usually associated with more crop production and greater access to more grazing land. In that case, larger land sizes will be expected to provide larger numbers of livestock units. It is therefore hypothesized that the larger the size of land the more on-farm investment takes place and the greater the chances of obtaining more improved productivity.

Farm size is greatly influenced by the system of land tenure prevalent in the area. Large scale cropping and animal production are difficult without sufficient land (Eze *et al.*, 2011). With rapid population growth and enforcement of land tenure systems, fragmentation of land becomes rampant, which reduces farm size holdings and thus reduce agricultural productivity. Land tenure problems remain unsolved, and constrain the efforts of the farmers in adopting new innovations and technology. With less adoption of new technologies and innovation it means less investment in improvements. It is therefore expected that farm size will have a positive influence on the on-farm investment.

4.7.3.2.8 Access to credit

Lack of access to finance has long been a major stumbling block for smallholder farmers in the developing world (Pillay, 2002). In South Africa prospective farmers need access to finance but

they lack funding (Sartorius & Kirsten, 2003). According to the Department of Agriculture (1995), most financial institutions, private or public sector, only served a part of the agricultural sector. Smallholder farmers therefore did not previously have access to financial services. The challenge to agricultural financial institutions is to render an effective service determined by demand. Lack of access to finance prevents smallholder farmers from investing in basic inputs, such as seeds, fertilizers and smallholder irrigation essential to raise farm productivity and generate profit (Standard Bank, 2009).

According to a study done by Mpandeli *et al.*, (undated) in Limpopo Province of South Africa indicates that lack of financing of smallholder farmers is still one of the major constraints to smallholder farmers in South Africa. Lack of access to credit has had negative effects in agricultural development in most parts of South Africa (Mpandeli *et al.*, undated). Mpandeli *et al.*, (undated) says although there is availability of credit from institutions, smallholder farmers are finding it increasingly difficult to get access to credit especially women because they often lack access to collateral, which becomes a challenge with the lending agencies in respect to loan repayment. Commercial banks are prepared to lend to creditworthy projects and individuals, where the farmer is certain to reap returns from the project. Also increased tenure security used to purchase inputs or to invest in the development of the crop, banks are reluctant to accept title as collateral unless the land is saleable (Mpandeli *et al.*, undated).

Again it has been difficult and costly to finance smallholder farmers because agriculture is concentrated in rural areas with poor infrastructure and low population densities. Farmers in rural areas are faced with market risks and are also vulnerable to environmental factors such as weather. A combination of all these factors has resulted in lending institutions losing interest in dealing with smallholder farmers. This has resulted in institutions like Land Bank having lost market share of smallholder farmers, which is being taken up by commercial banks (Simbi, 1998). Access to credit is expected to positively influence on-farm investment by the smallholder farmers.

4.7.3.2.9 Access to production inputs

When there are no productive inputs to use, that mean that there will be no agricultural production process taking place. Smallholder farmers use production inputs produce in order to engage in crops and livestock production, it will be difficult for them in the absentia of agricultural productive inputs. In the former homelands access to agricultural support services is a major factor constraining the growth of agriculture. Without adequate access to farming support services, improvement in rural agriculture can hardly be achieved. According to Gilimani (2005) the scarce resources for rural households are cash to purchase inputs and limited seasonal labour. If the smallholder farmers do not have access to production inputs it means they cannot invest more on their lands. Therefore access to production inputs is expected to have a positive relationship in on-farm investment by smallholder farmers.

4.7.3.2.10 Access to farm implements

A successful farmer is likely to be the one who own farm implements or who has access to farm implements e.g. tractor and its tools, irrigation equipment and animal drawn implements (ARDRI, 1999). The farmer is able to perform farm operations at any time instead of waiting e.g. for a tractor while it is busy used by other farmers. Access to agricultural implements may determine the level of investment at the farm thus resulting in improved on-farm productivity (Pote, 2008).

4.7.3.2.11 Access to grazing land

In the rural parts of Eastern Cape, most African communities practice a system of mixed agriculture involving crop production and animal husbandry. The system relies, however more heavily on animal production than on crop production. Livestock farming of communal grazing represents more than four-fifths of the agricultural assets of the farming rural households. Therefore availability of grazing land is vital to the decision of individual community members to maintain livestock enterprises in the first place or decide on making alternative arrangements to accommodate livestock enterprises where such communal grazing is not available. If a household cannot guarantee access to communal grazing land but is still intent on keeping livestock, it may decide to integrate the livestock enterprise with existing crop production in

order to have access to own feed for the livestock. But such inaccessibility may be a reason for abandoning livestock production entirely.

A large number of cattle farmers using smaller areas of arable land can be explained by use of communal grazing land for animal feeding. The use of communal grazing land verifies research by Stroebel (2004), which pointed out that communal grazing areas are important sources of livestock feed among smallholder farmers in many developing countries. In such cases, it is difficult to measure the amount of communal grazing land that is available to each household. This situation leaves less arable land for farming purposes. In addition, most smallholder farmers do not own the land they farm on, even though they have rights to use it (Ngqangweni and Delgado, 2003). Therefore it may be stated that farmers that have access to communal grazing land are less likely to invest than those that with access to freehold or private grazing land.

4.7.3.2.12 Access to markets

Suitable markets are regarded as a motivational factor towards higher production (Bembridge, 1984). Marketing is crucial to accelerating the transition from subsistence farming to the cash economy. As a policy instrument for development, marketing should initially be directed to developing institutions to supply the domestic market, both for final food consumer and agro-industries (Bembridge, 1984). It can be argued that lack of this facility and lack of a clear marketing plan that is understood by the farmers even before production, might lead to the poor performance of the farmer. A successful farmer is likely to be the one who has access to both rural and urban markets (ARDRI, 1999). On one hand a farmer without a secure output market is not likely to investment more in the farm thus resulting in decreased productivity. On the other hand a farmer with secure access to output markets will have incentives to invest more in improvements than those without access to markets. Access to markets is expected to positively influence on-farm investment by the smallholder farmers.

4.7.3.3 Expected regression outcomes on-farm productivity model

Factors which influence the on-farm productivity by the smallholder farmers were analysed using the multiple regression model. Table 4.4 shows variables used in the regression model and the expected outcomes.

Table 4.4 Variables used in the on-farm productivity model

Independent variables	Type of measurement	Priori expectations (+/-)
Land tenure system	Categorical	+/-
Age	Continuous	-
Investment	Continuous	+
Gender	Dummy	+/-
Household size	Continuous	+/-
Household income	Continuous	+
Educational level	Continuous	+
Farm size	Continuous	+
Access to credit	Dummy	+
Access to production inputs	Dummy	+
Access to farm implements	Dummy	+
Access to grazing land	Dummy	+
Access to markets	Dummy	+
Access to extension services	Dummy	+
Farming experience	Continuous	+
Membership to farmer organisations	Dummy	+
Irrigation	Dummy	+

(+/-) Expected outcome direction of the variable based on literature.

4.7.3.4 Explanatory variables and a priori expectations

This section explains the variables and the expected outcome direction based on literature. The explanatory variables explained here are thought to have influence on the on-farm productivity. These include household's demographic variables and socio-economic variables. These explanatory variables are defined as follows:

4.7.3.4.1 Land tenure security

There is no doubt that security of tenure is one of the most crucial factors determining farm development. Amani (2004) defines security of land tenure as the "...the right to use, transfer, exclude or include others in the exercise of such rights, as well as the authority to enforce the

foregoing rights.” Land tenure security directly influences other farming factors such as the inclination and obligation towards resource conservation and improvement of the land (Amani, 2004). Thus, farmers who are land secure are willing to learn and take the essential measures which enhance production and productivity. Amani (2004) further realised that government ownership of land in most developing countries is the source of land insecurity for most smallholder farmers who believe they possess the traditional right of ownership. Without title deeds, farmers find it difficult to develop the land and may lead to negligence of land conservation and sustainability. The climax of land insecurity may in some instances lead to civil conflict. Exclusive and secure land rights are expected to positively influence on-farm productivity by the smallholder farmers.

4.7.3.4.2 Age

The age structure of the farmers could be expected to have an effect on agricultural efficiency (Fraser, 1991). Taylor (1962) in a study of successful and unsuccessful farm families in Alabama found that, the younger farmers and the older farmers make less gross income than do middle aged farmers, those who 40 to 60 years of age. Bembridge (1978) stated that although advancing age may erode physical capabilities, research has indicated that mental capacity has shown little or no deterioration at least up to age of 60 years. With an increase in the age of a farmer, risk aversion increases and adopting new technologies seems less likely (Bonabana-Wabbi, 2002).

Age is a factor that will have an influence on attitude and cultural changes. According to Fraser (1991), the ageing of producers especially in low capital intensive agricultural sectors in developing countries is through to have a lowering effect on the efficiency of agriculture. Research has shown that predominance of old people may restrict social activities and may adversely affect the economic situation of the farm families (Romuld and Sandham, 1996). Older farmers are less likely to accept farm innovations than middle aged and young farmers. This suggests that an increase in the age of the farmer can be considered as a constraint to success of the farmer in farming. This variable is expected to negatively affect the on-farm productivity by the smallholder farmers.

4.7.3.4.3 Gender

Both males and female are likely to play different roles in influencing farm productivity, depending on the nature of the production. Gender difference is one of the factors influencing adoption of new technologies (Mihiretu, 2008). It is a nominal variable and was used as a dummy (1 if male, 0 female). The effect of this variable is indeterminate implying that its influence is not fixed or known in advance. It is expected that male headed household to participate more in farming activities more than female headed household. This expectation is based on Dlova and Fraser (2004) findings that males are physically stronger therefore, are more capable of coping with heavy manual demands of farming practices compared to women. The effect of this variable is indeterminate implying that its influence is not fixed or known in advance.

4.7.3.4.4 Household size

Household size refers to the number of people living together in a household. Household sizes impacts own food production, income and expenditure profile and thus influence livelihood activities (Machingura, 2007). On the other hand, household size determines the availability of labour to be used in the farming activities. In a rural subsistence economy, family size is an important factor in two respects. Firstly, the larger the family the more resources are needed to feed, clothe, house, and educate all members. Secondly, and perhaps a direct view is that the larger the family, the more labour is available to cultivate arable land or work outside the area and send remittances to the family.

Nevertheless, smaller families are necessary to reduce the pressure on land and to ensure a better future for individual. Larger families consequently cause a great burden on such families, which in turn affects their ability to finance farming development (Williams, 1986). A large family number (household size) may mean more family labour available to work on the farm. This reduces the farm's external labour requirements; therefore, as labour accessibility increases, productivity is also expected to increase (Yishak, 2005). In this study, the effect of family size on the on-farm productivity is expected to correlate positively.

4.7.3.4.5 Household income

The amount of money a household has determines the quantity of food a household should have. Individuals have sufficient access to food when they have adequate incomes or other resources to purchase food (Ziervogel *et al.*, 2006). For a household having better or good income will also be able to purchase production inputs so that household can grow or produce its own crop and keep livestock. When a household is in good financial status, that household can even hire people for agricultural production process.

Access to income can affect the probability of a rural household becoming successful in own food production (Dlova and Fraser, 2004). The probability of success in on farming productivity should be directly related access to other sources of income. According to Dlova and Fraser, (2004), those rural households who have access to other sources of incomes made better use of all existing factors of production while households who have access to little alternative income under-utilized some of their factors of production due to inadequate operating capital. Given the low levels of household income, those households will not have the resources or enough resources to engage in high-input agricultural production (Aliber and Hart, 2009).

4.7.3.4.6 Educational levels

Education status may influence one's thinking and behaviour with regards to agricultural activities, and in the context of this study, within the agricultural co-operatives themselves. Education has been regarded as one of the crucial variables in achieving economic growth and agricultural development (Panin, 1999). This therefore suggests that a high level of education for members of an agricultural co-operative leads to agricultural development. Educated farmers are in a position to attend effectively to the challenges that they may face in their co-operatives.

According to Panin (1999), education pushes back cultural prohibitions, widens the scope for decision-making because it broadens a person's idea of the "possible", adds new taste and stimulates motivation. Panin (1999) also concludes that it increases the farmers' inquisitiveness which heightens the discovery of new knowledge concerning the operation of the farm and its unique resources. Respondents' exposure to formal education may increase the farmers' ability to obtain process and use information relevant towards the adoption of new technologies

(Girmachew, 2005). Again, more education is expected to reduce a farmer's information acquisition costs. Therefore, education is expected to have a positive correlation with the on-farm productivity.

4.7.3.4.7 Farm size

The level of farming undertaken relies on the amount of access to land (Matshe, 2009). This means that in order for any farming activity (agricultural production process) to take place, amount and access to land is required. According to Altmann (2009) access to land is often considered as a determinant of people's involvement in agriculture or farming. There cannot be own production and household food security if households do not have access to land (Ankomah, 2001). When a rural household has access to arable land, which means that household can produce food for his or her family. Land area, may be a poor economic (as opposed to geographic) measure of farm size since land is so variable in its agricultural attributes and farms of different types can require vastly different areas of land for the same value of output (Lund and Price, 1983). Total farmers's land holding may serve as a favorable proxy for wealth, status and income levels (Bonabana-Wabbi, 2002). Having more land is likely to have a positive effect on the on-farm productivity by the smallholder farmers.

4.7.3.4.8 Access to credit

Credit is regarded as one of the crucial factors determining the availability of both production and marketing inputs. There is no shortage of literature to prove that credit plays an essential role for acquisition of capital goods (Ahmed *et al.*, 2005; Machethe, 2004; Blackman, 2001), land improvement (Amani, 2004), and to meet short term seasonal needs (Gouse, Kirsten, Jenkins, 2002; Amani, 2004). Generally, for many smallholder farmers in Africa, credit is elusive mainly because of absence of formal financial structures to finance smallholder farming (Amani, 2004).

It emerges from literature that the success of farm credit is related to the standard of managerial expertise of the credit organisation, as well as the existence of grass roots organisations to handle inputs, marketing of crops and deduction of loan repayment. Experience has shown that agricultural credit cannot be provided in isolation. It must be accompanied by marketing, suitable technology, land tenure and business approach to farming (Bembridge, 1984).

According to South African Government White Paper (1995), indicated that most financial institutions, whether in the private or public sector, were serving only a part of the agricultural sector and that many black farmers, smallholders and part-time farmers did not have access to credit. The realisation that farmers need to be provided with credit facilities is crucial to permit the improvements to land use and building of their own, the acquisition of modern tools, use of best material and also to exploit market price fluctuations to their own advantage (Van Averbeke *et al.*, 1998).

The availability of credit facilities also plays an important role in assisting farmers in obtaining the necessary funds for the purchase of production inputs requisites (Fraser, 1991). The success of the credit facility through cannot be determined only in terms of its accessibility but also in terms of its effect towards improving the agricultural productivity and financial position of the smallholder farmer using credit. A successful farmer is a farmer who has access to financial institutions. Access to credit facilities put the farmer in a better off position in that the farmer is able to improve his/her production as compared to the farmers who did not use the facility. Access to credit is expected to correlate positively to on farm production by the smallholder farmers.

4.7.3.4.9 Access to production inputs

Agricultural inputs such as seeds, fertilizers and chemicals play an important role in agricultural production (Matson *et al.*, 1997). Mabuza (2008) indicated that agricultural co-operatives receive funding from external sources that include commercial banks for example Land Bank, government and donor agencies. Access to inputs consequently leads to successful agricultural activities. When there are no productive inputs to use, that mean that there will be no agricultural production process taking place. Smallholder farmers need production inputs to produce, it will be difficult for them in the absence of production inputs to engage farming. In the former homelands access to agricultural support services is a major factor constraining the growth of agriculture. Without adequate access to production inputs and other farming support services improvement in rural agriculture can hardly be achieved. According to Gilimani (2005) the scarce resources for smallholder farmers are cash to purchase inputs and limited seasonal labour.

Therefore access to production inputs is expected to positively influence on-farm productivity by the smallholder farmers.

4.7.3.4.10 Access to farm implements

A successful farmer is likely to be the one who own farm implements or who has access to farm implements e.g. tractor and its tools, irrigation equipment and animal drawn implements (ARDRI, 1999). The farmer is able to perform farm operations at any time instead of waiting e.g. for a tractor while it is busy used by other farmers. In some instances the farmers want to plough but tractors do not come at the correct time since they are used by other farmers. This results in late soil preparation and planting for the farmer who does not own a tractor but hiring it (Sompali, 2002). Access to agricultural implements may determine the level of investment at the farm thus resulting in improved on-farm productivity (Pote, 2008).

4.7.3.4.11 Access to grazing land

In the rural parts of Eastern Cape, most African communities practice a system of mixed agriculture involving crop production and animal husbandry. The system relies, however more heavily on animal production than on crop production. Livestock farming of communal grazing represents more than four-fifths of the agricultural assets of the farming rural households. Therefore availability of grazing land is vital to the decision of individual community members to maintain livestock enterprises in the first place or decide on making alternative arrangements to accommodate livestock enterprises where such communal grazing is not available. If a household cannot guarantee access to communal grazing land but is still intent on keeping livestock, it may decide to integrate the livestock enterprise with existing crop production in order to have access to own feed for the livestock. But such inaccessibility may be a reason for abandoning livestock production entirely. A large number of cattle farmers using smaller areas of arable land can be explained by use of communal grazing land for animal feeding. The use of communal grazing land verifies research by Stroebel (2004), which pointed out that communal grazing areas are important sources of livestock feed among smallholder farmers in many developing countries. Therefore it may be stated that access to communal grazing land is likely to positively influence on-farm productivity.

4.7.3.4.12 Access to markets

There is no shortage of literature supporting the importance of market access to smallholder farmers and for alleviating or eradicating hunger and poverty through increased production and cash income generation (National Department of Agriculture Directorate: Marketing, 2005; Ostertag, Lundy, Gottret, Best and Ferris, 2005; Magingxa and Kamara, 2003). Magingxa and Kamara (2003) noted cash crops having a key role in rural growth and livelihood enhancement. However, without proper access to profitable markets, smallholder farmers are likely to remain poor. Pingali *et al.*, (2005) argue that if only small farms overcome constraints related to production, they are capable of entering markets considering their productive efficiency. Access to output markets is expected to have positive influence on-farm productivity by the smallholder farmers.

4.7.3.4.13 Access to extension services

Many scholars recognize the significance of extension and other support services in achieving enhanced smallholder agriculture production and productivity (Machethe, 2004; Amani, 2004; Ministry for Agriculture and Land Affairs, 1998). According to Amani (2004), extension services play a crucial role by empowering farmers with farming techniques, knowledge and management skills. Furthermore, Umali and Schwartz (1994) assert that extension services assist farmers with information regarding agricultural inventions such as farm production technologies facilitating farm management, marketing and processing equipment.

Machethe (2004) argues that growth in smallholder farming is elusive without support services. There is no doubt about the importance of extension services. This has been clearly demonstrated by Zimbabwean cotton and maize smallholder producers who doubled their production in the 1980s (Rukuni and Eicher, 1994). This achievement has been attributed to extension complemented by finance and marketing services. Extension services are a source of information on better farming practices. Access to extension services and frequent extension contacts are expected to positively impact adoption of new technologies. Extension contact was hypothesized to have a positive influence on farmers's adoption of improved technologies by Mihiretu (2008). Therefore, access to extension in this study is expected to be positively correlated with the on-farm productivity by the smallholder farmers.

4.7.3.4.14 Farming experience

Farming experience refers to the number of years that the farmer has been involved in farming. The farmers were asked to indicate the number of years that they have been involved in farming. Mjonono, 2001 citing Kille (1993) indicated that improvements are accomplished over time, therefore it is expected that farmers who spend more time on the land would be more likely to invest in productivity enhancing infrastructure. The longer the time spent on the land the greater the probability of investment occurring (Kille, 1993). With more investment more productivity is expected to be achieved by the smallholder farmers. It is therefore expected that farming experience will have positive influence on-farm productivity by the smallholder farmers.

4.7.3.4.15 Membership to farmer organisations

According to Randela (2005), farmer organisations are important means of linking producers with markets, where an individual producer cannot individually enjoy economies of scale. Those who belong to farmer groups stand to benefit by receiving financial support, market information and moral support from the organisations. Some farmer organisations go to the extent of insuring their farmers in order to cover for risks and uncertainties. The organisations operating in the area are community farmer associations, farmer cooperatives and commodity groups. Research has shown that the farmers belonging to more formalised organisations such as NAFU had better access to resources and are better supported than those belonging to the other smaller organisations (Jari, 2009). Therefore membership to any farmer organization is expected to benefit smallholder farmers substantially through number of benefits such information, advice, marketing and financial support. With access to such benefits there is no doubt that the smallholder farmers would be more productive in their farming activities.

4.7.3.4.16 Irrigation

With all other things being equal, it is hypothesized that access to irrigation water can enable the farmer to increase productivity in terms of crop performance, growth and yield per unit area he/she can be able to sell more from his/her produce rather than to consume all. In the stakeholder analysis report (ARDRI, 1999) stakeholders identified the best farmer as the farmer that can produce quality plants with access to irrigation water (ARDRI, 1999).

4.8 Summary

This chapter provided a description of the sampling method employed, data collection, and research design explaining what data and how it was obtained and analytical methods used to obtain results. It also highlighted the explanatory variables considered and their priori expectations. The chapter also explained the use of primary data in the analysis and the empirical models used. Table 4.5 summarizes the research objectives and analytical tools used.

Table 4.5 Summary of the research objectives and analytical tools used

Objective	Research question	Analytical tools
To assess constraints encountered by the smallholder farmers under different forms of land tenure systems.	What are the constraints encountered by the smallholder farmers in their farming activities under the different forms of land tenure systems?	Descriptive analysis.
To identify factors influencing on-farm investment by the smallholder farmers.	What are the factors influencing on - farm investment by the smallholder farmers under the different forms of land tenure systems?	On farm investment model (Multiple regression).
To find out factors influencing on-farm productivity by the smallholder farmers.	What are factors influencing on-farm investment and agricultural productivity of the smallholder farmers under the different forms of land tenure systems?	On-farm productivity model (Multiple regression).

CHAPTER FIVE

RESULTS AND DISCUSSION OF THE DESCRIPTIVE ANALYSIS

5.0 Introduction

In this chapter the results and discussion of the descriptive analysis of the socio-economic characteristics of the smallholder farmers are presented. The chapter begins with brief explanations of the demographic characteristics of the sampled farmers, and is then followed by an overview of agricultural production of the smallholder farmers, improvements and investment of the smallholder farmers. It goes on to discuss socio-economic factors likely to affect on-farm investment and on-farm productivity giving special attention to aspects related to investment and agricultural production and factors influencing them.

5.1 Land tenure security systems

There is no doubt that security of tenure is one of the most crucial factors determining farm development. Amani (2004) defines security of land tenure as the "...the right to use, transfer, exclude or include others in the exercise of such rights, as well as the authority to enforce the foregoing rights." Land tenure security directly influences the inclination and obligation towards resource conservation and improvement of the land (Amani, 2004). Thus, farmers who are land secure are better placed to take the essential measures which enhance production and productivity. Amani (2004) further realised that government ownership of land in most developing countries is the source of land insecurity for most smallholder farmers who believe they possess the traditional right of ownership. Without title deeds, farmers find it difficult to develop the land and may lead to negligence of land conservation and sustainability. The climax of land insecurity may in some instances lead to civil conflict. Figure 5.1 shows distribution of land tenure systems of respondents.

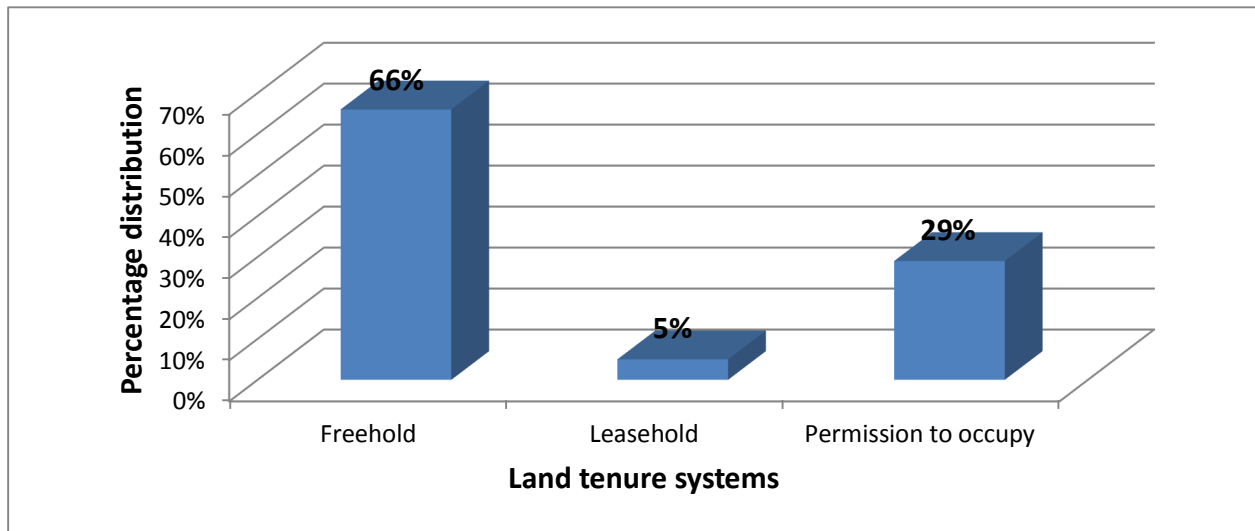


Figure 5.1 Distribution of land tenure systems of respondents

Source: Field survey, 2013

Figure 5.1 shows the land tenure system of the farmers that were interviewed in the study area. Sixty six percent of the land is privately owned, 5% is being leased or rented and lastly, 29 % of the land is communally owned under Permission to Occupy system. The farmers who owned land under freehold with title deed accessed their land through tribal lands. The lands with title deed are the lands that were officially surveyed and registered in the deeds office. The farmers inherited their lands from their parents who were all deceased. This imposes a challenge to the farmers as the land is still registered to a deceased person. Although the land was held under freehold farmers did not have secure land rights since the land was registered to deceased person. However the farmers felt they have secure land rights because the land was still registered to a deceased family member and that in gave them a sense of security.

About 29 % of the famers owned land under Permission to Occupy which is one form of land tenure system under communal land tenure. Apart from the title deeds, a variety of methods are used to record land rights, although many are dubious legal or practical value. The most common written record is probably the Permission to Occupy a certificate issued under Bantu Areas Land Regulation (Proclamation R188 of 1969), which drew its legal authority from the 1936 Native and Land Act (Lahiff, 2000). A variety of devices, both written and verbal are also referred to as Permission to Occupy such as R188 permit, which effectively grant a lifetime inheritable right to

land in a particular area. Such permits usually indicate a right to residential, arable and grazing lands. Permission to Occupy and other devices is general seen as relatively secure form of tenure, although their legal status is not always clear. The most obvious limitation is in the area of transfer of rights as farmers general do not have the right to sell their interest in the property and permits are not acceptable as collateral by commercial lenders.

The results suggest that land tenure security is not problematic in the study area. Although 66 % of the smallholder farmers that had title deeds, 29 % under PTO and 5 % leasehold it is unlikely that the smallholder farmers have problems in accessing the land. However the only challenges with existing land tenure systems is that land transfer and use of land as collateral was impossible. It is clear that across the study area land tenure security was problematic for smallholder farmers. The farmers were asked to indicate if they perceived their individual land tenure systems as having effect on both on-farm investment and on-farm productivity. The results indicate that 29 % of the smallholder farmers said it had an effect whilst 71% indicated it had no effect on both farm investment and productivity. Therefore this suggests that farmers could not access capital to acquire the productions inputs, equipment and infrastructure required to invest their farms. Without such inputs no investment can takes on the farm and therefore if there is no investment and there will be no productivity.

5.1.1 Tenure effects on-farm investment

The debate on the links between land tenure security and farmer's investment in their land is based on the assumption that the nature and enforceability of land rights will affect farmer's propensity and ability to make such investments. There is empirical evidence to suggest there is some existence of some relationship between land rights and investment. For an example farmers were found to be more likely to invest in their own land than in borrowed fields (Gavian & Fafchamps, 1996). Farmers with long term access to land have a greater incentive to sustain the land and develop ways of preserving and regenerating it (Quisumbing *et al.*, 1999). Land tenure and property rights affect the application of technologies for agricultural development and natural resource management (Tenaw *et al.*, 2009).

With agricultural development land rights are so important. A number of studies have demonstrated that security of land ownership has substantial effect on the agricultural performance by farmers. Land tenure security relates to investment in agriculture through demand and supply effects side effects (Feder *et al.*, 1988). The demand side indicates that an enhancement in tenure security would increase demand for medium to long term land improvements (investment on land). The increase in demand comes from the fact that better tenure security will increase the likelihood that farmers will get returns from investments (Sompolvorachai, 2004). As result, demand for short term inputs will increase as well. With the assumption that labour and credit markets are available, the existence of viable technologies, access to inputs, an improved tenure security will lead to higher investment thus higher yields (Besley, 1995). In regards to supply side effect, transferability of land rights plays an important role. It is agreed that the major barrier to prosperity in developing countries is the inability to convert property into usable assets, due not only to lack of clear cut, legally recognised rights, but also transferability of those rights (Sompolvorachai, 2004). Since land is an attractive collateral asset and if farmers can assure the lender that he has the ability to transfer the land, especially for long term credit. This may enhance the land's collateral value and lenders return. As a result, credit constraints should be minimised with improved transfer rights (Besley, 1995 & Sompolvorachai, 2004).

According to Alston *et al.*, (1996) investments in land, as well land values, are positively associated with possession of formal titles in Brazil. Field and Torero (2003) find that possession of legal titles leads to greater access to credit for the poor in Peru. Investment may be encouraged by better land tenure security and the easier convertibility of land into liquid assets and the emergence of a credit market may be helped by land rendered able to be collateralised (Barhan and Udry, 1999). It is therefore clear that land tenure security can be very influential in determining farm investment. Figure 5.2 shows distribution of perceived land tenure effects on-farm investment.

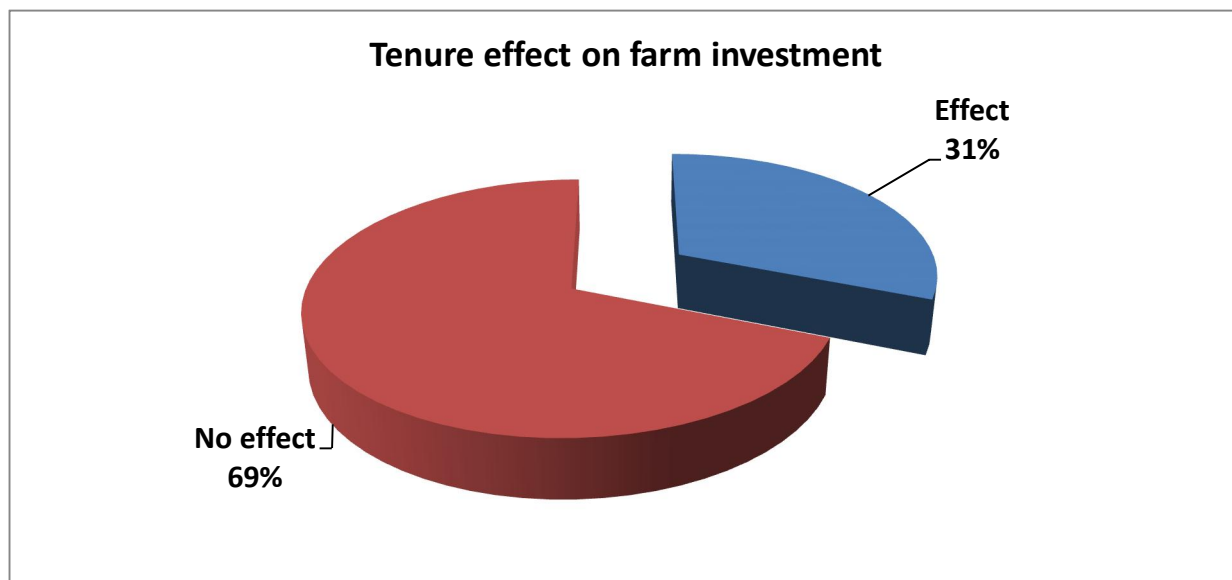


Figure 5.2 Tenure effects on-farm investment

Source: Field survey, 2013

The respondents were asked to indicate if the land tenure system has an effect on the on farm investment or not. The results shows that 31 % said it had an effect whilst 69% indicated that it had not effect at all. The majority farmers (69%) felt that they could do investment at any time as the land belonged to them. In the eyes of the farmers the fact that they had access to their lands anytime without threats of being deprived of their rights to land it means that their tenure was secure. If their land rights are secured it means that they can produce whatever they need since tenure security was not a problem. However, although they had continuous access to land, they could not use the land as collateral to lending financial institutions as the title deeds were not registered in their names but those of deceased family members. Therefore this suggests that farmers could not access to capital to acquire the productions inputs, equipment and infrastructure required to invest their farms. Without such inputs no investment can takes on the farm and therefore if there is no investment and there will be no productivity. It can therefore be concluded that land tenure systems has an effect on farm invest due lack of transferability of land rights that affect lack of access to credit or capital.

5.1.2 Tenure effects on-farm productivity

Secure land tenure is an important institutional aspect affecting the agricultural technology utilisation by smallholder farmers by providing incentives for greater investment to enhance the productivity of the land due to secure property rights (Kyomugisha, 2008). Property rights to land represent the key institutional asset on which rural people build their livelihoods. The nature of farmer's property rights to land substantially impacts their willingness and ability to adopt productivity enhancing investments (Landesa, 2012). Secure land rights are a foundational building block for agricultural productivity as well as for economic and social empowerment of smallholder farmers. Smallholder farmers who have more secure property rights are more likely to make productivity – enhancing investments since they are more confident that they can recoup their investments over medium and long term. Figure 5.3 shows distribution of perceived land tenure effects on farm productivity.

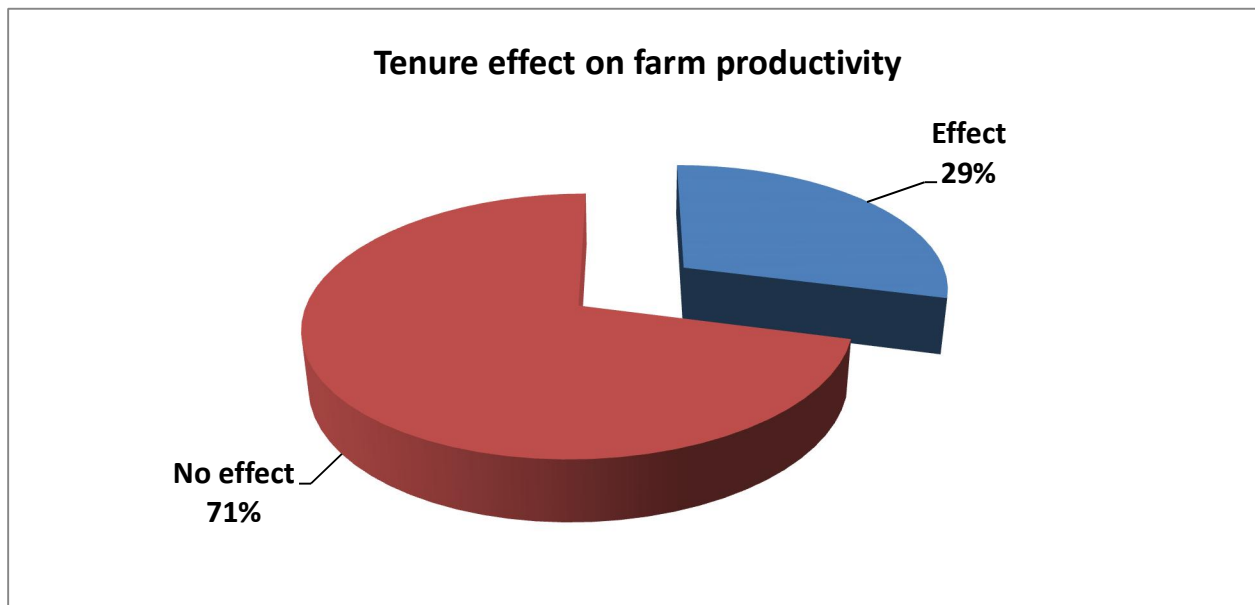


Figure 5.3 Tenure effects on-farm productivity

Source: Field survey, 2013

The respondents were asked to indicate if the land tenure system has an effect on the farm productivity or not. The results shows that 29% said it had an effect whilst 71% indicated that it had no effect at all. The majority farmers felt that they could do any production at any time as they wish since the land belonged to them. In the view of the farmers the fact that they had continuous access to their lands without any threats of being dispossessed it means that their

tenure was secured. Secure land rights means that they were free to invest on any production since their tenure security was not a problem. However, although they had continuous access to land, they could not use the land as collateral to lending financial institutions as the title deeds were not registered in their names but those of deceased family members. The results suggest that farmers could not access to credit to acquire the productions inputs, equipment and infrastructure required to produce their farms. Without such inputs no investment can takes on the farm and therefore if there is no investment and there will be no productivity. It can therefore be concluded that land tenure systems have an indirect effect on-farm productivity of the smallholder farmers due lack of access to credit, production inputs and farm implements. Having presented this scenario the next section will show the preferred tenure system by the respondents.

5.1.3 Preferred land tenure system

The smallholder farmers were asked to indicate their preferred tenure system for their farming activities. In almost all the villages in the study area, land was not legally owned by farmers by means of title deed. The results has shown that 66% of the smallholder farmers were under freehold with title deeds still under name of deceased family members, 29 % under PTO and 5% under leasehold but all these groups do not clear cut legal rights to land. It is not surprising that 96% of the respondents expressed a desire to obtain title deed for their lands whilst only 3 % indicated that would prefer tenure system under Permission to occupy (PTO). However no farmers expressed the need to be under leasehold tenure system due to level of tenure insecurity associated with this system.

The expression of a general desire to obtain title deed to their lands may be an indication of a perceived lack of security of tenure among smallholder farmers within the current system of holding land. This lack of security might not affect the smallholder farmers who continue farming in their land themselves, but mainly those who wish to sell, transfer or rent out their lands. This would indicate that the present breadth of rights over landholdings limit land transfers and, therefore, also allocative efficiency. The smallholder farmers were prepared to pay for title deeds if the land were to be given to them. Table 5.1 shows distribution of preferred land tenure systems by respondents.

Table 5.1 Preferred land tenure system by respondents

Preferred tenure system	Frequency (No)	Percentage (%)
Freehold	77	96
Leasehold	0	0
Permission to Occupy (PTO)	3	4
Total	80	100

Source: Field survey, 2013

Land tenure security is just one of the factors that influence investment to enhance farm productivity. The literature suggests that factors other than land tenure may play bigger role in determining farmer's decision to invest in their landholdings. These include farm size, access to credit, access to production inputs, access to farm implements, access to grazing land, access to markets, access to extension services, household income, farming experience, membership to farmer organisations and expected income from crop and livestock production. Thus, while land tenure does impact on the level of investment and the resultant agricultural productivity, it is not necessarily the most significant determinant in this regard. There are other factors that significantly influence on-farm investment and on-farm productivity of the smallholder farmers and these will be discussed in the next section.

5.2 Demographic characteristics of sampled farmers

In this section, demographic characteristics such as age, gender, marital status, educational levels, and household size are discussed. These aspects are important because the main household activities are coordinated by the household head and the decisions of the head of household are most likely to be influenced by such demographic aspects (Bembridge, 1988 & Makhura, 2001). Demographic characteristics of households are essential when analyzing economic data because such factors influence the household's economic behavior and decision making patterns (Randela, 2005 & Sibanda, 2012). It then follows that household demographic attributes are relevant in analyzing factors influencing the on-farm investment and on-farm productivity by smallholder farmers (Ngemntu, 2010). An overview of the results obtained from

the field survey are presented showing agricultural production practices related to on-farm investment and productivity of the sampled farmers.

5.2.1 Age distribution of interviewed farmers

According to Hofferth (2003), the age of a household head is a vital aspect in agricultural productivity as it determines farming experience. Furthermore, the age of a household head determines the knowledge of the social and physical environments. Age of the household head is an important aspect in agriculture because it determines experience one has in a certain type of farming. In addition, to a certain extent, age indicates the position of the household in the life cycle. Household head's experience further influences household members' farming activities since they usually get guidance from the head (Ngqangweni and Delgado, 2003). Age of sampled farmers was classified into different into groups where each farmer belonged to one group. Figure 5.4 summarizes the age distribution of respondents.

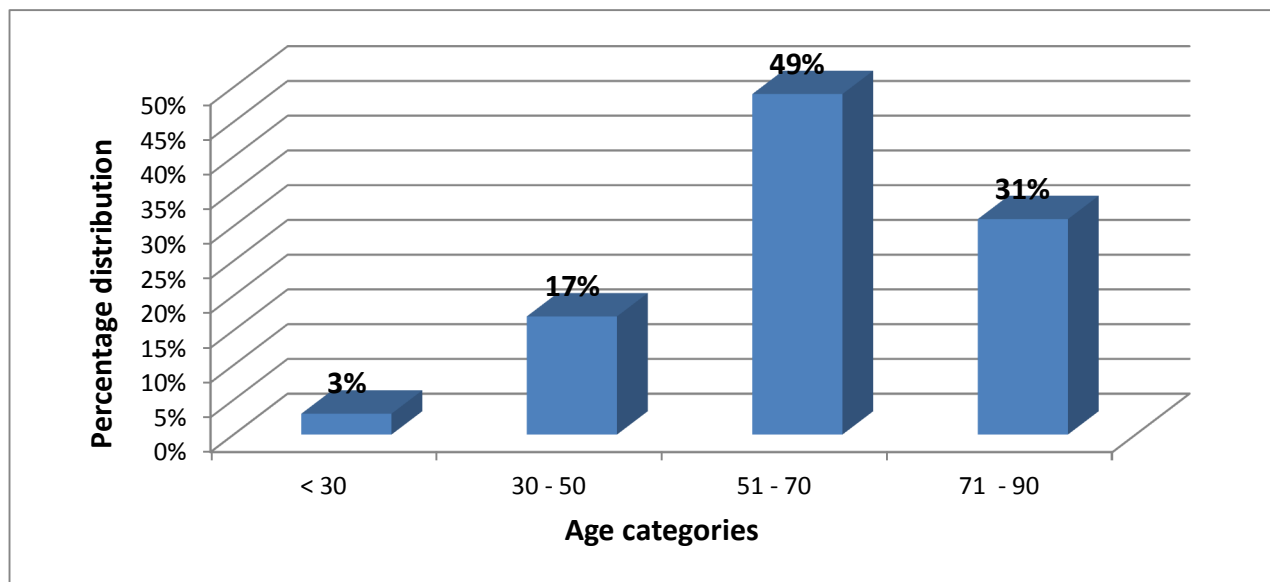


Figure 5.4 Age distribution of respondents

Source: Field survey, 2013

The minimum age of respondents in the study area was 24 whilst the maximum age was 87 years old. The mean age of interviewed farmers was about 62 old. Overall, the dominant age group of the interviewed farmers was above 50 years, which constituted about 49% of the total respondents. The second largest group of farmers was between 71 – 90 years accounted for 31%.

The age group which had the least number of respondents was that below the age of 30 years, which had only 3 % of total respondents. These findings suggest that farming in the rural areas is usually done by older people. This is probably because younger people are not interested in agriculture or they migrate to urban areas in pursuit of other forms of employment, which may offer better income compared to farming. Dereje (2006) suggested that as a farmer's age increases, he/she becomes conservative. Farmer's age increases, the probability of adopting new technology decreases. However, Hofferth (2003) argues that older people can be more adaptive to new technologies because they have relatively richer experiences of the social and physical environments as well as greater experience of farming activities. The results in this study confirm view by Mushunje, Belete and Fraser, (2003) that in previous studies have proven that population in rural areas is skewed towards upper ages. Age has a great influence on the physical abilities and behavioral patterns of the people which is very important in smallholder farming (Koch, 1991). Based on the findings in relation to ages of the farmers, it is likely that these farmers can invest to invest less in their farms due old age accompanied by lack of strengthen and courage thus resulting in low productivity.

5.2.2 Gender distribution of respondents

Gender divisions plays an important role in agriculture. Gender plays an exclusively important role in agricultural development because in most cases in rural areas men are the breadwinners and are the ones who bring income at home while on the other hand women are house wives. In general, men are physically capable of coping with all the farming practices that may be recommended by change agents. On the other hand, women, even if they are better educated, often need men's help to carry out certain activities in farming (Sokhela, 1990).

Besides the physical capability for performing difficult activities, gender tends to influence the way in which an individual thinks and behaves and is therefore an important determinant of sound agricultural development. In each household, the head has the greatest influence in the decision making for the household. Whether new technology (agricultural or otherwise) will be acceptable to a household or not will depend much on the attitude of the head of the household towards that technology. It is for this reason that the gender of specifically only the heads of households was considered (Sokhela, 1990). In the majority of mainland societies groups of men

control land and make major decisions about its use (Brouwer *et al.*, 1998). Gender distribution of respondents is shown in Table 5.2.

Table 5.2 Gender distribution of respondents

Gender	Frequency (No)	Percentage (%)
Males	57	71
Females	23	29
Total	80	100

Source: Field survey, 2013

The results (Table 5.2) show that the distribution of males was 71% while that of females was 29%. This is similar to the findings of Van Averbek *et al.*, (1998) where the majority (62%) of households heads were males and 38% were females. High unemployment in the Eastern Cape could have forced more males into farming as means to fight poverty and generate income. This could also imply a situation where males make most production decisions at their households. According to Mihiretu (2008) males and female are likely to play different roles in technology adoption and use, depending on the nature of the technology. Due to many socio-cultural values and norms, males have freedom of mobility and participation in different extension programs; consequently, they have greater access to information. Since there are more male farmers in the study area, they are more likely to positively influence on farm investment and farm productivity.

5.2.3 Marital status of respondents

Stable married couples are in a position of being committed to their farming business than single or divorced persons (Randela, 2005). This is probably as a result of the heavier load for family support that married persons have to shoulder. As does age, marriage plays an exclusively important role in agricultural production because, for many people who are married, agriculture is their life and a source of their family income (Musemwa, 2008). Table 5.3 represents the marital status of the respondents.

Table 5.3 Marital status of respondents

Variables	Frequency (No)	Percentage (%)
Single	11	14
Married	47	59
Divorced	2	2
Widowed	20	24
Total	80	100

Source: Field survey, 2013

The results show that on average most (59%) farmers were married. A smaller proportion (14%) was single and (24%) were widowed whilst 2% was divorced. These results are similar to findings by Dlova, (2001) whereby widow farmers constituted 29,8% and single farmers accounted for 10%. Bembridge (1984) regarded high percentage of *de facto* heads of households being unattached as a constraint to farming efficiency. On the basis of these results it can be argued that this can be the same in the context of smallholder farmers and thus would assume that married couples can effectively participate in their farming activities to overcome some of the problems they face. Across the study area, 79% of widowed farmers were females. These findings are similar to Dlova (2001) whereby 80% of the widowed respondents were females. According to Williams (1986), this can be regarded as a constraint due to possibly family instability and reduced potential for labour and family income. A large proportion of widows was recorded by Steyn (1988) in a study of two rural areas in former Ciskei. According to Steyn (1988) this situation had a negative effect on the level of agricultural production. Marital status can influence the stability of the farming business, however it does not necessarily follow that single persons are less burdened by family responsibilities. According to Sokhela (1990) the greater the number of married people in the area, the sounder are decisions which are taken because of shared opinions and organised leadership. It can therefore be concluded marital status can have either positive or negative influence on the on-farm investment and productivity of the smallholder farmers.

5.2.4 Educational level of respondents

The level of education of the farmer is a direct measure of the human capital of the farmer. The human capital element is generally postulated to have a positive impact on efficiency. Efficiency in this research is good agricultural performance in respect to the production and marketing of the produce. Abdulai and Eberlin (2001) showed that the level of education has a positive impact on efficiency. Therefore, it can be concluded that higher levels of education can be expected to increase efficiency. This finding is consistent with the Battese *et al.*, (1996) reported results for wheat farmers in Pakistan. In this research, secondary and tertiary education is to be considered as educated. Figure 5.5 shows that in the study area, the level of tertiary and secondary education when added together is generally low ($40\% + 3\% = 43\%$). These results show that Amathole District has low human capital, which can be postulated to be the main positive factor resulting in inefficiency. Feder *et al.*, (1988) asserted that education plays a positive role in determining the rate at which new technologies are adopted in developing agriculture. However, Lyne (1989) contrasted that by stating that the more educated an individual is the higher the income demanded thus leading to the person opting for off-farm employment, which pays more, thus leaving agriculture. Figure 5.5 shows education levels of respondents.

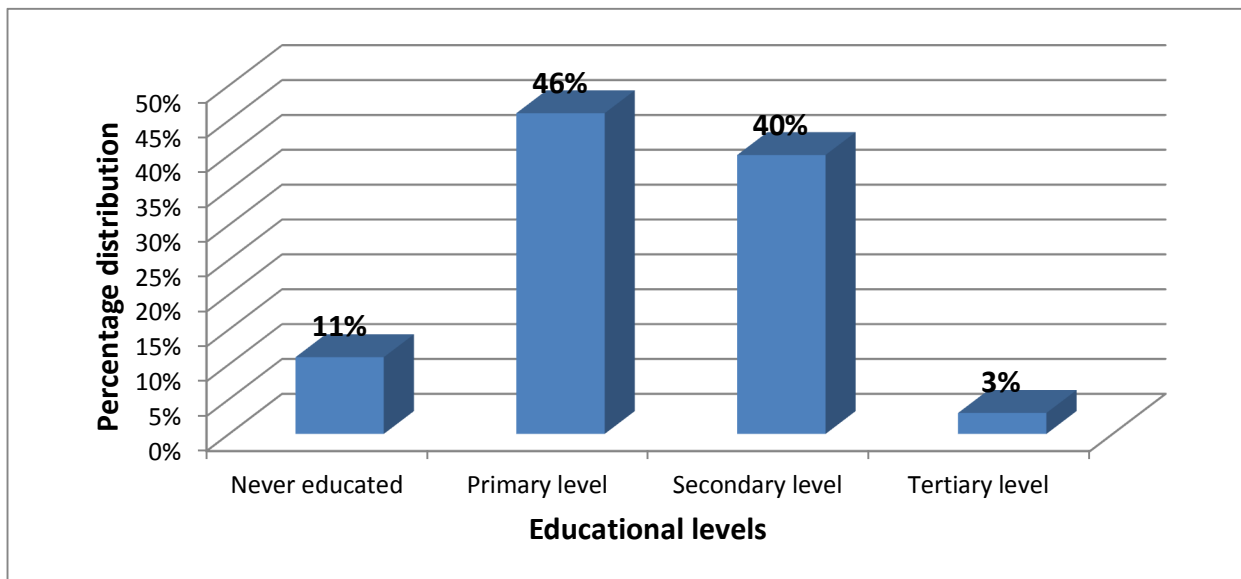


Figure 5.5 Educational levels of respondents

Source: Field survey, 2013

The level of education ranges from those who attended primary school to those who reached a tertiary level. However there were only 11% of farmers who had not education at all. Education level was taken as the number of years of schooling completed by the respondents. According to Bembridge *et al.*, (1992), people who attended school for a period of less than 4 years can be regarded as functionally illiterate. Accordingly, 46 % of the respondents would be classified as functionally literate. Most of the respondents (46%) had attended primary school. Secondary school level was accounted for 40%. The study shows that only 3% of the farmers had a tertiary education. This suggest that back then in the old days school was not important to rural households as the majority of them attended primary school. This also indicates that rural households rely on or used their indigenous knowledge for farming as the majority attended primary school.

Education is the cornerstone of the development of any society. Panin (1999) stated that education has a relationship with farming progressiveness because there is a possible correlation between education and the adoption of improved practices and hence farming efficiency. A high level of illiteracy can be regarded as a severe constraint to agricultural development. From the results obtained, it clear that respondents did not obtain much formal education. According to ARDRI (1989), heads of households with low levels of education appear to be characteristics of former homelands areas, in general, and former Ciskei and Transkei in particular. Similarly low levels of formal education among heads of households were reported by Williams and Rose (1989) in the Mgwalana and Khambashe tribal areas of former Ciskei.

According to a study done by Madikizela (1997) in Seymour area, the effect of providing rural people with better access to education, a development dating back at least two or three decades, appears not to have an effect on the educational levels of heads of households in the study area. Based on the findings of this study it can be concluded that most farmers were functionally illiterate as shown by 11 % of farmers who never attended school and 46 % of farmers who only attained at least primary level schooling. Illiteracy has implications on extension, precluding use of material in the transfer of knowledge (Bembridge, 1992). Under such conditions, communication between farmers and extension officers has to rely on oral means, including face to face communication, field demonstration and use of audio-visual technology, such as flip

chart, audio-cassette programmes used in basic education. Since most of the farmers in the study area have less or no formal education, this may make it impossible for them to interpret and process information systematically. The inability to process information means the farmer cannot read and write effectively and therefore might not understand information that can be of benefit to them. If the farmers cannot understand through reading and writing it is clear that they may not be well placed to consider decisions towards on farm investment and productivity. It can be therefore be concluded that farmers with better education can make effective towards on farmers investment and productivity as compared to farmers with less or no schooling at all. The higher the educational level of the farmers, the better the decisions made towards on farm investment and productivity.

5.2.5 Household size

Household size refers to the number of people living together in a household. Household sizes impacts own food production, income and expenditure profile and thus influence livelihood activities (Timmermans *et al.*, 2004; Machingura, 2007). On the other hand, household size determines the availability of labour in own food production process. In a rural subsistence economy, family size is an important factor in two respects. Firstly, the larger the family the more resources are needed to feed, clothe, house, and educate all members. Secondly, and perhaps a direct view is that the larger the family, the more labour is available to cultivate arable land or work outside the area and send remittances to the family. Nevertheless, smaller families are necessary to reduce the pressure on land and to ensure a better future for individual. Larger families consequently cause a great burden on such families, which in turn affects their ability to finance farming development (Williams, 1986). Table 5.4 shows distribution of the household sizes of respondents.

Table 5.4 Household size distribution

Household size	Frequency (No)	Percentage (%)
1-2	12	15
3-4	24	30
5-6	19	24
7-8	17	21
➤ 8	8	10

Total	80	100
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Source: Field survey, 2013

From Table 5.4 the study revealed that family sizes vary from two people per household to a maximum of 12 family members. The mean average family size in the study area was 5 with 10 % having 8 or more family members. These results to those reported by Steyn (1988) at Peddie and Dlova (2001) at Seymour in the former Ciskei. Table 5.3 shows that 30% of the households had family sizes ranging from 3 to 4 members, 24 % had household sizes ranges from 5-6 members while 21% represents household sizes ranging between 7-8 family members. Furthermore the results show that only 15% of the farmers had family members ranging from 1-2 people per household. Large families may have the necessary labour available to be active in farming activities, but lack the necessary funds to obtain inputs. Taking family size, as a proxy for labor availability, can be inferred that farming households would not encounter problems with farm labor. These findings are supported by Phororo (2001) and Hages, Roth and Zapeda (1997) that a larger family size means that a variety of labor capacity is available in the form of young, middle aged and elderly members. Therefore, these results suggest that farmers in the Amathole District have access to family labor and this may have a positive influence on the on farm investment and productivity as there will be enough family labour. Again having a high family size may mean availability of cost effective labour with diverse skills, knowledge and experience.

5.3 Agricultural production of the smallholder farmers

This section of the chapter analyses information collected from farming participants. The purpose of including this section is to get the information about agricultural production of rural households as farmers. There are a number of factors that influence individuals or households to participate in agricultural production process or to be engaged in farming activities. Such factors may include the ease with which to access agricultural inputs, household size, gender of the household head, household income, access to irrigation water, access to irrigation infrastructure, access to extension services, access to markets, access to financial support, production challenges, education level and extension services. This section will try to discuss the farm size

and production practices with main focus on crop and livestock production and the major constraints that affect the production of smallholder farmers.

5.3.1 Farm size

Land is one of the most important resources in agriculture (Stockbridge, 2007). Therefore access and ownership of land motivates farmers to participate in agricultural practices. Land is the most important agricultural input in food production process and it is a determining factor in production. This means that if there is no land, agricultural production will not take place, but if there is arable land, agricultural production will occur. Having access to arable land for a household is important, as the household can produce own food products and by doing so it will reduce poverty at household level. Table 5.5 shows distribution of farm sizes of respondents.

Table 5.5 Distribution of farm sizes of respondents

Farm size (ha)	Frequency (No)	Percentage (%)
1 – 2	43	54
3 – 4	17	21
5 – 6	9	11
7–8	3	4
➤ 8	8	10
Total	80	100

Source: Field survey, 2013

The smallholder farmers were asked to indicate the sizes of their farms or landholdings. The results show that most (54%) owned land that ranged between 1ha-2ha, 21% owned land that ranged between 3ha-4ha whilst about only 11% of the farmers owned land between 5ha-6ha. The results also showed that about 4% of the farmers owned land that ranged between 7ha – 8ha whilst only 10% of the farmers owned land that was greater 8ha in size. These results show that the land ownership by the smallholder farmers is skewed towards small sizes in terms of hectares. These results are similar to the findings by Aina (2007) that generally and on average, smallholder farmers in the Eastern Cape Province hold between 0.5ha to 4ha of land. This implies land availability and land size in rural areas is a problem.

This therefore means that access to land implies that farmers can expand their farming activities by putting more land under production. Putting more land under production means more investment which is expected to result in high productivity. However, size of the landholdings can directly influence the investment decisions of the farmer depending on the size of land available. The bigger the size of the land the better the chances of investing in that particular piece land whilst the smaller size of land can seriously affect investment prospects and expected productivity levels. Furthermore small pieces of land cannot attract good market values when used as collateral even where land rights are secured. If the land cannot be used as collateral when acquiring credit it therefore directly affects possibly productivity enhancing investments. It can therefore be concluded that the size of the land can definitely influence on farm investment and productivity. The next section will discuss crop production of the smallholder farmers.

5.3.2 Crop production

In the Eastern Cape Province, the smallholder farmers practice the mixed farming system that is known to Southern Nguni tribes (ARDRI, 1999). This farming system has three components namely, livestock production, consisting of mainly cattle, crop production on one or more fields and vegetable production in home gardens (ARDRI, 1999). In rural parts of the Eastern Cape, most African communities practice a system of mixed agriculture involving crop production and animal husbandry. The system relies, however more heavily on animal production than on crop production. Crop production consists of intensive home gardening and relatively extensive cultivation of fields further away from residences) cropping. Crops such as maize, beans, pumpkins, potatoes, cabbages and melons that feature prominently in the local diet are usually planted (ARDRI, 1999). However, Lenta (1981), observed that maize is synonymous with agriculture among many rural people. This farming system of the smallholder is characterized by sharing of many resources. These may include sharing of yields with neighbours and relatives, grazing fields, arable land, dipping tanks, shearing sheds, dams, labour, and physical implements (Lent *et al.*, 2000). The traditional crop production is not market oriented and the family consumes most of the food grown. Land preparation for field crops is mainly done by a tractor or animal drawn implements (ARDRI, 1996). Table 5.6 presents different food crops produced or grown by the smallholder farmers.

Table 5.6 Different types of crops & vegetables grown by smallholder farmers

Crops & vegetables	Frequency (No)	Percentage (%) of farmers
Maize	80	100
Pumpkins	40	50
Melon	11	14
Potatoes	39	49
Butternut	19	24
Beans	18	23
Cabbages	12	15
Spinach	13	16
Onion	9	11
Beetroot	5	6
Peas	3	4
Tomatoes	5	6
Watermelon	3	4
Green pepper	1	1

Source: Field survey, 2013

The respondents were asked to indicate the type of crops and vegetables they produced during the past year. The results shows that vegetable production was comprised of cabbages, potatoes, beetroot, onions and pumpkins, spinach, tomatoes, green pepper and watermelons. Crop production consisted of maize, melons, beans and peas. Results from the above table show that all farmers (100%) were producing maize, 50% were producing pumpkins and 49% were producing potatoes. However, farmers who were producing butternuts and beans accounted for 24% and 23% respectively. It is possible that these are crops that constitute major components of the diet of these households or where an objective was to sell it could be possible that these were most selling crops and vegetables. The rest of crops and vegetables were produced by very few farmers as shown in Table 5.6. The reason for this is that these types of crops and vegetables need more attention in terms planting and weeding. In addition to that, these crops and vegetables in their nature need more water in order for them to grow and maximise crop performance. Without constant water supply these crops cannot survive dry weather conditions

as result only few farmers were keen in producing them. It must be noted the crops that were crops produced by most farmers are crops that are more extensive and can grow in the field without much attention as compared to other crops and vegetables. The next section will discuss the total average yield that was obtained by farmers from two most common crops that were produced by the smallholder farmers namely maize and potatoes. Table 5.7 shows distribution of the yield of the smallholders obtained from the two main crops that were common amongst them

Table 5.7 Distribution of yield obtained from maize and potatoes by respondents.

Yield categories (kg)	Maize		Potatoes	
	No	%	No	%
1 - 500	71	89	78	98
501 - 1000	7	9	0	0
1001 - 1500	1	1	1	1
1501 - 2000	0	0	0	0
➤ 2000	1	1	1	1
Total	80	100	80	100

Source: Field survey, 2013

The yield from the two common crops was calculated for each farmer and was categorised according to the output obtained by the farmers ranging from 1kg and beyond 2000kg. The above table presents the individual yield obtained by each farmer from the two crops that were commonly produced by the smallholder farmers. To have uniformity in measurement of the output, all the yields were calculated in kilograms (kg) which is the common measure of output that these farmers use to determine their production levels. The results from Table 5.7 indicate that majority of farmers (89%) the farmers had obtained maize yield ranging between 1- 500kg whilst the 98% of the farmers obtained potatoes yield ranging from 1 – 500kg. It must however be noted that only 10% of the farmers were producing between 501 – 1000kg of maize. The results shows the farmers obtained very low levels of production on the two most planted crops. The likely reason for this is the demographic factors such as age, gender, family size, educational levels and household income. Research from various studies has confirmed all these factors have great influence on the production possible to the farmers. In addition to this, access to production

inputs, implements, irrigation water, irrigation infrastructure and capital are also likely to influence production levels possible to these farmers. Constraints to crop production of the smallholder farmers are discussed in the next section.

5.3.2.1 Constraints in crop production

The majority of smallholder farmers do not own the land they cultivate, as it belongs to the tribe or the state. Smallholder farmers of South Africa plant less than one hectare of maize. Maize which is the most important source of food in South Africa is only planted at less than one hectare by an average South African smallholder farmer. According to Dalelo (2003) a diversity of crops is grown by smallholder farmers of South Africa. Of the diverse crops grown by rural households, maize is the major crop produced. Many smallholder farmers, especially in rural areas, use manure to maintain and to replenish soil fertility for crop production. This is due to the fact that smallholder farmers cannot afford to purchase the production inputs, implements, vaccines, and many other needed resources for their farming activities. Table 5.8 shows the constraints faced by the smallholder farmers.

Table 5.8 Constraints faced by the smallholder farmers

Constraints	Frequency (No)	Percentage (%)
Access to labour	57	71
Pests	76	95
Production inputs	71	89
Diseases	78	98
Lack of transport	59	74
Access to capital	80	100
Storage facilities	10	13
Management skills	5	6
Drought	78	98

Source: Field survey, 2013

According to Kirsten and Sartorius (2002) smallholder farmers have a combination of challenges that include high transaction costs, poor infrastructure, poor technology, lack of marketing

infrastructure, lack of access to capital and limited technology and infrastructure such as roads, buildings and storage facilities. Table 5.8 shows the constraints faced by the smallholder farmers. These include access to labour, pests, lack of access to production inputs, diseases, lack of transport, lack of access to capital, lack of access to storage facilities, lack of management skills and incidence of severe drought which make it difficult to produce and store high quality produce. However, from Table 5.8 it can be observed that the most critical challenges were lack of access to capital and pests and this is shown by 100%, 98%, 98% and 95% in the results respectively. The incidence of drought, pests and diseases were also highlighted to be a challenge after the lack of access to capital.

Furthermore the smallholder farmers indicated that they are financially constrained and hence could not afford to buy all the necessary chemicals and infrastructure for irrigation. A combination of such farming constraints often results to product rejection, difficulties to enforce contracts, difficulties to meet strict quality and food safety standards as noted by Delgado (1999). Lack of access to capital suggests that the acquisition of agricultural resources becomes difficult. Unavailability of transport and storage facilities means the farmers find difficulties to supply and access markets. Lack of access to markets results in poor supply and low volumes that may lead to high transaction costs of production as noted by Kirsten & Van Zyl, 1998. Lack of access to tractor and implements can seriously affect the production planning and thus results in low yields. All these factors can create a long term record of failures particularly in smallholder farming. Livestock production of the smallholder farmers in the study area is discussed in the following section.

5.3.3 Livestock production

The role of livestock and rural livelihoods is related to the reasons for holding stock. According to Krige (1936), livestock play a crucial role in household economy of the rural areas. Livestock and cattle in particular, play an important role in the lives of people. The livestock sector and the importance of livestock to household remain poorly understood (Hatch, 1996). According to Hatch (1996), the social system of rural people, revealed that cattle provide a variety of functions including meat, milk, manure, drought power, a means of social exchange, security against diverse conditions. Cattle also provide hides for shields (in the case of Zulu people) and for

clothing. The wealth of a man is recognised by large number of cattle, since cattle will be used to acquire wives (to pay *lobola*) for himself and his sons, although livestock ownership is centered on cattle, small stock provides an important source of income or utility in the form of meat and skins. The livestock are important to the majority of rural poor in less developed countries (Holden *et al.*, 1997). Livestock contributes in many and diverse ways to rural livelihood. They can represent:

- Source of cash income from the sale or hire of animals.
- One of assets available to the rural poor for maintenance.
- Central component of farming system i.e. provides power and manure.
- A source of livelihood security by diversifying and protecting crop yields, particularly in drought prone areas.
- A source of food, transport, fuel, access to support networks, cultural well-being and a variety of other functions.

There are basic differences of interests between commercial and subsistence livestock holders, which are allied to differences in socio-economic perspective objectives, and cultural values (Colvin, 1985 as quoted by Fraser, 1991). A commercial livestock farmer views animals as means of achieving some economic objective through sale of animals or animal products. Subsistence livestock farmers on the other hand, view the possession of livestock as end in itself. The animals are however, used for a number of purposes. Hobart – Houghton and Walton (1952,) as quoted by Fraser, (1991) made the point that stock farming (in Ciskei) is a misnomer if it be taken to imply that stock is acquired and bred with the objective of producing an economic return, because the Bantu peasants makes no attempt, except possibly in the case of wool, to direct his farming activities so as to yield marketable products. Ownership of cattle is desired per se regardless of any return they may yield, because of their importance in ritual and social status that large herds confer upon their owner. Figure 5.6 shows keeping of livestock by smallholder farmers.

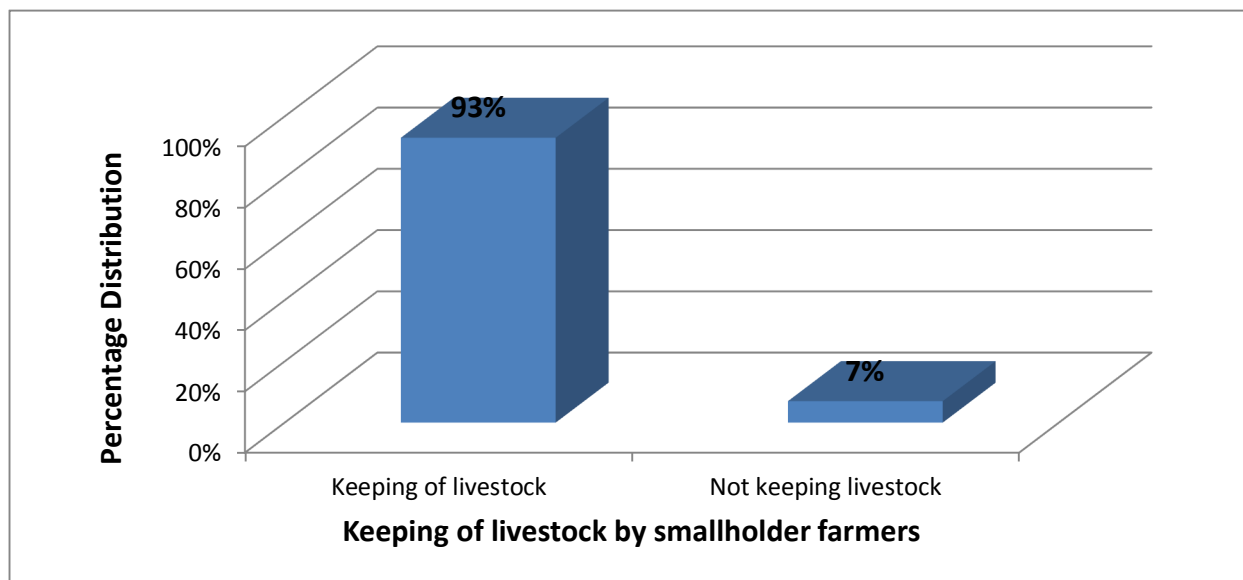


Figure 5.6 Keeping of livestock by the smallholder farmers

The study revealed that livestock production is an important strategy in the sampled population's livelihood. Figure 5.6 indicate that most farmers keep livestock as 93% represent the farmers keeping livestock and remaining 7% represent the farmers who do not have and keep livestock. This means that the majority of smallholder farmers keep livestock. Although the majority of smallholder farmers keep livestock, they keep different types of livestock namely cattle, sheep, goats, pigs and chickens but it is rare for a household to have all different types of livestock, but in some cases few households do keep all different types of livestock. The next section is discussing the livestock production of the smallholder farmers. This includes all products obtained by the smallholder farmers from livestock such as meat, milk, eggs, manure. Further the production discussed below includes income obtained by farmers from sales of animals and other products as mentioned above. Table 5.9 presents livestock production of the smallholder farmers.

Table 5.9 Livestock production of the smallholder farmers

Livestock	Total number	Number of farmers	Number sold	Total income
Cattle	498	54	57	R 253 000
Sheep	452	21	29	R 27 400
Goats	412	45	56	R 38 250
Pigs	86	32	5	R 18 500

Chickens	1370	56	192	R 5 950
Total	2818	-	339	R 343 100

Source: Field survey, 2013

Table 5.9 above summarizes livestock and sales income. From the results, a total of 498 cattle were owned by 54 farmers. This is just above 50% of the smallholder that were interviewed as part of this study. This again confirms the results by ARDRI (1999) that the farming system of the smallholder farmers relies more heavily on livestock in particular cattle. The cattle farmers have sold about 57 cattle and earned R 253 000 during the 2012/13 production season. From Table 5.9 it can be observed that majority of farmers have chickens and was the highest group of livestock in terms of ownership numbers, sales and income. Lastly about 56 farmers kept 1370 chickens and they sold 192 and this earned them an income of R 343 100. In generally the farmers had kept high number of animals although the number of sales was very low. This finding confirms the view by Fraser (1991) that most smallholder farmers do not view livestock as means of achieving economic objectives but as store of wealth. Livestock is also kept as a form of saving and approximately 70% of the livestock owners do not sell stock at all (Lent *et al.*, 2000 and Sandham, 1996). Many livestock owners have livestock as an economic safety net to solve problems in the family and sell animals if they are in immediately need of cash (Sandham, 1996). Constraints in livestock production of the smallholder farmer are discussed in the next section.

5.3.3.1 Constraints in livestock production

As indicated in the previous section under agricultural production that most smallholder farmers practice a system of mixed agriculture involving crop and livestock production. Since the farming system relies more heavily on animal production than on crop production, it is therefore important to also understand the constraints that affect the livestock production. The farmers were asked to indicate the types of constraints they experienced in their livestock production. Table 5.19 presents the results from the analysis of data about constraints that affect the livestock production of the smallholder farmers in the study area. From table 5.9 it can be observed that very few (8%) of the farmers indicated that they did not experience any livestock production constraints. It is likely that these are few farmers who were not keeping livestock as they did not

get any challenges with regards to livestock production. However it must be noted the smallholder farmers mentioned a number of constraints to livestock namely diseases, theft of animals, animals being attacked by wild animals, lack of fencing in the camps, lack of labour, lack of access to vaccines, lack of capital to buy vaccines, dipping facility too far and drought. Within these constraints the most prominent challenges included drought, lack of access to vaccines, diseases, lack of labour, lack of fence, theft of animals and these are shown in the table 5.10 below by 100%, 100%, 95%, 78%, 74% and 70% respectively.

The results suggest there might be a link between high incidents of diseases and lack of access to vaccines and dipping facilities being far away. In addition to this, the situation is worsened by the fact farmers also indicated they did not have access to capital in order to purchase the vaccines. Furthermore it is likely that there is a relationship between high incidents of stock theft with lack of fencing and labour to look after animals in the camps. Without proper fencing in the camps it is difficult for the smallholder farmers to manage their livestock, as the animals move from one camp to another without being controlled. This situation has made the livestock to be vulnerable to theft as they move around unattended due to lack of labour. Table 5.10 shows constraints in livestock production.

Table 5.10 Constraints in livestock production

Type of constraint	Frequency (No)	Percentage (%)
No constraints	7	9
Diseases	76	95
Theft of animals	56	70
Animals attacked by wild animals	54	68
Lack of fence in the camps	59	74
Lack of labour	62	78
Access to vaccines	58	73
Lack of capital to buy vaccines	80	100
Dipping facilities too far	56	70
Drought	80	100

Source: Field survey, 2013

Finally, one other major constraint that affected the production of smallholder farmers is the incidence of severe drought. This presented a major challenge for the smallholder farmers as they depend solely on natural grazing for their livestock. Livestock farming of communal grazing represents more than four-fifths of the agricultural assets of rural households. Agriculture plays an insignificant part of the production in rural areas, with livestock contributing about 9% to the household income (Romuld and Sandham, 1996). However, the benefits of livestock are numerous for example fresh milk, sour milk, meat, wool and eggs. With such benefits from livestock production it is important to have adequate access to grazing land especially communal land. Generally, cattle are grazed day and night, but milking animals are kraaled at night. All the smallholder farmers who kept large stock grazed them animals on communal lands and provided night kraaling. Small stock was mostly on free range system with night accommodation around the premises of the main house (Lent *et al.*, 2000).

The literature review suggests that majority of these smallholders farmers are dependent on communal grazing land as the main source of fodder to livestock. This implies high dependency on communal grazing land and a need to ensure constant supply of feed for animals. Without properly managed communal grazing land, even arable lands are converted into grazing land in winter. This means that with drought hitting the farmers there will be less or no feed for livestock as the grass depends on the rain to grow. Livestock production of the smallholder farmers can be affected a great deal since the farmers cannot afford to buy feed for livestock especially during the dry season. Finally drought can be a deterrent towards progressive livestock production of the smallholder farmers. It is therefore clear that access to grazing land can positively influence on farm investment and productivity of the smallholder farmers. Socio-economic factors that are likely to affect on farm investment and productivity of the smallholder farmers are discussed in the next section.

5.4 Socio-economic factors likely to affect on-farm investment and on-farm productivity

This section focused on household socio-economic factors related to farming, likely to affect the on farm investment and productivity of the smallholder farmers. These include access to credit, access to production inputs, access to farm implements, access to grazing land, access to markets, access to extension services, household income, farming experience, membership to

farmer organisations and irrigation. Understanding these factors is useful in determining the influences they may have on on-farm investment and on-farm productivity of the smallholder farmers.

5.4.1 Access to credit

Credit is regarded as one of the crucial factors determining the availability of both production and marketing inputs. There is no shortage of literature to prove that credit plays an essential role for acquisition of capital goods (Ahmed *et al.*, 2005; Machethe, 2004; Blackman, 2001), land improvement (Amani, 2004), and to meet short term seasonal needs (Gouse, Kirsten, Jenkins, 2002; Amani, 2004). Generally, for many smallholder farmers in Africa, credit is elusive mainly because of absence of formal financial structures to provide credit and finance smallholder farming (Amani, 2004). Provision of credit and finance to smallholder farmers is a major issue in most developing countries in the world. There is abundant evidence that lack of credit and available finance provided to the farmer at right time constitute a constraint to development (Bembridge, 1985).

Smallholder farmers need credit and loans to purchase inputs, prepare land, to invest in infrastructure and hire labour. Smallholder farmers are discriminated against by lending agencies because of the relatively poor resources background (Igodan, 1991). This attitude by banks and lending institutions with respect to credit and fiancés is consistent with World Bank study in Rwanda with smallholder food crop farmers. Commercial banks wish to lend money to creditworthy initiatives and individuals, but will be reluctant to lend money if the farmer is not certain on reaping the returns from such initiatives. According to Van Averbeke (1998), increased tenure security in a form of land title, long term lease may facilitate farmer's access to credit which could be used to purchase inputs or invest in the infrastructure development. However, no bank will accept title deed as a collateral unless the land saleable. Smallholder farmers in the study area do not receive any government funding. All costs pertaining to farming are borne by the smallholder with exception of limited production inputs in certain villages in Alice. Table 5.11 shows the percentage of farmers with and without access to credit in the study area. The majority, about 84% of the interviewed farmers were constrained in terms of access to credit. Only about 16% of the interviewed households have access to credit. The farmers who

had access to credit had obtained from mostly from informal sources such as families, friends and relatives with very little obtained from the formal lending institutions such as banks. It is therefore clear that the smallholder farmers were constrained in terms of access to credit due to requirements and processes that must followed before credit is granted. It is clear that farmers opted for informal credit via family, friends and relatives as result of difficulties in accessing formal credit. Table 5.11 shows distribution of access to credit.

Table 5.11 Distribution of access to credit

Access to credit	Frequency (No)	Percentage (%)
Access to credit	13	16
Lack of access to credit	67	84
Total	80	100

Source: Field survey, 2013

Farmers with access to formal credits are more likely to adopt improved technology than those who have no access to formal credits. This confirms Pillay's (2002) observation that lack of access to credit is a major constraint for smallholder farmers in the developing countries. Due to lack of credit, some of the farmers do not have the capital investment to expand their productive activities, and therefore implies lack of access to inputs (seed, fertilizer and insecticides). According to Diagne, Zeller and Sharma (2000), access to credit increases the ability of a household with no or little savings to acquire the essential agricultural inputs. It is therefore clear that access to credit will definitely influence positively on farm investment and productivity of the smallholder farmers.

5.4.2 Access to productions inputs

Agricultural production inputs are important factors of production as they are the one used to produce food crop products and feed animals. The agricultural inputs that were used in the crop production include seeds, seedlings, fertilizer, manure and water. Without these production inputs farmers cannot be able to produce in their farms. Agricultural inputs such as seeds, fertilizers, chemicals, vaccines play an important role in agricultural production (Matson *et al.*,

1997). Access to inputs consequently leads to successful agricultural activities by smallholder farmers. Table 5.12 shows distribution of access to production inputs by respondents.

Table 5.12 Access to production inputs

Access to production inputs	Frequency (No)	Percentage (%)
Access to inputs	51	61
Lack of access	29	39
Total	80	100

Source: Field survey, 2013

Table 5.12 shows that 61% of the smallholder farmers have access to production inputs whilst 29% had no access. This can be linked to the fact that the majority (61%) have access to inputs such as fertilizer, seeds, and chemicals which are at times supplied by the government through extension agents. This is in line with Mabuza (2008) that smallholder farmers receive funding from external sources that include commercial banks for example Land Bank, government and donor agencies. Furthermore farmers who have access to productions inputs were willing and able to commit a portion from their household income in order to purchase productions inputs. However, the 29 % can be part of the farmers who are not benefitting from the programme because government has not implemented it all the areas due to limited budget.

The farmers were depending on their household income or support from government in order to get production inputs. They indicated that not all villages get this support and where they get it, it is always delayed as result their production cycle is disturbed. However it must be noted whilst majority have to access to inputs for crop production, it was difficult to access to inputs for livestock production such as vaccines, dipping mixtures and fodder. Access to adequate supply of production inputs lead to successful farming activities. Without these inputs not production will takes place and it is there reasonable to conclude that access to production affects the on farm investment and productivity of the smallholder farmers. The following section will discuss access to farm implements by smallholder farmers.

5.4.3 Access to farm implements

Agricultural implements refers to the implements and tools used in own food production by households. Many rural households do have agricultural implements that are needed in own food production. Access to agricultural implements may determine the level of investment at the farm (Pote, 2008). Table 5.13 shows distribution of access to farm implements.

Table 5.13 Access to farm implements

Access to farm implements	Frequency (No)	Percentage (%)
Access	42	53
Lack of access	38	47
Total	80	100

Source: Field survey, 2013

The respondents were asked to indicate if they have access to equipment or not. The result shows that 53% indicated they had access whilst 47% indicated that they have not access to equipment. The farmers had access to households implements such as spade, rakes and wheelbarrows. There are few farmers who had access to bigger implements such ploughs, discs, cultivators, tractor. In order for farmers to have access to these implements they had hire them from other farmers either in their area or other neighbouring villages. Some opted for use of animal drawn implements due high costs of acquiring the tractor drawn implements. The most scarce and challenging implement is a tractor and according to the farmers. They had to hire it at very expensive rates. The tractor is very important in the whole production cycle of the farmers as it is used for land preparation during the preseason and for actual planting during the planting season. Sometimes the farmers had to wait for longer periods for a tractor whilst it is being used by farmers in other areas. Due to this situation farmer's production plans were interrupted and sometimes delayed. Access to farm implements may determine the level of investment and resultant productivity.

5.4.4 Access to grazing land

In the Eastern Cape, the mixed farming system practiced by Southern Nguni tribes had three components, namely livestock production consisting of mainly cattle, crop production on one or more fields, and vegetable production in home gardens (ARDRI, 1999). In the rural parts of Eastern Cape, most African communities practice a system of mixed agriculture involving crop production and animal husbandry. The system relies, however more heavily on animal production than on crop production. Livestock farming of communal grazing represents more than four-fifths of the agricultural assets of the farming rural households. However agriculture plays an insignificant part of the production in the rural areas, with livestock contributing only 9% to the household income (Romuld and Sandham, 1996). Generally, cattle are grazed day and night in the communal lands whilst milking animals are kraaled at night. The bulk of the land area of the communal areas of South Africa is used as grazing (ARDRI, 1996). Animals kept by the majority of the smallholder farmers in the Eastern Cape are cattle goats, sheep, chickens and pigs (Sompali, 2002). All farmers who kept large stock grazed their animals on communal land and provided night kraaling. Small stock such as sheep and goats was mostly kept on free range system with night accommodation around the premises of the main house (Lent *et al.*, 2000). This means therefore that livestock production of smallholder farmers in the study areas depends heavily on access to well managed communal grazing lands. Figure 5.7 shows access to grazing land by smallholder farmers.

The findings of the survey reveals that majority (91%) of the smallholder farmers had access to communal grazing land whilst only 9% indicated they did not have access to grazing land. Out of the 91% who have access to grazing about 95% had access to communal grazing land whilst only 5% have access to private grazing land. Those farmers who indicated lack of access to grazing land cited reasons such lack of fence and that some of them were near the forests as a result they could not get more land. However it is clear that grazing land was available through communal grazing land however there are challenges associated it.

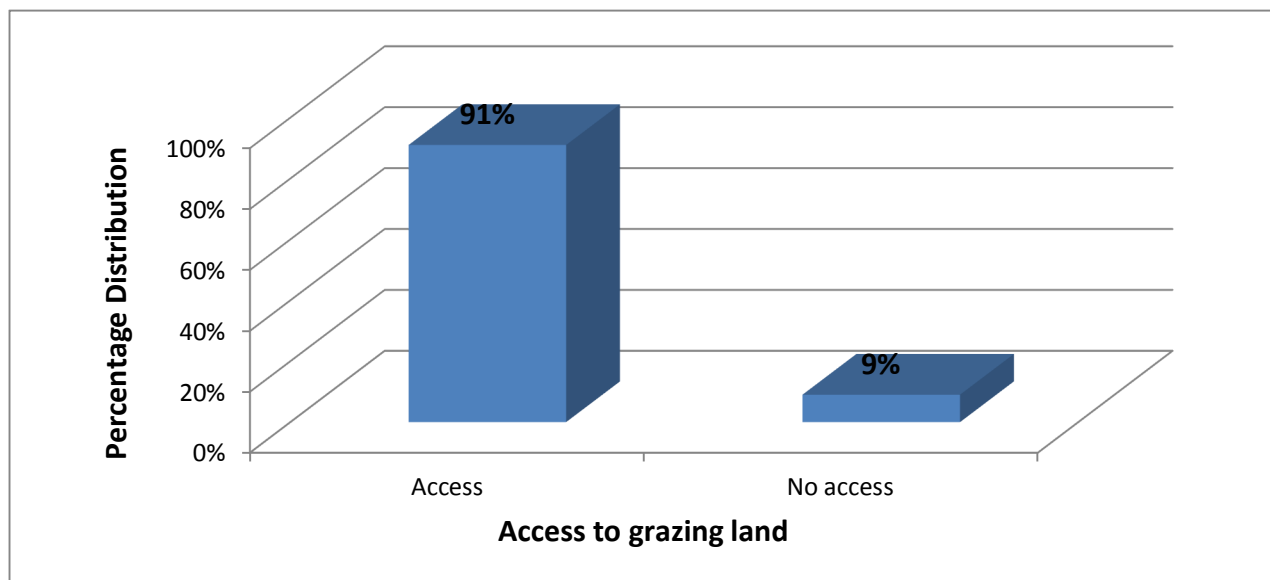


Figure 5.7 Distribution of access to grazing land

Source: Field survey, 2013

Even those who had access to grazing land they cited a number of challenges that affect their livestock production activities. These include lack of fencing, reduced grazing land size due to bush encroachment, sharing grazing land with farmers from other areas, increased livestock numbers and land not divided into camps. It is therefore clear that grazing land can contribute very strongly on the livestock production of smallholders and it is a key factor towards successful farming. With poorly managed grazing lands, farmers will be discouraged to invest more in livestock farming thus resulting in low productivity among them. It can therefore be summed up that if grazing is not properly managed it can influence both on-farm investment and productivity levels of the smallholder farmers. The results suggest access to grazing by the smallholder farmers is influenced by the fact they are under the communal tenure. Based on the results it is clear the land tenure system has serious influence on the livestock production possible to the farmers since more than 90% depends on the natural veld for grazing their livestock. It is therefore clear that access to grazing is directly linked to the tenure system that farmers belonged to and has influence on both on-farm investment and productivity of the smallholder farmers. The next section will discuss access to markets by the smallholders and how that affects the on-farm investment and productivity.

5.4.5 Access to markets

According to Groenewald (1993), the extent of the marketable surplus, which is extracted from agriculture, will depend on system variables such as government taxation and price policies and the nature of marketing arrangements, the land tenure system and the human factor. While an efficient market structure will not guarantee that all farmers will increase production, the contention can be made that the absence of such a structure is a barrier to individual incentive (Groenewald, 1993). Marketing is crucial to accelerating the transaction from subsistence farming to cash economy (Bembridge, 1984). According to Groenewald (1993), many smallholder farmers in South Africa have insufficient access to markets for their produce and inputs. Lack of markets and accessibility to markets, are one of the problems that farmers in the rural areas of Nkonkobe Local Municipality are facing. Smallholder farmers generally find it difficult to participate in formal markets (Qeqe and Cartwright (2004). Figure 5.8 shows access to the markets by respondents.

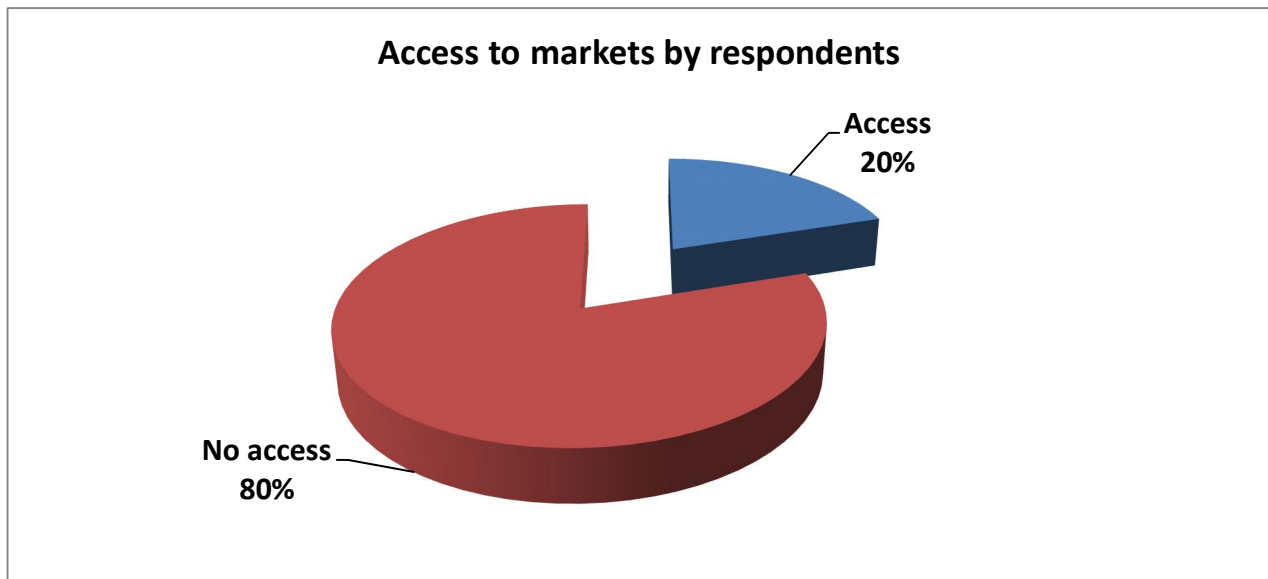


Figure 5.8 Access to markets by respondents

Source: Field survey, 2013

The few that had access have access to access to local markets and hawkers but they were not selling to shops, supermarkets nor did they have any contractual agreements. These farmers also did not have marketing agents to market their produce. Market access also includes aspects such

as distance to markets, transport to and from the markets, market information, storage facilities and road conditions to the markets. Kirsten and Sartorius (2002) indicated that smallholder farmers have high transaction costs, poor infrastructure which often leads to product rejection, difficulties to enforce contracts, difficulties to meet strict quality and food safety standards due to poor technology, marketing infrastructure and lack of access to capital for investing on more improved technology and infrastructure such as roads, buildings and storage facilities. This could be one of the reasons why the smallholder farmers were finding it difficult to get access into formal markets.

According to Dorward *et al.*, (2003) farmers who stay far from the markets have problems of transporting produce to the markets because of poor infrastructure including poor road conditions and inadequate communication services. Lack of road infrastructure often leads to delays in transporting produce to the market. Such conditions can result in farm-gate produce sales which often fetch lower prices. If the smallholder farmers cannot access formal markets it means the produce cannot be sold and therefore no return on investment made whilst producing the products can be obtained. With such a situation there is no doubt that access to markets have direct influence on expected on farm investment and productivity levels. It can be concluded that the smallholder farmers had serious challenges in accessing formal markets. It can be concluded that farmers with access with secure markets are likely to invest more in improvements than those without access to markets. Market access is expected to positively influence investment and productivity by the smallholder farmers. The next section will discuss marketing problems experienced by these farmers.

5.4.5.1 Marketing constraints experienced by respondents

The smallholder farmers were asked to indicate their major marketing constraints and these included lack of access to markets, high transport costs, lack of transport, and low volumes of produce and lack of market information. This is confirmed by the results that 99 % of the farmers mentioned lack of access to markets, 94 % reported high transport as constraints whilst farmers who mentioned lack of transport costs and low volumes of produce as constraints accounted for 91% and 85% respectively. From these findings it might happen that the farmers were too far from markets hence a need to hire the transport and such transport did not come at a cheaper

price. From asset ownership point of view it is clear that the farmers did not have their own transport neither as individuals nor as a group that can be used to market the produce. Due to this situation they had to rely on a hired transport which often comes at a very expensive price. The farmers who managed to get a hired transport in order to transport produce had a challenge of both high transport costs and low market prices. These low prices were not only experienced in informal markets but also in formal markets. About 65% of the farmers mentioned lack of market information as a constraint towards marketing of their produce. According to Fraser (1991), market information is just as important to farmers in the smallholder farming sector as it is to commercial farmers. It facilitates the smooth and efficient operations of the marketing system. Lele (1975, as quoted by Fraser, 1991) pointed out that inadequate and unreliable information throughout the marketing system is a basic cause of unequal bargaining power, poor producer prices and low level of inter-market price agreement. Smallholder farmers may have difficulties in obtaining market information, and that which is available may not always be reliable. Table 5.14 shows marketing problems experienced by the smallholder farmers.

Table 5.14 Marketing constraints experienced by respondents

Marketing constraints	Frequency (No)	Percentage (%)
Poor roads	51	64
High transport costs	75	94
Low prices	52	65
Lack of transport	73	91
Lack of market information	49	61
Lack of access to markets	79	99
Low produce	68	85
Poor payment by people	39	49

Source: Field survey, 2013

The marketing situation of the smallholder farmers was made worse because farmers were getting low prices for their produce and this did not justify the high costs of transport. This resulted in farmers selling their produce in the informal markets through local shops, schools, clinics, individual households and hawkers. One other challenge associated with informal markets was poor payment and this mentioned by 49% of the farmers. The reason for this being

that not all people were buying produce on cash but there were also those who were buying on credit. With informal markets farmers had no option but to accept given low market prices. This case of low market prices was even harder on smallholder farmers with low produce because they could not cover all their costs from the sale of produce. Without a secured market access, farmers were not willing to invest more on their land since returns on investment were guaranteed. At this point it can be concluded that lack of access to secure markets have a negative effect to the prospects for on farm investment and productivity. Access to extension services will be discussed with in the next section.

5.4.6 Access to extension services

Extension services are a source of information on better farming practices. The farmer's confidence in the extension worker influences the rate of adoption of farming practices. It would appear that whether an individual farmer has contact with extension service or not depends in large measure on his/her perception of the service and how he/she interprets its effect on farmers visited by extension officer. The farmers on several occasions expressed their need for extension services (Bembridge, 1984). Table 5.15 shows access to extension services by respondents.

Table 5.15 Access to extension services

Variable		Frequency (No)	Percentage (%)
Awareness about extension services	Aware	72	90
	Not aware	8	10
Access to extension services	Has access	69	86
	No access	11	14
Provider of extension services	No access	11	14
	Extension officers	69	86
Extension advice provided	Pests & diseases	34	43
	Water management	1	1
	Crop management	36	45
	Weed control	10	13
	Fertilizer/manure application	11	14

	Record keeping	0	0
	Marketing	2	3
Extension contacts	Weekly	0	0
	Monthly	28	35
	Twice a month	2	2
	Quarterly	47	59
	Annually	3	4

Source: Field survey, 2013

From Table 5.15 it can be observed that majority (90%) of smallholder farmers were aware about existence of extension services whilst only 10% of farmers were not aware. Furthermore it can also be observed that most (86%) of the farmers had access and those without access accounted for 14%. In terms of provision of extension services the results from Table 5.15 shows that majority (86%) of extension services were provided by government through extension officers whilst only 14% indicated they were not provided with extension services. The smallholder farmers were asked to indicate the frequency of contact with extension officers. They were asked to indicate if they were in contact either weekly, monthly, twice a month, quarterly or once a year. The results shows that majority (59%) of farmers were contacted by extension officers, whilst 35% were contacted on monthly basis with only 2 % and 4 % of the farmers that were contacted twice a month and once a year respectively. These results suggest that majority (59%) were not contacted regularly by extension officers. According to the study that was conducted by ARDRI (1999) of the stakeholder analysis the best situation and visits by extension officers must be at least once a month. The farmers who fall within this standard only accounted for 35%.

Research has also shown that smallholder farmers with some form of training are likely to be more productive than those with no training (Bembridge, 1987). From Table 5.15 it is clear that communication between extension officers and farmers was erratic and could affect the productive capacity of these farmers. The communication between smallholder farmers, especially in former homelands, and the extension officers is lacking because of the poor road networks. The interaction of farmers with the extension officers is very important in disseminating information from extension officers to smallholder farmers. However the long

distance to rural areas where many smallholder farmers exist is a constraint. Access to extension services and frequent extension contacts are expected to positively impact adoption of new technologies. Extension contact was hypothesized to have a positive influence on farmer's adoption of improved technologies by Mihiretu (2008). Therefore, access to extension in this study is expected to be positively correlated with the on-farm investment and productivity of the smallholder farmers. It was applied as a dummy variable in the regression model, which takes the value "1" if the farmer had access to extension services and "0" where there were no extension services.

5.4.7 Household income

The total income for a household is defined as the total amount received by a household from their various sources and livelihood strategies. Total income is the money derived from social grants, remittances, salaries, crops and livestock sales by a household and from income from their jobs (permanent and casual jobs). Household income is the most crucial variable in rural livelihoods in two aspects. Firstly, income is a measure of relative material well-being, and secondly, income reflects the degree of dependence on farm and non-farm resources within any given family (Bembridge, 1987). Figure 5.9 shows distribution of sources of income of respondents.

Figure 5.9 shows different sources of income for the smallholder farmers (respondents). Social grants seem to be the dominating source of income for the households as it is indicated by 70% from figure 5.9 above. Social grants include old age pension, child support and disability grants. Among the social grants, old age pension was the mainly source of income for many households in the study areas. It can also be observed that farming or agriculture contributed with only 20% of income whilst income from employment accounted for only 9%. Employment income was mainly from self-employment, salaries and wages as they were employed. Few households received income from remittances and that is indicated by 1% from figure 5.9 above.

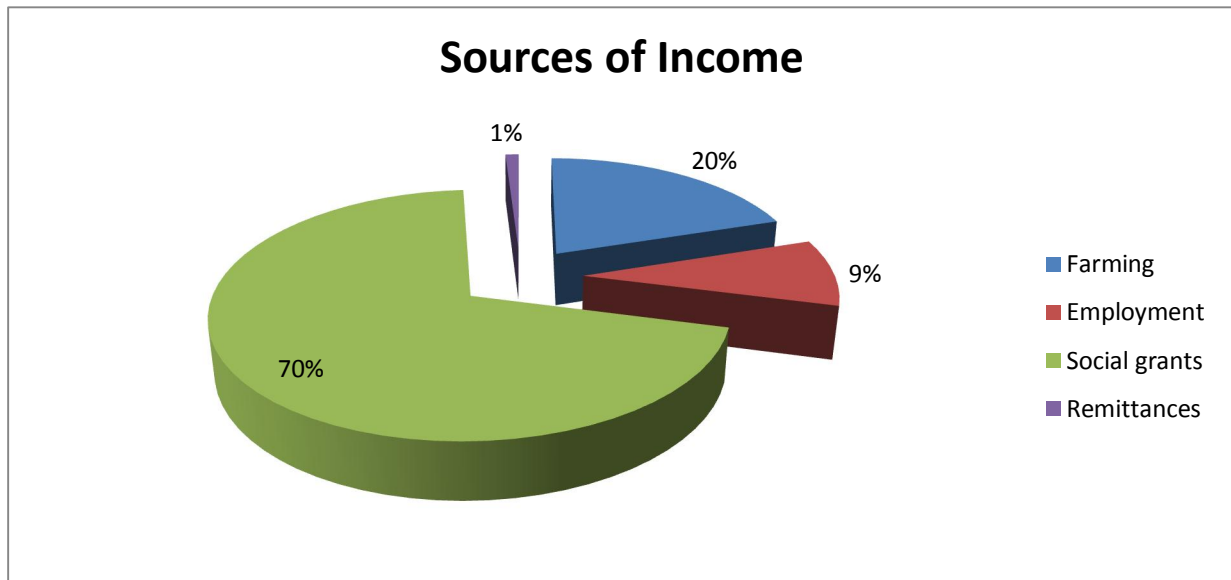


Figure 5.9 Distribution of sources of income of respondents

The smallholder farmers are characterized by having multiple sources of income meaning they rely on other sources of income other than farming). The off farm income sources are usually more important than farming. However the household income is likely to change from time to time as determined by the various sources. For the purpose of this study the focus will be on income from farming, additional income and assess sources of additional income. Table 5.16 shows distribution of total household income of the respondents in the study area.

Table 5.16 Distribution of total household income per annum

Income categories	Frequency (No)	Percentage (%)
R 1 – R 10 000	66	82
R 10 001 – R 20 000	7	9
R 20 001 – R 30 000	4	5
R 30 001 – R40 000	3	4
Total	80	100

Source: Field survey, 2013

Results show that majority (82%) of farmers only earned income between R1 - R 10 000 whilst 9% earned between R 10 001 – R 20 000, 5% earned between R 20 001 – R 30 000 and 4%

earned income between R 30 001 – R 40 000. These results shows the total household income earnings were skewed towards low categories with only few were higher categories. These figures could have been very low if they were not boosted by income received from sales livestock. This means that the off farm income was relatively low as compared to on farm income. From the results shown in Table 5.16 it is clear that farmers were earning very low income either because they did not have many sources of off farm income or they did not have good income from the farming in during the 2012/2013 production season. The amount of money a household has, determine the level of capital a household should investment farming. Farmers have sufficient access to capital when they have adequate incomes or other resources to purchase production inputs (Ziervogel *et al.*, 2006). When a household have better or good income it will also be able to purchase agricultural inputs so that they can continue farming. A household that is in good financial status can even hire people for agricultural production process. It is therefore clear that household income plays a very important role in influencing success of farming enterprise.

Access to income can affect the probability of a rural households becoming successful in farming (Dlova *et al.*, 2004). The probability of success in farming for rural households is directly related to access to other sources of income. According to Dlova *et al.*, (2004), those farmers or rural households who have access to other sources of incomes made better use of all existing factors of production while households who have access to little alternative income under-utilized some of their factors of production due to inadequate operating capital. Given the low levels of household income, those households will not have the resources or enough resources to engage in high-input agricultural production (Aliber and Hart, 2009). It can be concluded that the total household income at the disposal of farmers will have direct influence on the on-farm investment and productivity of the smallholder farmers. In the following section, farming experience of the respondents in relation to its influence and effect on-farm investment and productivity of the smallholder farmers is discussed.

5.4.8 Farming experience

Farming experience refers to the number of years that the farmer has been involved in farming. The farmers were asked to indicate the number of years that they have been involved in farming.

Mjonono, 2000 citing Kille (1993) indicated that improvements are accomplished over time, therefore it is expected that farmers who spend more time on the land would be more likely to invest in productivity enhancing infrastructure. The longer the time spent on the land the greater the probability of investment occurring (Kille, 1993). Table 5.17 shows distribution of farming experience of respondents.

From Table 5.17 it can be observed that majority (31%) of farmers had farming experience of between 1-5 years, whilst other groups of farmers who had farming experience that ranged from 6 – 10, 11-20 and 21-30 years and have accounted for 18%, 21 % and 17% respectively. In terms of the analysis of results some of these farmers have some considerable experience in farming. These results suggests two things, firstly it might happen that some farmers were involved in farming since they grew up until to date whilst it may also happen that some farmers only resorted to farming due to absence of other economic activities. Secondly it is likely that some joined farming at an old age after retirement or when they were retrenched from their lifetime jobs in other cities either due to old age or health reasons. According to Van Averbeke *et al.*, (1998) most people from rural areas returned to their homes when other sectors of the economy can no longer absorb them. He further inserted that when they return back to rural areas they often see farming as the last resort for economic activity (Van Averbeke *et al.*, 1998).

Table 5.17 Farming experience of respondents

Farming experience (Years)	Frequency (No)	Percentage (%)
1 - 5	25	31
6 - 10	14	18
11 - 20	17	21
21 - 30	13	17
31 - 40	5	6
41 - 50	5	6
➤ 50	1	1
Total	80	100

Source: Field survey, 2013

Age analysis of these farmers indicates that majority (60 %) were above 60 years of age. A measure of work experience as age is highly correlated with experience (Feder, 1987). More experienced farmers would have had more time to accumulate capital and may be in better financial position to make improvements in their lands. Moreover experienced farmers have accumulated a lot of knowledge about farming and are therefore in a position to apply better farming practices as compared to farmers with less experience. Therefore there is a relationship between farming experience and prospects for on-farm investment and productivity. Membership to farmer organisation and how it influences on-farm investment and on-farm productivity of the smallholder farmers is discussed in the next section.

5.4.9 Membership to farmer organisations

According to Van Averbek *et al.*, (1998), it has been accepted that participation of farmer organisations can be regarded as a measure to gauge progressiveness and success. Farmer organisations constitute farmers that have come together as a group to carry out objectives formulated by them to solve problems which cannot otherwise be easily solved by the individual farmers. The implication here is that the organisations mandate must be clearly defined (Legoupil, 1990). For smallholder farmers with or without access to irrigation, productions inputs, farming implements, access to markets and access to capital belonging to farmer's organisations often brings positive impacts on its participants (Abernethy, 1993). However the productivity and sustainability of farmer organisations will depend on the creativity, resourcefulness, honesty and hard work of its members as shown by the results of the study in Bangladesh where with little or no co-operation from outside, smallholder farmers were able to organise themselves into groups for service functions (Abernethy, 1993). Table 5.18 shows distribution of membership to farmer organisations by respondents.

Table 5.18 Membership to farmer organisations

Membership to farmer organisation	Frequency (No)	Percentage (%)
Member	51	64
Not a member	29	34
Total	80	100

Source: Field survey, 2013

Farmers were asked to indicate if they belonged to particular organisations. According to Randela (2005), farmer organisations are important means of linking producers with markets, where an individual producer cannot individually enjoy economies of scale. Results show that 51% were members of farmer organisations whilst 29% were not members of any farmer organisations. Those who belong to farmer groups in the study area indicated that they benefited from such organisations by receiving financial support, access to implements, market information and moral support from the organisations. The organisations operating in the area are community farmer associations, farmer cooperatives and commodity groups. However the farmers who were not members of the farmer's organisations indicated either the organisations were none existent or were at the early stages of development or were associations not relevant to the farmer's needs. For example cattle farmers might be interested in joining an association but only to find that the existing association is for piggery farmers.

Results analysis suggests that the farmers belonging to farmer organisations are likely to have better access to resources and might be better supported than those who did not belong to any farmer organisations. The best farmer is expected to be a member of one or more farming organisations (ARDRI, 1999). Being a member of a farmer organisation, the more likely the farmer is to be successful, as he/she would benefit from the organisation. Farmers who are members of farmer organisations are likely to investment more in their farms thus resulting in more productivity than those who are not members. It can therefore be concluded that membership to farmer organisations is likely to influence on farm investment and productivity by the smallholder farmers. The next section will discuss the access to irrigation water by smallholder farmers and how it affects their on farm investment and productivity.

5.4.10 Access to irrigation water

The farmers were asked to indicate if they were irrigating or not in their farming practices. The results show that majority (91%) of the farmers were not irrigating whilst only 9% were irrigating their fields. The farmers were also asked to indicate if they have to access irrigation water or not. The results of the analysis show that majority (76%) had no access to irrigation water whilst only 24% had access to irrigation water. It is an obvious reason why most (76%) of the farmers depended on the erratic rainfall for their farming activities. The farmers were further

asked to indicate if the water status as whether irrigation water was always enough, sometimes enough or never enough. Table 5.19 shows access to irrigation water by respondents.

Table 5.19 Access to irrigation water by respondents

Variable		Frequency (No)	Percentage (%)
Irrigation status of respondents	Irrigating	7	9
	Not irrigating	73	91
Access to irrigation water	Have access	19	24
	Not access	61	76
Status of irrigation water	No access at all	61	76
	Always enough	8	10
	Sometimes enough	7	9
	Never enough	4	5
Experience water scarcity	Yes	65	81
	No	15	19
Problems with water supply	Yes	57	71
	No	23	29
Access to irrigation infrastructure	Have access	7	9
	Not access	73	91
Reasons for lack of infrastructure	Lack of capital	56	70
	Depend on rainfall for water	12	15
	Dams far from the fields	2	3
	Cannot afford infrastructure	6	8
	Waiting for government	1	1
	Problems with generator	3	3

Source: Field survey, 2013

From the results in Table 5.19 it can be observed that 76% of the farmers indicated that they had no access to irrigation water at all, whilst 10% said water was always enough, 9% indicated sometimes water was enough and lastly 5% indicated that irrigation water was never enough.

This clearly indicates that the farmers had serious water scarcity problems as confirmed by the analysis of the results in Table 5.19. These results indicate that 81% of the farmers experienced water scarcity problems whilst only 19% did not report any water supply problems. With the high levels of water scarcity this could mean that smallholder farmers had serious water supply challenges. Again, these results confirm this as shown by the 71% of farmers who reported water supply problems against the 19% that did not experience any water supply problems. Based on these findings it is clear that the farmers had very serious challenges with water.

It is not surprising that 71% reported water supply challenges because only 9% of the farmers indicated they have access to irrigation infrastructure with majority (91%) of farmers with no access to irrigation infrastructure at all. This clearly suggests that there is a correlation between water availability and access to irrigation infrastructure. Besides infrastructure farmers attributed this situation to a number of challenges. The farmers were asked to indicate the major reasons for this situation. The results show that the most common constraints identified by the farmers are as follows, namely lack of capital (70%), depending on rainfall (15%), dams far from the fields (3%), cannot afford infrastructure (8%), waiting for government support (1%) and problems with generator (3%).

From the above analysis, the findings suggest that the most farmers had no access to irrigation water and they were depending on the rainfall for their farming activities. In cases where there farmers had access to irrigation infrastructure there were still problems of supply due to poor or lack of infrastructure. Having indicated that majority did not have access to irrigation water and infrastructure it is clear that these farmers could have suffered due to drought as rain was their only source of water for their farming activities. Furthermore without proper irrigation infrastructure farmers cannot have access to constant supply of water hence they reported water scarcity due to water supply problems. This was either caused by lack of access to irrigation infrastructure or severe droughts that hit the study area. Without secured water supply there could be no crop production and this is even made worse as the climate change effects are beginning to have impact on the crop production performance of the smallholder farmers. It is therefore clear that the smallholder farmers can no longer depend on the rain in order to get access to water for their farming activities. This means therefore that there is a need for huge investment

on both water sources and irrigation infrastructure. Based on these finds it can be safely concluded that access to irrigation water can have great effects on possible levels of on farm investment and productivity.

5.5 Improvements and investments by smallholder farmers

Secure property rights to land are expected to encourage greater on farm investment by enhancing the incentive to invest on by improving access to credit (Feder, 1987). Decreased uncertainty about future access to land positively influences a farmer's decision to invest time, effort and capital into long-term improvements on the farm, which may enhance the productive capacity of land or maintain present productive capacity (Kille and Lyne, 1993). Secure and exclusive use rights are also necessary conditions for a land market and land markets have implications for investment and conservation. Firstly, income streams from investments in land can be captured on sale or lease and if the transfer of land is restricted, then so the transfer of fixed assets on the land. Table 5.20 shows distribution of improvements and investments made by the smallholder farmers.

Table 5.20 Improvements and investments made by the smallholder farmers

Variables		Frequency (No)	Percentage (%)
Improvements made	Fencing	31	39
	Improved pastures	6	8
	Irrigation	4	5
	Drinking troughs	3	4
	Dipping facilities	5	6
	Contour drains	3	4
	Dams	1	1
	Farm buildings	1	1
Reasons for no improvements	Lack of capital	65	81
	Poor produce	1	1
	Land tenure system	1	1
	No need for improvements	10	13

	Depending on government	2	3
	Use natural resources	1	1
Capital investments made	Buildings	16	20
	Tractor	4	5
	Car	4	5
	Truck	1	1
	Machines	3	4
	Trailer	2	3
	Generator	2	3
Aspiring to make investments	Yes	61	76
	No	19	24
Reasons preventing investments	Lack of capital	57	71
	Lack of fence	8	10
	Hiring of tractor	1	1
	Afraid of debt	10	13
	Land ownership	1	1
	Severe drought	1	1
	Old age	1	1
	Lack of production inputs	1	1
Plans for future investments	Yes	66	83
	No	14	17
Possible future investments	Fencing of land	34	43
	Irrigation water	8	10
	Production inputs	2	3
	Purchase more livestock	5	6
	Tractor	1	1
	Implements/Equipment	4	5
	Land improvements	2	3
	Grow irrigated crops	11	14
	Tunnel farming	1	1

	Vaccines for livestock	1	1
	Chicken House	2	3
	Irrigation infrastructure	2	3
	Garage for tractor	1	1
	House	1	1
	Vehicle	1	1
	Invest in camps	1	1
	Buy more land	2	2
Prevention of future investments	Lack of capital	70	88
	Depend on rain water	3	4
	Land tenure security	1	1
	Lack of information	1	1
	Drought	4	5
	Cannot manage repayment	1	1

Source: Field survey, 2013

The farmers were asked if they have made some improvements in the past three years in their farms. The assumption is that for any investment to be assessed very well, it should be done over certain period. It was an assumption that the farmers could have made some improvements in the farms such as fencing, improved pastures, irrigation infrastructure, drinking troughs, dipping facilities, contour drains, dams and farm buildings. From Table 5.20 it can be observed that the generally, very few farmers have done some minimal improvements in their lands with the exception of the farmers (39%) who invested in fencing of their land. This reflects general low levels of improvements that were done by farmers. The farmers were asked to indicate as to what could be the possible reasons for not making improvements and the following are some of the reasons that came up namely lack of capital, poor produce, land tenure system, no need for improvements, depending on government, use natural resources. However it must be noted the most prominent reason why the smallholder farmers did not make any improvements was because of lack of capital and this has been confirmed by majority (81%) of farmers as reflected in the results shown in Table 5.20. In addition to this 13% of the smallholder farmers indicated that there was no need for any improvements.

In effort to understand investment trends of the smallholder farmers, they were asked to indicate if they made any capital investments in their farms such as buildings, tractor, vehicles, truck, machines, trailer and generator. The results shows that most (20%) investments made on their farms were on buildings with very few farms investing other capital equipment as mentioned above. Furthermore the smallholder farmers indicated that during past three years they wanted to make some investments in their farms but prevented by number of factors such as lack of capital, lack of fence, hiring of tractor, afraid of debt, land ownership, severe drought, old age and lack of production inputs. However majority of farmers cited lack of capital (83%), as the main reason for prevention of investments. This is followed by lack of fence (10%) and afraid of debt (13%) as other reasons why there were no investments. The farmers were asked to indicate the possible future investments that they will possible invest on. Among the top possible investments the farmers identified these included fencing of land (43%), irrigation infrastructure (10%) and growing irrigated crops (14%). Furthermore the smallholder farmers were asked to indicate what could possible prevent them from making such investments in the future. The farmers mention lack of capital, dependency on government, land tenure security, drought and cannot afford debt repayment. However the majority (88%) of farmers identified lack of capital whilst only 1% mentioned land tenure security as limitation towards possible future investment.

5.6 Summary

This chapter discussed the household demographics as well as socio-economic characteristics of the study population. The results of the survey revealed that generally, the household demographic characteristics have an influence on the decision to investment in the farm thus on farm productivity. These included age, gender, marital status, educational level and household size of the smallholder farmers. However the survey findings of the survey revealed that smallholder farmers were not much concerned the land tenure security of the land as they see themselves as owners of these lands. The reason being that they always had access to their land and there were no perceived threats in terms of land tenure security. The majority of the smallholder farmers were not worried that they might lose their land in the future as they felt that their land tenure was secured. However, the majority of farmers although have sense of security but they still preferred a freehold tenure system as form of land tenure security. This suggests that there was a sense of insecurity among the smallholder farmers caused by the existing land

tenure system. Majority of the farmers held their land under freehold (66%), leasehold (5%) and communal hold (29 %). Even though majority had freehold tenure system, they could not use their land as collateral because the title deeds were not registered in their names but that those of deceased family members. The farmers cannot use their land as collateral when required funding from the lending institutions. The majority was constrained by lack of credit and had low income. Lack of cash may suggest that the farmers have difficulties in purchasing farm inputs and making necessary improvements and investments in their lands.

Generally, the results of the survey suggest that the household demographics and socio-economic variables may have an influence on the on-farm investment and on-farm productivity by the smallholder farmers. About 69% of the smallholders indicated that land tenure security did not have an effect whilst only 31 % said it had an effect. With regards to on farm productivity 71 % had reported land tenure did not have any effect on the on-farm productivity whilst only 29 % said it had effects. Furthermore besides the challenges with land tenure, there are other factors that influence on-farm investment and on-farm productivity.

The results of the survey revealed that smallholder farmers were faced with lot of challenges. These included lack of access to markets, grazing land, credit, farm implements, productions inputs and irrigation water. In addition to this the smallholder farmers were faced with both crops and livestock production constraints. Crop production constraints included lack of access to labour, pests, lack of access to production inputs, diseases, lack of transport, lack of access to capital, lack of storage facilities, lack of management skills and severe drought. Livestock was constrained by diseases, theft of livestock, attack by wild animals, lack of fence in the camps, lack of labour, lack of access to vaccines, dipping facilities too far and severe drought. For both crop and livestock production disease and drought were major concern for smallholder farmers since they were dependent on rain for their farming activities. With regards to improvements and investment there is little or not much investment that has been made by the smallholder farmers. One of the reasons mentioned by the farmers as the main cause for little or no investments is the lack of capital to make such improvements or investments.

CHAPTER SIX

RESULTS AND DISCUSSION OF THE EMPIRICAL ANALYSIS

6.0 Introduction

The main aim of this chapter is to present the empirical results of the on-farm investment and on-farm productivity models that were formulated and explained in Chapter four. Within the chapter, independent variables are tested for their significance, how they influence the two dependent variables namely on-farm investment & on-farm productivity and conclusions are drawn based on the results. An in-depth explanation is provided for the significant variables.

6.1 Empirical models

This section presents the results of the on farm investment and on farm productivity models that employed a multiple regression model. All the household socio-economic factors age, gender, education, household size (family size), educational level, household income (off farm & on farm income), access to extension services, land tenure system, farm size, access to credit, access to production inputs, access to farm implements, access to grazing land, access to markets, access to extension services, farming experience, membership to farmer organisations and irrigation that were discussed in previous Section 4.8.1.1 were considered for the on-farm investment and on farm productivity models and tested for their significance. The next section aims to assess the effect of the household demographic characteristics and other socio-economic factors mentioned above on the on-farm investment and productivity. It is hypothesized that the land tenure security affects investments & productivity and the availability of resources to finance on-farm improvements & investments.

6.1.1 Econometric analysis of variables through the multiple regression model

The previously explained on-farm investment and productivity models will employ a multiple regression model. Gujarati (1992) defined multiple regression model as a statistical technique that allows the prediction of scores of a dependent variable on the basis of scores on several other variables (independent variables). A multiple regression model is important because it tests whether a dependent variable in this case (*I*) and (*AP*) are related to more than one independent variable for example: $X_1, X_2, X_3, \dots, X_n$ and $Z_1, Z_2, Z_3, \dots, Z_n$ respectively. This model is an important statistical analysis tool in most fields because of its power and flexibility (Gujarati,

1992) as cited by Sibanda (2012). Partial regression coefficients (such as beta values $\beta_1, \beta_2, \beta_3, \dots, \beta_n$) were also obtained and these measure how strongly each independent variable influences the dependent variables (I) and (AP). Thus, the higher the beta value the greater the impact of the independent variable on the dependent variables (Gujarati, 1992). In this study, the first dependent variable is (I) is on-farm investment, and the independent variables which are ($X_1, X_2, X_3, X_4, X_5, X_6, X_7, X_8, X_9, \dots, X_{12}$) include socio-economic factors. In this case β is a parameter (regression coefficient) of socio-economic factors. The socio-economic factors as listed in under on-farm investment model in Table 4.2 will be tested to under whether they have influence on farm investment.

The on-farm investment model explained in chapter four employing a multiple regression model is in the form:

$$I_i = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \beta_9 X_9 + \dots + \beta_{12} X_{12} + \dots \mu_1(1).$$

Where:

I_i = Value of improvements made in the farm

X = a matrix of designed of socio-economic factors influencing on-farm investment,

β is a parameter to be estimated,

ϵ is a stochastic error term.

By fitting the variables into the on-farm investment model, it is presented as shown in equation 1:

$$I_i = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \beta_9 X_9 + \dots + \beta_{12} X_{12} + \dots \mu_1(1).$$

Where:

I_i = Value of improvements made in the farm

X_1 = Land tenure security

X_2 = Age

X₃ = Gender

X₄ = Household size (Family size)

X₅ = Household income (includes both off farm and on farm income)

X₆ = Educational levels

X₇ = Farm size

X₈ = Access to credit

X₉ = Access to production inputs

X₁₀ = Access to farm implements

X₁₁ = Access to grazing land

X₁₂ = Access to markets

The second dependent variable is on-farm productivity (*AP*) i.e. agricultural productivity and the independent variables which are (*Z*₁, *Z*₂, *Z*₃, *Z*₄, *Z*₅, *Z*₆, *Z*₇, *Z*₈, *Z*₉,...*Z*₁₇) include socio-economic factors. In this case β will be a parameter (regression coefficient) of socio-economic factors. The socio-economic factors as listed in under on-farm investment model in Table 4.2 will be tested to under whether they have influence on-farm productivity.

$$AP_i = \beta_0 + \beta_1 Z_1 + \beta_2 Z_2 + \beta_3 Z_3 + \beta_4 Z_4 + \beta_5 Z_5 + \beta_6 Z_6 + \beta_7 Z_7 + \beta_8 Z_8 + \beta_9 Z_9 + \dots + \beta_{17} Z_{17} + \dots \mu_1 (2).$$

Where:

*AP*_{*i*} = Productivity post on-farm investment,

Z = a matrix of designed of socio-economic factors influencing on-farm productivity,

β is a parameter to be estimated,

ϵ is a stochastic error term.

By fitting the variables into the on-farm productivity model, it will be presented as shown in equation 2:

$$AP_i = \beta_0 + \beta_1 Z_1 + \beta_2 Z_2 + \beta_3 Z_3 + \beta_4 Z_4 + \beta_5 Z_5 + \beta_6 Z_6 + \beta_7 Z_7 + \beta_8 Z_8 + \beta_9 Z_9 + \dots + \beta_{16} Z_{16} + \dots \mu_1 (2)$$

Where:

AP_i = Productivity post on-farm investment.

Z_1 = Land tenure security

Z_2 = Investment

Z_3 = Age

Z_4 = Gender

Z_5 = Household size (Family size)

Z_6 = Household income (includes both off farm and on farm income)

Z_7 = Educational levels

Z_8 = Farm size

Z_9 = Access to credit

Z_{10} = Access to production inputs

Z_{11} = Access to farm implements

Z_{12} = Access to grazing land

Z_{13} = Access to markets

Z_{14} = Access to extension services

Z_{15} = Farming experience

Z_{16} = Membership to farmer organisations

Z_{17} = Irrigation

To estimate the partial regression coefficients, β , a set of “n” observed values on the (n + 1), the least squares principle was used to obtain an equation for estimating the mean of Y. The least squares principle specifies that the estimates, β_i , minimize the error sum of squares (Freund, Wilson & Sa, 2006). The least squares estimates are provided by the solution to the following set of (n + 1) linear equations in the (n + 1) unknown parameters, $\beta_0, \beta_1, \dots, \beta_n$. The solutions to these normal equations provide the least squares estimates of the coefficients, which were denoted by $\beta_0, \beta_1, \dots, \beta_n$. The significance values show whether or not a change in the independent variable significantly influences the dependent variable at a given level. In this study, the variables were tested at 5% significance level.

6.1.2 Empirical results of the regression model

The descriptive analysis and interpretation of the results has been given in the previous chapter. It is therefore important to predict scores of one variable (dependent variable) on the basis of scores on several other variables (independent variables). In other words, how would changes on the farm investment relate to those of independent variables such as land tenure security, age, gender, education, household size (family size), educational level, household income (off farm & on farm income), access to extension services, farm size, access to credit, access to production inputs, access to farm implements, access to grazing land, access to markets, access to extension services, farming experience, membership to farmer organisations and irrigation. For the purpose of this study, the multiple regression model was used to test how these variables relate to one another. The main reason for using this model is to obtain the beta values ($\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6, \beta_7, \beta_8, \beta_9 + \dots + \beta_{12}$) and ($\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6, \beta_7, \beta_8, \beta_9 + \dots + \beta_{16}$) as these measure how strongly each independent variable ($X_1, X_2, X_3, X_4, X_5, X_6, X_7, X_8, X_9 + \dots + X_{12}$) & ($Z_1, Z_2, Z_3, Z_4, Z_5, Z_6, Z_7, Z_8, Z_9 + \dots + Z_{17}$) and how they influence the dependent variables (I) and (AP).

6.1.2.1. Multiple regression results on-farm investment model

Improvements enhance the productive capacity of land or maintain its productive capacity by preventing degradation of resources (Kille, 1993). The on farm improvements require capital injection for materials and labour. Investment in on farm improvements by the smallholder farmers was recorded as a dummy variable (IFA) that scored one if the farmer had invested in improvements, and zero otherwise. The model assumes that non exclusive and insecure land rights will restrict access to credit and reduce a farmer's incentive to invest. Apart from the variable land tenure security, other personal and farm characteristics that likely to influence investment decisions were also included in the model. The following variables were considered in the model.

The on-farm investment model is as follows:

$$I = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \dots + \beta_{12} X_{12} + U.$$

Where: I = Value of improvements made in the farm
 X_1 = Land tenure security (LTS)
 X_2 = Age (AGE)

- X₃ = Gender (GEN)
 X₄ = Household size (HHS)
 X₅ = Household income (HHI)
 X₆ = Educational levels (EDCL)
 X₇ = Farm size (FS)
 X₈ = Access to credit (ACR)
 X₉ = Access to production inputs (API)
 X₁₀ = Access to farm implements (AFI)
 X₁₁ = Access to grazing land (AGL)
 X₁₂ = Access to markets (AM)
 U = Error term

Table 6.1 Multiple regression results applied on-farm investment

Parameter ($\beta_0, \beta_1, \dots, \beta_{12}$)	Coefficients	t - Statistics	Significance
Intercept/Constant (β_0)	2.577	3.717	0.000
Land tenure security (β_1)	-0.018	-0.143	0.887
Age (β_2)	-0.113	-0.836	0.406
Gender (β_3)	-0.103	-0.852	0.397
Household size (β_4)	-0.256	-2.201	0.031
Household income (β_5)	-0.056	-0.471	0.639
Educational levels (β_6)	-0.297	-2.249	0.028
Farm size (β_7)	-0.246	-2.160	0.034
Access to credit (β_8)	0.001	0.011	0.991
Production inputs (β_9)	0.044	0.358	0.721
Farm implements (β_{10})	0.037	0.301	0.765
Access to grazing land (β_{11})	0.071	0.598	0.552
Access to markets (β_{12})	-0.137	-1.061	0.293

R = 0.442, Adjusted R² = 0.37

Table 6.1 shows the estimated coefficients (β values), standard error, t-statistics and significance values of independent variables in the model. According to Gujarati (1992), the coefficient values measure the expected change in the dependent variable for a unit change in each independent variable, all other independent variables being equal. The sign of the coefficient shows the direction of influence of the variable on the dependent variable. It follows that a positive value indicates a positive association or relationship between dependent variable and independent variables. On the other hand, a negative value shows a negative relationship between dependent variable and independent variables. Therefore, in this study, a positive value implies a positive relationship between on-farm investment and independent variable and negative value implies that on-farm investment is negatively related with an independent variable or an independent variable does not have an impact on on-farm investment by a smallholder farmer (dependent variable).

The significance values (also known as p-values) show whether a change in the independent variable significantly influences the dependent variable. In this study, the variables were tested at the 5% significance level. Thus, if the significance value is greater than 0.05, then it shows that there is insufficient evidence to support that the independent variable influences a change away from dependent variable. If the significance value is equal to or less than 0.05, then there is enough evidence to support a claim presented by the coefficient value.

From Table 6.1, 12 variables were associated with on-farm investment by the smallholder farmers. These are land tenure security, age, gender, household size, household income, educational levels, farm size, access to credit, access to production inputs, access to farm implements, access to grazing land and access to markets. The results suggest not all of them had significant influence on farm investment. Based on the findings only three variables have some influence in on farm investment namely household size, educational levels and farm size. The results of each factor's association with on-farm investment are explained below.

6.1.2.1.1 Household size (HHS)

The negative regression coefficient of -0.256 (β_4) for household size shows a negative relation between a household size and on-farm investment by smallholder farmers. The results suggest

the bigger household size, the less chances of investing in farming as resources are directing to other household needs. When the household is big it is likely that money will be used towards supporting the family. This means that household size does affect on-farm investment by smallholder farmers. This positive relationship is shown or proved by 31%, as it is shown by such big percentage (31%), it can be claimed that household size did not determine how much investment a smallholder farmer can make. It is likely that other household demographic characteristics and socio-economic factors have a bigger role in determining the investment as compared to the household size. A t-Statistics value of -2.201 shows that there is sufficient evidence to support that the household size can still influence a change away from on-farm investment by smallholder farmers when other factors.

6.1.2.1.2 Educational levels (EDCL)

Education is a measure of human capital. Better educated farmers are expected to have lower information costs and better knowledge of the benefits of on-farm improvements (Kille, 1993). According to Feder *et al.*, (1981), education plays a positive role in determining adoption rates of new technology in developing agriculture. However, more skilled individuals can command high incomes in off-farm employment and may leave agriculture (Lyne, 1989). The estimated effect of education on investment may therefore be negative if educational level is correlated with on farm employment.

Regression coefficient of (β_6) -0.297 proves a negative relationship between on-farm investment and educational level of the smallholder farmers. This implies that educated farmers might not have prioritized farming as they can get income from employment somewhere. Furthermore it can be possible that farmers were not motivated to invest in agriculture. Another possible reason for this negative relationship between education level and on-farm investment can be that even if a farmer is better educated he or she will not be able to make any improvements and investments if he or she does have access to resources such as credit through bank loans. In addition to this, the educational levels of the smallholder farmers as analysed and discussed in chapter are very low.

The majority (46%) of the farmers have at least attended primary school with only 3% who have reached tertiary level. However, although the regression coefficient shows negative relationship between the educational level of the farmer and on-farm investment and this was significant at 5 % level. The t-Statistics value of -2.249 which is less than 0.05 and that implies that a claim that education level affect or influence on-farm investment by smallholder farmers can be made. With a t – Statistics value of 0.297 this indicates that there is sufficient evidence to support that education level has influence on the on-farm investment of the smallholder farmers.

6.1.2.1.3 Farm size (FS)

Total farmers land holding may serve as a favourable proxy for wealth, status and income levels (Bonabana-Wabbi, 2002). Having more land is likely to have a positive effect on adoption of most practices. The regression results show that there is a negative relationship between farm size and on-farm investment by smallholder farmers. This is shown by a beta value of -0.246 and significant level of 0.034. This clearly means that in the case of the smallholder farmers in the study area, size of the farm did not necessarily have an influence or affect the possible level of on farm investment. Investment is expected to be high with farmers with big land. This might be caused by the fact that these farmers were not practicing intensive farming and do not invest much on the land. This suggests that again other factors might have played a very strong role in influencing on farm investment thus dominating farm size.

6.1.2.2 Multiple regression results on-farm productivity model

Improvements enhance the productive capacity of land or maintain its productive capacity by preventing degradation of resources (Kille, 1993). The on farm improvements require capital injection for materials and labour. Investment in on farm improvements by the smallholder farmers was recorded as a dummy variable (IFA) that scored one if the farmer had invested in improvements, and zero otherwise. The model assumes that non exclusive and in secure land rights will restrict access to credit and reduce a farmer's incentive to invest. The model also assumes that secure property rights to land promote on farm productivity and it included variable land tenure security (LTS) as explanatory variable. According to Brown (1999), if the supposition that land title stimulates investment is valid, the variable land tenure security which is informed by being in possession of a title deed to land, the variable land tenure security was

expected to impact positively on farm productivity. However, apart from the variable land tenure security, other personal and farm characteristics that likely to influence productivity were also included in the model. The socio-economic variables as listed in Table 4.3 following control variables were considered in the model. The on-farm productivity model is specified as follows in equation 2:

$$AP_i = \beta_0 + \beta_1 Z_1 + \beta_2 Z_2 + \beta_3 Z_3 + \beta_4 Z_4 + \beta_5 Z_5 + \beta_6 Z_6 + \beta_7 Z_7 + \beta_8 Z_8 + \beta_9 Z_9 + \dots + \beta_{17} Z_{17} + \dots \mu_i \quad (2)$$

Where:

AP_i = Productivity post on-farm investment,

Z = a matrix of designed of socio-economic factors influencing on-farm productivity,

β is a parameter to be estimated,

ϵ is a stochastic error term.

On-farm productivity model empirical results:

The on-farm productivity model is specified as follows:

$$AP_i = \beta_0 + \beta_1 Z_1 + \beta_2 Z_2 + \beta_3 Z_3 + \beta_4 Z_4 + \beta_5 Z_5 + \beta_6 Z_6 + \beta_7 Z_7 + \beta_8 Z_8 + \beta_9 Z_9 + \dots + \beta_{17} Z_{17} + \dots \mu_i \quad (2)$$

Where: AP = Productivity post on-farm investment

Z_1 = Land tenure security (LTS)

Z_2 = Investment (INV)

Z_3 = Age (AGE)

Z_4 = Gender (GEN)

Z_5 = Household size (HHS)

Z_6 = Household income (HHI)

Z_7 = Educational levels (EDCL)

Z_8 = Farm size (FS)

Z_9 = Access to credit (ACR)

Z_{10} = Access to production inputs (API)

Z_{11} = Access to farm implements (AFI)

Z_{12} = Access to grazing land (AGL)

Z_{13} = Access to markets (AM)

Z_{14} = Access to extension services (AES)

Z_{15} = Farming experience (FE)

Z_{16} = Membership to farmer organisations (MTFO)

Z_{17} = Irrigation (IRR)

U = Error term,

β_0 = the intercept and

β is the partial regression coefficient

Table 6.2 Multiple regression results applied on-farm productivity model

Parameter ($\beta_1, \beta_2, \dots, \beta_3$)	Coefficients	t - Statistics	Significance
Intercept/Constant (β_0)	1.845	2.322	0.023
Land tenure security (β_1)	-0.038	-0.272	0.786
Investment (β_2)	0.037	0.321	0.788
Age (β_3)	-0.212	-1.444	0.154
Gender (β_4)	0.172	1.367	0.176
Household size (β_5)	0.043	0.353	0.725
Household income (β_6)	-0.003	-0.021	0.984
Educational levels (β_7)	-0.200	-1.479	0.144
Farm size (β_8)	-0.195	-2.656	0.010
Access to credit (β_9)	-0.081	-3.656	0.041
Production inputs (β_{10})	0.122	0.962	0.340
Farm implements (β_{11})	-0.060	-0.470	0.640
Access to grazing land (β_{12})	0.134	1.078	0.285
Access to markets (β_{13})	0.026	0.193	0.848
Extension services (β_{14})	0.089	2.685	0.042
Farming experience (β_{15})	0.129	1.059	0.294
Farmer organisations (β_{16})	0.066	0.521	0.604
Irrigation (β_{17})	0.099	0.762	0.449

$R = 0.448$, Adjusted $R^2 = 0.38$

Table 6.2 shows the estimated coefficients (β values), standard error, t-statistics and significance values of independent variables in the model. According to Gujarati, (1992), the coefficient values measure the expected change in the dependent variable for a unit change in each independent variable, all other independent variables being equal. The sign of the coefficient shows the direction of influence of the variable on the dependent variable. It follows that a positive value indicates a positive association or relationship between dependent variable and independent variables. On the other hand, a negative value shows a negative relationship between dependent variable and independent variables. Therefore, in this study, a positive value implies a positive relationship between on-farm productivity and independent variable and negative value implies that on-farm productivity is negatively related with an independent variable or an independent variable does not have an impact on on-farm productivity by a smallholder farmer (dependent variable).

The significance values (also known as p-values) show whether a change in the independent variable significantly influences the dependent variable. In this study, the variables were tested at the 5% significance level. Thus, if the significance value is greater than 0.05, then it shows that there is insufficient evidence to support that the independent variable influences a change away from dependent variable. If the significance value is equal to or less than 0.05, then there is enough evidence to support a claim presented by the coefficient value.

From Table 6.2, 17 variables were associated with on-farm investment by the smallholder farmers. These are land tenure security, age, gender, household size, household income, educational levels, farm size, access to credit, access to production inputs, access to farm implements, access to grazing land and access to markets. The results suggest that not all of them had significant influence on-farm productivity. Based on the findings only three variables have some influence namely farm size, access to credit and access to extension services. The results of each factor's association with on-farm productivity are explained below.

6.1.2.2.1 Investment

Investment was positive but not significant as expected. This is shown by a β value of 0.37 (β_2) and with a t-Statistics value of 0.321. This may be because effects of investment are normally

realised after a long time. The investment as shown in Table 5.5 was very minimal and did not have effect on productivity.

6.1.2.2.2 Farm size (FS)

Total farmers land holding may serve as a favourable proxy for wealth, status and income levels (Bonabana-Wabbi, 2002). Having more land is likely to have a positive effect on adoption of most practices. The regression results show that there is a negative relationship between farm size and on-farm productivity by smallholder farmers. This is shown by a β value of - 0.195 (β_7) and with a t-Statistics value of -2.656 and it was significant at 10% level. The reason could be that productivity is low because investment is also low as farm size increases. These farmers are using extensive farming methods hence low productivity. This clearly means that in the case of the smallholder farmers in the study area, size of the farm did not necessarily have an influence or affect the possible level of on-farm productivity. This suggests that other factors might have played a very strong role in influencing on-farm productivity thus dominating the effect of farm size.

6.1.2.2.3 Access to credit (ACR)

The regression results show that there is a negative relationship between access to credit and on farm productivity by smallholder farmers. This is confirmed by the regression coefficient with a negative beta value (β_8) -0.081. This was an unexpected result, but it is contributing negatively although by a small margin of 0.08. This could be because the farmers are getting insignificant credit to make a difference in productivity. Furthermore they do not have enough training on how to use credit productively. Access to credit was not statistically significant in the study area as shown by t – Statistics value of -3.656 which is greater than 0.050. The regression model indicates that access to credit is not positively related to the demand for improvements and investments thus resulting on better on-farm productivity by the smallholder farmers in this study. Smallholder farmers can be better off if they can have access to affordable credit so that they can be able to effect much needed improvements and investments in their farming thus increasing their productivity.

For a viable and successful farming business, there has to be availability of funds to carry out all the activities of the business. Lack of credit may mean farmers lack the capital investment to expand on their productive activities and by implication lack of access to inputs (seeds and fertilizer). These findings are also supported by Diagne *et al.*, (2000) that access to credit increases the ability of a household with little or no savings to acquire needed production inputs. Therefore access to credit is likely to increase the potential improvements and investments by the smallholder farmers and thereby result in improved on farm productivity.

6.1.2.2.4 Access to extension services (AES)

Extension services are a source of information on better farming practices. Access to extension services and frequent extension contacts are expected to positively impact adoption of new technologies. Extension contact was hypothesized to have a positive influence on farmers on the adoption of new technologies by Mihiretu (2008). Therefore, access to extension in this study was expected to be positively correlated with the on-farm productivity by the smallholder farmers. There is negative relationship between on-farm productivity and access to extension services by smallholder farmers. The positive relationship between on-farm productivity and access to extension services is shown or proved by t- Statistics of 2.685 (β_{13}). This therefore means extension services are positively influencing productivity. Furthermore government should be encouraged to continue provide extension services to the smallholder farmers. In addition to this government should also cover issues of access to credit and promote intensive farming. The significant level of 0.042 which is greater than 0.05, does allows a claim that on-farm productivity is influenced by access to extension services. However, at significant level of 0.042 shows that there is insufficient evidence to support that access to extension services have an influence on a change on-farm productivity by smallholder farmers in the study area.

6.2 Summary

This chapter presented and discussed empirical results of the on farm investment model and on farm productivity model of the study on the factors influencing the on-farm investment and on farm productivity by the smallholder farmers in the study area. In both models, the independent variables were tested for their significance and it was found that some variables were significant whilst other were not. With regards to the dependent variable on-farm investment, household

socio-economic factors such as household size, educational levels and farm size, had a positive influence in on-farm investment and were also statistically significant. On the other side, factors such as land tenure security, age, gender, household income and access to markets did not have any influence and were not statistically significant. From the perspective of on-farm productivity variables such as farm size, access to credit and access to extension services had a positive influence. However, variables such as land tenure security, age, household income, educational levels, access to implements, were not influencing on-farm productivity and were not significant.

CHAPTER SEVEN

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

7.0 Introduction

This chapter draws a summary of the research findings and conclusions based on results of the study and recommendations put forward for the smallholder farmers, particularly those engaged in crops and livestock production farming.

7.1 Summary and conclusions of results

The objectives of this study were to assess the characteristics of the smallholder farmers, assess the productivity levels of these farmers under different forms of land tenure systems, assess constraints encountered by the smallholder farmers under different forms of land tenure systems, identify factors influencing on-farm investment by the smallholder farmers, find out other factors beyond land tenure security, influencing on farm productivity of the smallholder farmers under different forms of land tenure systems and assess the relationship between land tenure security and on-farm productivity of the smallholder farmers under different forms of land tenure systems.

Smallholder farmers who were actively farming in both crops and livestock production under dry land and irrigated conditions were identified for inclusion in the study. For the investigation of the factors influencing the on-farm investment and on-farm productivity by the smallholder farmers, a total of 80 sample farmers were interviewed using structured interviews. The analysis was done with the help of descriptive and multiple regression model employing SPSS software (Version 20.0). Two models were formulated namely on-farm investment and on-farm productivity models in order to test the influence of independent variables (socio-economic factors) on dependent variables i.e. on-farm investment and on farm productivity. The multiple regression model was employed to analyze the factors influencing the on-farm investment and on-farm productivity by the smallholder farmers in the study area.

Looking at the effects of land tenure security of the smallholder farmers, the findings of the study is that there are three main types of land tenure systems in the study area namely freehold, leasehold and commonhold. Freeholders refer to all the farmers who inherited their farms from

the parents who had title deeds but were still in the name of their deceased family members. In leasehold these were the farmers who were tenants and paying rent to the owner of the farm either monthly or yearly. Lastly, this was a group of farmers under Permission to Occupy (PTO) which is the inherent arrangements between government and communities. Such permits usually indicate a right to residential, arable and grazing lands. Permission to Occupy and other devices is general seen as relatively secure form of tenure, although their legal status is not always clear.

The strengths of the respondent's property rights differed according to type of land tenure system (Freehold, leasehold and commonhold) and within the freehold group, conditions of the title deed. Individuals with freehold title deed theoretically enjoy exclusive and secure tenure but many of the freehold respondents shared access to land with other family members and or had no direct claim to their land as title was registered to a deceased family member (ancestor). Under leasehold group, property rights to land were characterized by insecure, inclusive rights to grazing and limited transferability of use rights as the vast majority were tenants. With regards to Permission to occupy, this has exclusive and secure residential and use rights on arable whilst they inclusive and unsecured property rights land. These rights inherently come with their agreement from government under Permission to Occupy (PTO). Based on these arguments and findings, farmers under freehold and PTO were deemed to be more secured as compared to leasehold that was highly vulnerable to land tenure insecurity. On the basis of this, for two groups who have some sort of secure tenure the variable land tenure security (LTS) was included in both on- farm investment and on-farm productivity models as an explanatory variable.

The descriptive analysis results show that majority (66%) of farmers were under freehold, 5% on leasehold whilst 29% were under communal hold (Permission to Occupy). About 31% of the smallholder farmers indicated the land tenure security had an effect on-farm investment whilst about 69% reported that it had no effect all. Very close or similar results were obtained with regards to effect on-farm productivity. About 31% of the smallholder farmers indicated land tenure security had an effect whilst 71% said it had no effect. With these findings it is clear that there factors other than land tenure security played a very big role in influencing both on farm investment and productivity. In one hand, on-farm investment by the smallholder farmers was positively influenced by access to credit, access to production inputs, access to implements and

access to grazing land. All these variables were statistically significant. On other hand, variable such as gender, household size, access to production inputs, access to grazing, access to markets, farming experience, membership to farmer organisation and irrigation have positively influenced on farm productivity by the smallholder farmers. However it must be noted that variables such as access to production inputs and access to grazing land were important for both on farm investment and on farm productivity by the smallholder farmers. Although almost (70%) smallholder farmers for both on-farm investment and productivity indicated land tenure security had no effect but almost all (96%) preferred freehold tenure with title deed. This clearly expresses a general desire to obtain title deed to their lands may due be an indication of a perceived lack of security of tenure among smallholder farmers within the current system of holding land.

The study also analyzed on the household demographic characteristics of the smallholder farmers as attempt to understand the characteristics of these farmers. The results show that majority (54%) were using very small ranging between 1-2ha of land for their farming activities. Small land size of this can seriously affect the economies of scale of the smallholder farmers especially when they want to extend their production activities. This therefore means that access to land implies that farmers cannot expand their farming activities by putting more land under production. Putting more land under production means more investment which is expected to result in high productivity. The majority, (84%) of the interviewed farmers were constrained in terms of access to credit. Only about 16% of the interviewed farmers have access to credit. The farmers who had access to credit had obtained it mostly from informal sources such as families, friends and relatives with very little obtained from the formal lending institutions such as banks.

Results shows that 61% of the smallholder farmers have access to production inputs whilst 29% had no access. This can be linked to the fact that the majority (61%) has access to inputs such as fertilizer, seeds, and chemicals which are at times supplied by the government through extension agents and sometime the farmers use their old pension money to purchase production inputs. With regards to access to farm implements, the result shows that 53% indicated they had access whilst 47% indicated that they have not access to equipment. Most farmers had access to households implements such as spade, rakes and wheelbarrows. There are few farmers who had

access to bigger implements such ploughs, disc, cultivator, tractor. In order for farmers to have access to these implements they had to hire them from other farmers either in their area or other neighbouring villages. Due to lack of access to farm implements some smallholder farmers opted for use of animal drawn implements due high costs of acquiring the tractor drawn implements. The findings of the survey revealed that majority (91%) of the smallholder farmers had access to communal grazing land whilst only 9% indicated they did not have access to grazing land. The farming system for smallholder farmers rely more on livestock production than crop production. Therefore access to grazing land is very key resource in agricultural production of the smallholder farmers. Without access to adequate communal grazing land there will be no livestock production for smallholder farmers.

Many smallholder farmers in South Africa have insufficient access to markets for their produce and inputs. The study has also revealed that about 80% of the smallholder farmers had access to markets whilst only 20% had access and this is not much different to national statics about access of smallholder farmers to output markets. The smallholder farmers were asked to indicate their major marketing constraints and these included lack of transport, low prices, high transport costs, low produce and lack of market information. With such a situation there is no doughty that access to markets have direct influence on expected on farm investment and productivity levels. It can therefore be concluded that the smallholder farmers had serious challenges in accessing formal markets.

Most (86%) of the farmers had access and farmers without access accounted for 14%. Extension services were largely provided by government through extension officers whilst only 14% indicated they were not provided with extension services. Extension officers are necessary in order to connect smallholder farmers with agricultural institutions for technology dissemination. Without access to proper and adequate information smallholder farmers cannot take informed decisions and adopt relevant technologies in their farming practices. It is therefore concluded that lack of access to reliable extension services can seriously affect both on-farm investment and productivity. Results from descriptive analysis about household income show that majority (82%) of farmers only earned income between R1 - R 10 000 whilst 9% earned between R 10 001 – R 20 000, 5% earned between R 20 001 – R 30 000 and 4% earned income between R 30

001 – R 40 000. These results shows the total household income earnings were skewed towards low categories with only few were higher categories. Farmers were earning very low income as they did not have many sources of off farm income. In addition to this it is clear that smallholder farmers did not have good income from the farming in during the 2012/2013 production season. It can be concluded that the total household income at the disposal of farmers will have direct influence on-farm investment and productivity of the smallholder farmers.

The study also analysed farming experience of the farmers. The results has shown that majority (49%) of farmers had farming experience of between 1-10 years, whilst other groups of farmers who had farming experience that ranged from 11-20 and 21-30 years both accounted for 21 % and 17% respectively. In terms of the analysis of results these were the farmers that have some considerable experience in farming. Results show that 51% were members of farmer organisations whilst 29% were not members of any farmer organisations. Those who belong to farmer groups in the study area indicated that they benefited from such organisations by receiving financial support, access to implements, market information and moral support from the organisations. Results of the analysis show that the farmers belonging to farmer organisations had better access to resources and are better supported than those who did not belong to any farmer organisations. It can therefore be concluded that membership to farmer organisations is likely to influence on-farm investment and productivity by the smallholder farmers.

The results show that majority (91%) of the farmers were not irrigating whilst only 9% were irrigating their fields. The results of the analysis show that majority (76%) had no access to irrigation water whilst only 24% had access to irrigation water. It is probably this reason why most (76%) of the farmers depended on the erratic rainfall for their farming activities. From the Results also revealed that 76% of the farmers indicated that they had no access to irrigation water at all, 10% said water was always enough, only 9% indicated sometimes water was enough and lastly 5% indicated that irrigation water was never enough. This clearly indicates that the farmers had serious water scarcity problems as confirmed by the analysis of the results. These results indicate that 81% of the farmers experienced water scarcity problems whilst only 19% did not report any water supply problems. With the high levels of water scarcity it can be concluded that smallholder farmers had serious water supply challenges. It is not surprising that 71% reported

water supply challenges because only 9% of the farmers indicated they have access to irrigation infrastructure with majority (91%) of farmers with no access to irrigation infrastructure at all. concluded that access to irrigation water can have great effects on possible levels of on farm investment and productivity.

The study also investigated and analysed the crops and livestock production of the smallholder farmers. In terms of crop production the farmers produce the following crops namely maize, pumpkins, melon, potatoes, butternut, beans, cabbages, spinach, onion, beetroot, peas, tomatoes, watermelon and green pepper. Results from the analysis also showed that show that majority of farmers (100%) were producing maize, 50% were producing pumpkins and 49% were producing potatoes whilst other crops were produced by few farmers. The results shows the farmers obtained very low levels of production on the three most planted crops. The likely reason for this is the demographic factors such as age, gender, family size, educational levels and household income had a great influence on the crop production output. In addition to this, access to production inputs, implements, irrigation water, irrigation infrastructure and capital are also likely to influence production levels possible to these farmers. With regards to crop production smallholder farmers faced the following constraints namely access to labour, pests, lack of access to production inputs, diseases, lack of transport, lack of access to capital, lack of access to storage facilities, lack of management skills and incidence of severe drought. All these constraints made it difficult for the smallholder farmers to produce and store high quality produce.

The study revealed that livestock production is an important strategy in the sampled population's livelihood. Results indicate that most farmers keep livestock as 93% represent the farmers keeping livestock and remaining 7% represent the farmers who do not have and keep livestock. The smallholder farmers keep different types of livestock namely cattle, sheep, goats, pigs and chickens but it is rare for a household to have all different types of livestock, but in some cases few households do keep all different types of livestock. It must be noted the smallholder farmers mentioned a number of constraints to livestock namely diseases, theft of animals, animals being attacked by wild animals, lack of fencing in the camps, lack of labour, lack of access to vaccines, lack of capital to buy vaccines, dipping facility too far and drought. Within these constraints the

most prominent challenges included diseases, theft of animals, lack of access to vaccines and drought and these are shown in the table below by 44 %, 11%, 8% and 9% respectively.

The farmers were asked if they have made some improvements in the past three years in their farms. It was assumed that the farmers could have made some improvements in the farms such as fencing, improved pastures, irrigation infrastructure, drinking troughs, dipping facilities, contour drains, dams and farm buildings. The results revealed that very few farmers have done some minimal improvements in their lands with the exception of the farmers (39%) who invested in fencing of their land. The following are some of the reasons that came up for not making any improvements namely lack of capital, poor produce and land tenure security. However it must be noted the most prominent reason why the smallholder farmers did not make any improvements was because of lack of capital and this has been confirmed by majority (81%) of farmers.

Furthermore the smallholder farmers indicated that during past three years they wanted to make some investments in their farms but prevented by number of factors such as lack of capital, lack of fence, hiring of tractor, afraid of debt, land ownership, severe drought, old age and lack of production inputs. However majority of farmers cited lack of capital (83%), as the main reason for prevention of investments. The farmers were asked to indicate the possible future investments that they will possible invest on. Among the top possible investments by the farmers included fencing of land (43%), irrigation infrastructure (10%) and growing irrigated crops (14%). Furthermore the smallholder farmers were asked to indicate what could possible prevent them from making such investments in the future. The farmers mention lack of capital, dependency on government, land tenure security, drought and cannot afford debt repayment. However the majority (88%) of farmers identified lack of capital whilst only 1% mentioned land tenure security as limitation towards possible future investment.

In analyzing the factors most likely to influence the on-farm investment and on-farm productivity of the smallholder farmers, empirical results from the on-farm investment model showed that access to credit, access to production inputs, access to farm implements, access to grazing land were significant factors conditioning farmers decisions towards making

improvements and investments in the farm. In one hand, access to credit, access to production inputs, access to farm implements, access to grazing were positively influencing the on-farm investment by the smallholder farmers. On the other hand, the land tenure security, age, gender, household income, household size, farm size and access to markets were negatively influencing on farm investment by the smallholder farmers.

Access to credit suggested a positive relationship with the possibility of investing in the farm by the smallholder. The regression model showed that access to credit can have a positive influence with the on-farm investment. This suggested that if farmers have an extra income and cash for purchasing farm inputs and implements through formal credits, they are more likely to invest more than those who have no access to formal credits. Strengthening and expansion of credit institutions into rural farming areas can be an important step in facilitating credit needs of farmers, and thus, investing more in infrastructure, production inputs, farm implements.

On-farm investment is positively related with access to production inputs. The positive relationship between on-farm investment and access to production inputs is shown by β value of 0.044 (β_9). This means that the more farming inputs a smallholder farmer have, the more crops and livestock the smallholder farmer will produce. The level of on-farm investment made really depend on the amount of production inputs used or incurred during the production process. The more production inputs used in the farming activity the better the returns on investment.

There is positive relationship between on-farm investment and access to farm implements by smallholder farmers. As farm implements are implements and tools used in the process of on farm investment by smallholder farmers, therefore access to farm implements have an impact or influence on-farm investment by smallholder farmers. Without farm implements such as ploughs, cultivators, discs, harrows for smallholder farmers, it will be difficult for them to participate in on-farm investment (farming) as they will not have the implements to prepare and plant on the soil (land). There is positive relationship between on-farm investment and access to grazing land by smallholder farmers. The descriptive analysis in the previous chapter has confirmed that 91% of the smallholder farmers depend on communal grazing as the only source of feed for livestock. Furthermore the descriptive analysis also confirmed that the smallholder

farmers practice mixed farming system and they rely heavily on livestock production than crop production. This therefore clearly indicates how important this resource to these farmers is. Access to grazing land is used by the smallholder farmers as an input in their livestock production since is the major source of feed for their livestock especially cattle.

Variables such as age, gender, household size, household income, farm size And access to markets were negatively influencing on-farm investment. Regression analysis results suggest that age of the farmer does not have a relation with the on -farm investment by the smallholders. This is indicated by the negative regression coefficient β_2 result (-0.113) obtained from the analysis. This clearly indicates that age of the smallholder farmers did not have impact on the possible investment in the farm. There is negative relationship between on-farm investment and the gender of the household head as it is indicated by negative β_2 coefficient of - 0.103. This implies that whether the head of the household is a male or female, it does not matter, as they both can decide to make productivity enhancing investments in their farms. The negative relation between on-farm investment and gender of the household head is proved by that both women and man participate in farming. It is therefore concluded that gender did not have positive influence on-farm investment although it was significant factor in on-farm investment.

The negative regression coefficient of -0.256 (β_4) for household size shows a negative relation between a household size and on-farm investment by smallholder farmers. This means that household size does not affect on-farm investment by smallholder farmers. It can be concluded that household size did not determine how much investment a smallholder farmer can make. Regression analysis of household income the results shows a negative relationship between the total amount of money earned by a household per month (household income) and farm investments done by the farmer. This implies that how much a household earn per month has nothing to do with on-farm investment or the amount of money earned by a household does not affect on-farm investment by the smallholder farmers. The regression results show that there is a negative relationship between farm size and on-farm investment by smallholder farmers. This is shown by a beta value of -0.246 and significant level of 0.034. This clearly means that in the case of the smallholder farmers in the study area, size of the farm did not necessarily have an influence or affect the possible level of on farm investment. The regression results show that

there is a negative relationship between on farm investment and access to markets by smallholder farmers. This clearly means that in the case of the smallholder farmers in the study area, access to market did not necessarily have an influence or affect the possible levels of on-farm investment. In analyzing the factors most likely to influence the on-farm productivity and productivity of the smallholder farmers, empirical results from the on-farm productivity model showed that gender, household size, household income, access to production inputs, access to grazing land, access to markets, farming experience, membership to farmer organisations and irrigation were positively influencing on-farm productivity.

There is a positive relationship between on-farm productivity and the gender of the household head as it is indicated by positive β_3 coefficient of 0.172. This implies that the gender of head the household had an effect in on-farm productivity by the smallholder farmers. Gender division plays an important role in agriculture. The reason being that in general, men are physically capable of coping with all the farming practices that may be recommended by change agents. On other hand, women even if they are better educated, they often need men's help to carry out certain activities in farming. The positive relation between on-farm productivity and gender of the household head is proved by that men are capable of handling most physically demanding activities in the farm such land preparation, ploughing, planting and many other activities. It therefore concluded that gender have influence on-farm productivity.

The positive regression coefficient of 0.043 (β_4) for household size shows a positive relation between a household size and on-farm productivity by smallholder farmers. This means that household size does affect on-farm productivity by smallholder farmers. It can be concluded that household size did determine how much productivity a smallholder farmer can make. On-farm productivity is positively related with access to production inputs. The positive relationship between on-farm productivity and access to production inputs is shown by β value of 0.122 (β_9). This means that the more farming inputs a smallholder farmer have, the more crops and livestock the smallholder farmer will produce. The level of on-farm productivity made really depend on the amount of production inputs used or incurred during the production process. It is therefore concluded that access to production inputs play a crucial role in on-farm productivity by smallholder farmers.

There is positive relationship between on-farm productivity and access to grazing land by smallholder farmers. The descriptive analysis in the previous chapter has confirmed that 91% of the smallholder farmers depend on communal grazing as the only source of feed for livestock. Furthermore the descriptive analysis also confirmed that the smallholder farmers practice mixed farming system and they rely heavily on livestock production than crop production. This therefore clearly indicates how important this resource to these farmers is. Therefore access to grazing land has an impact or influence on-farm productivity by the smallholder farmers.

The regression results show that there is a positive relationship between on-farm productivity and access to markets by smallholder farmers. This clearly means that in the case of the smallholder farmers in the study area, access to market had a positive influence on the possible levels of on-farm productivity. Without access to secure output markets produce cannot be sold and if produce cannot be sold it means there will be no income for the business. This suggests that access to market is one of the critical factors for a success of any farming venture. Access to market played important role in influencing on-farm productivity by the smallholder farmers.

The regression results show that there is a positive relationship between on-farm productivity and farming experience by smallholder farmers. This is not surprising at all because the descriptive analysis results presented in the previous chapter show that most of smallholder farmers have more than years of farming experience. As improvements are accomplished overtime, the longer the time spent on the land the greater the probability of investment occurring thus resulting in improved productivity. In conclusion, farming experience has a great influence or effect on the possible levels of on-farm productivity. The regression results show that there is a positive relationship between on-farm productivity and membership to farmer organisations by smallholder farmers. For smallholder farmers with or without access to irrigation, productions inputs, farming implements, access to markets and access to capital belonging to farmer organisations often brings positive impacts on its participants. This clearly means that in the case of the smallholder farmers in the study area, membership to farmer organization by the smallholder farmers have a great influence on the possible levels of on-farm productivity. The regression results show that there is a positive relationship between on-farm

productivity and irrigation by smallholder farmers. Water development is therefore important to support various aspects of farming, including irrigation and aquaculture. Smallholder farmers depend on erratic rain fed agriculture, and therefore are severely affected by water shortages. Irrigation by the smallholder farmers has a great influence on the possible levels of on-farm productivity.

Variables such as land tenure security, age, household income, educational levels, access to credit, access to implements, access to extension services, farm size were all negatively influencing the on farm productivity by the smallholder farmers. The regression analysis results suggest that land tenure security did not have a relation with the on-farm productivity by the smallholder farmers. These results confirms findings of the descriptive analysis that 71% of the smallholder farmers reported that land tenure system had no effect whilst 29% indicated that it had an effect. This implies that the land tenure security status of respondents did not have a significant influence on the on-farm productivity at all. This further means the level of productivity possible to the smallholder farmers was not affected by the conditions of their land rights but by other factors such as gender, household size, access to production inputs, access to markets, farming experience, membership to farmer organisations and irrigation. It can therefore be concluded factors other than land tenure security played a bigger role in determining farmers' productivity levels.

The regression analysis results suggest that age of the farmer does not have a relation with the on farm productivity by the smallholders. In conclusion, age of the smallholder farmers did not have any impact on the possible productivity in the farm. The negative sign on the coefficient suggests There is a negative relationship between on-farm productivity and household income of the smallholder farmers. A beta value of -0.003 (β_5) shows a negative relationship between the total amount of money earned by a household per month (household income) and farm productivity done by the farmer. This implies that how much a household earn per month has nothing to do with on-farm productivity or the amount of money earned by a household does not affect on farm productivity by the smallholder farmers. It is therefore concluded that household income did not have influence on-farm productivity by the smallholder farmers.

Regression results prove a negative relationship between on-farm productivity and educational level of the smallholder farmers. This implies that whether or not the farmer is better educated the level of on-farm productivity will not be affected or influenced. The possible reason for this negative relationship between education level and on-farm productivity can be that even if a farmer is better educated he or she will not be able to make any improvements & investments thus leading productivity if he or she does have access to resources such as credit, production inputs, farm implements, irrigation water and may other needed resources. There is insufficient evidence to support that education level has influence on the on-farm productivity of the smallholder farmers. It can therefore be concluded that educational level of the smallholder farmers did not have positive influence on the on-farm productivity.

The regression model indicates that access to credit is not positively related to the demand for improvements and investments thus resulting on better on farm productivity by the smallholder farmers in this study. Smallholder farmers can be better off if they can have access to affordable credit so that they can be able to effect much needed improvements and investments in their farming thus increasing their productivity. Lack of credit may mean farmers lack the capital investment to expand on their productive activities and by implication lack of access to inputs (seeds and fertilizer). Therefore access to credit is likely to increase the potential improvements and investments by the smallholder farmers and thereby resulting in improved on farm productivity.

There is negative relationship between on-farm productivity and access to farm implements by smallholder farmers. As farm implements are implements and tools used in the process of on-farm productivity by smallholder farmers, therefore access to farm implements have an impact or influence on farm productivity by smallholder farmers. Without farm implements such as ploughs, cultivators, discs, harrows for smallholder farmers, it will be difficult for them to participate in on-farm productivity (farming) as they will not have the implements to prepare and plant on the soil (land). There is sufficient evidence to support that access to farm implements have an influence on change on-farm productivity by smallholder farmers in the study area.

There is negative relationship between on-farm productivity and access to extension services by smallholder farmers. Extension contact was hypothesized to have a positive influence on farmers on the adoption of new technologies by Mihiretu (2008). Therefore, access to extension in this study was expected to be positively correlated with the on-farm productivity by the smallholder farmers. There is insufficient evidence to support that access to extension services have an influence on a change on-farm productivity by smallholder farmers in the study area.

The regression results show that there is a negative relationship between farm size and on-farm productivity by smallholder farmers. This clearly means that in the case of the smallholder farmers in the study area, size of the farm did not necessarily have an influence or affect the possible level of on-farm productivity. This suggests that other factors might have played a very strong role in influencing on-farm productivity thus dominating the effect of farm size.

7.2 Recommendations

Having identified the fundamental factors constraining the development of viable, profitable and sustainable smallholder farming in the study area, it is believed that the following policy recommendations could serve to overcome these constraints.

- The descriptive statistics has showed that the smallholder farmers were affected by number of factors such as demographic characteristics and other socio-economic factors. With regards to demographics the results has shown that majority of farmers were above 60 years of age. This clearly shows that there were no young farmers in the sampled farmers. The average farmer was 62 years old which is already an old pension age. It is therefore recommended that special programmes should be developed for participation of women and youth in agribusiness. Agricultural training and educational programmes should be evaluated to ensure that the young people are able to contribute directly to agricultural production, processing and marketing. Youth should be exposed to modern smallholder production systems given a vision of the potential and prosperous future in a well-developed agricultural industry. It is recommended that government should to partner with relevant stakeholders both in private and public sectors to introduce incentives and programmes that will attract young people to join farming. In addition to

this, government should lobby tertiary institutions that are offering agricultural sciences together with Departments of Basic Education and Higher Education & Training, AgriSeta to taut agriculture as one of the careers that can be followed by young people not as practitioners only but also as smallholder farmers.

- It is therefore recommended that government through the Department of Rural Development and Agrarian Reform (Provincial Government), Department of Agriculture, Forestry and Fisheries (National Government) and Department of Rural and Land Reform in collaboration with research institutes facilitate access to of production through introduction of Farmer Support Centres (FSC's) that will become one-stop facilities assisting with information, marketing, production inputs and access to credit. It is therefore important they are supported through introducing support packages by through the Farmer Support Centres where these could act as close by source of information. These FSC's should be complimented by regular visits of extension officers. It should from these centres where smallholder farmers get information about crops and livestock production, market information, new technologies, access to finance, market information, new technologies etc.
- There is still a growing perception that within the study area that farming is mainly for men. Government should enact laws to remove any form of discrimination based on sex with regard to property rights and addressing the gender imbalances. Furthermore, a legal system and traditional practice which denies women ownership and control over land should be abolished because lack of access to land, and lack of collateral prevent women from having access to credit.
- Government policies need to establish priorities in allocating scarce resources for the different types of smallholder farmers as found in the study area. There is an urgent need to address the present form of land tenure in the area and introduce a policy based on the enlargement of arable holdings and grant title deeds in order to ensure land tenure security, thus facilitating access to credit facilities. Government should consider granting title deeds to all farmers whom their title deeds are still registered in the names of the deceased family members. In addition to this, the current communal tenure system

(Permission to Occupy) should be reviewed especially rights relating to arable and communal grazing land. The financial institutions should be encouraged to grant loans to smallholder farmers at low interest rates. Furthermore the current funding model of Landbank should be reviewed in order to consider funding infrastructure and production inputs needs of the smallholder farmers. Consideration of land as collateral for credit by commercial lending institutions.

- The majority of the interviewed farmers in the study area indicated that they are aware of extension services and they have access to extension services. Access to extension support can be a useful source of information as it can play a crucial role in empowering farmers with farming knowledge, techniques and skills. The only the challenge that they mentioned is the frequency of contact with smallholder farmers. The farmers reported that extension officers do not often visit their farms and only once in three months. Government needs to increase the number of extension officers in order to address the ration of extension officers in relation to farmers. The extension officers are covering vast areas as result they cannot be able to visit all the numbers within the reasonable required time. Research and extension efforts need to be linked and strengthened to increase the flow of information to farmers in collaboration with the government and other stakeholders.
- Government and other stakeholders may put into place strategies to foster improved farmer productivity by providing crop & livestock management information and offer advisory services, training, credit opportunities and infrastructure investments. Again, registered varieties must be produced and marketed, to strengthen and link farmers with seed companies for contract seed production and for the provision of training and inputs for increased production capacity. This will thus result in quality assurance to the production of seed of acceptable quality to be placed on the market. Through seed production, farmers can generate revenue and improve their livelihoods.
- The research has revealed the smallholder farmers have serious challenge with access to infrastructure as irrigation, fence, storages, road networks etc. Aina (2007) noted that smallholder farmers in South Africa are living in areas where there is lack of basic

infrastructure such as telephone, electricity, piped borne water and good road network. The rural areas in South Africa generally all have poor infrastructure such as roads (Groenewald, 2003). This then becomes a constraint to smallholder farmers in rural areas in terms of transportation and communication which are essential for market access. It is therefore recommended that such basic infrastructure should be establish for farmers so that it can enhance their on farm productivity. It is therefore recommended that government should intervene by coming up special programmes to address this challenge that is facing smallholder farmers.

- Furthermore the smallholder farmers were depending on erratic rainfall for agriculture. With incidents of climate changes manifesting themselves as severe drought or heavy floods there is need to for government to support these farmers with irrigation infrastructure and irrigation water sources such as dams. Rainfall patterns are no longer predicted as a result the farmers were delayed in terms of planting because they were waiting first rains to come around August/September only to find that the first rains will come in November. Depending on the rainfall has proven to be problematic especially most of the crops that were planted need lot of water. In areas where they use irrigation technology, there is often lack of support services for irrigation. These smallholder farmers therefore face a number of problems with irrigation technology which include lack of specialized irrigation extension technicians, for technical advice on cropping and engineering aspects and also maintenance services are often poor or non available. If the government can improve the infrastructure (build proper tarred roads, telephone lines and electricity) in smallholder rural farming areas, it might facilitate access to markets and communication between different stakeholders such as donors, researchers, extension agents and farmers. By so doing, there is easy access to information and markets. Therefore, with improvements in infrastructure such as roads and networks, farmers can become successful. Results of this study showed that lack of access to agricultural support such as finance was one of the limiting factors and a significant variable that can influence a farmer's on-farm investment and on-farm productivity. Access to credit has been a major constraint for smallholder farmers in the developing world (Pillay, 2002). Generally farmers in the study area had no access to credit and lacked funding. Farmers

need access to finance but they may not be getting access to it because financial institutes may not be available in their areas or because they may not know where to access the services. Most financial institutions (banks) are mainly located in towns, and farmers may or may not have knowledge on accessing their services. If financial services, private or public sector, can be made accessible to smallholder farmers through loans, farmers can be empowered and thus invest in basic inputs, such as seeds, fertilizers and smallholder irrigation essential to raise farm productivity and generate profits. Farmers can be educated or informed on how and where to get the financial support (bank loans and grants). Governments can as well introduce agricultural finance institutions in rural areas mainly to assist smallholder farmers since other financial institutions like banks may have strict requirements in providing loans such as collateral which the smallholder farmers may not have.

- More research efforts are needed in the Eastern Cape Province. Agricultural scientists and extension workers officers often find difficulties in their dealings with smallholder farmers such as lack of understanding in terms of indigenous languages and traditional cultural beliefs and also the ratio of agricultural extension workers to farmers is low. As a result, agricultural research work becomes limited. Agricultural research can be an essential tool. This has to include planning and execution of research programmes. Researchers should start with identification of farmer's problems and opportunities, develop and test appropriate technologies under farmer's conditions (such as the on-farm trials) and conclude with solutions that would enable farmers to increase their income. Generation, dissemination and utilization of appropriate technology depend on interdisciplinary team approach, organized into an interacting and cohesive group involving researchers, extension workers and farmers. There is need for strong research-extension-farmer linkages in order to develop and test suitable and adaptable technology that will increase production of the smallholder farmers. Linkages between research, training and extension should be promoted through active collaboration between Department of Rural Development and Agrarian Reform, research institutions and higher education institutions in the Eastern Cape Province.

- Special attention should be given to building the capacity of smallholder farmers enabling them to be competitive in terms of production technology, product quality and market information.

7.2.1 Future research design

The study raised a number of questions and identifies a need for more detailed work, using suitable relevant methodologies for this work.

A need was identified for alternative crops that are less perishable and drought resistant than those grown by the smallholder farmers. Marketing of produce was a serious constraint in smallholder farming. Research into alternative marketing strategies that suit the conditions of the smallholder farmers was identified as a need.

Farmers have identified drought as the major constraint for both crops and livestock production. There is a need to investigate either drought resistant crops and animals or alternative irrigation methods that will be affordable and be cost effective for the smallholder farmers. Furthermore there is a need to investigate alternative sources of water for irrigation. With regards to livestock production smallholder farmers were also greatly affected by the drought. Due to this situation their livestock does not have much fodder for grazing especially during dry periods such as winter. The reason being these farmers solely depend on the communal grazing land as source of feed for their livestock. It is therefore important that alternatives sources of feed for animals are identified as these farmers currently cannot afford to engage on cultivated pastures for their livestock.

There is also a need to investigate the impact of access to finance and agricultural production within the context of the smallholder farming sector. At this stage farmer seems to be struggling in terms of accessing credit but at the same time they have not made attempts to get formal credit. This should be linked to the investigation of the alternative affordable credit for smallholder farmers. Presently the existing commercial banks have difficulties in lending money to these farmers citing lack of collateral or security. It is clear that with the current tenure form, their land cannot be used as collateral. There is a need for research work to be conducted into the

processes that may lead to enhance security of tenure by which land is held by farmers is governed by state under different forms of tenure. It is recommended that such research processes adopts a participatory approach, whereby farmers play an important role in determining the direction and pace of change.

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APPENDIX 1
Questionnaire for smallholder farmers

UNIVERSITY OF FORT HARE
FACULTY OF SCIENCE AND AGRICULTURE
Department of Agricultural Economics and Extension

An evaluation of land tenure security effects on farm investment and agricultural productivity: A case study of the smallholder farmers in the Amathole District of the Eastern Cape Province of South Africa. *All information provided will be treated as STRICTLY CONFIDENTIAL.*

Interviewer's Name.....Name of farmer.....

Date of Interview.....Village/Area.....

Local Municipality.....Province.....

SECTION A: DEMOGRAPHIC INFORMATION

A1. What is your family size.....

A2. Head of household (Gender)

A3. Age of Head of household.....

A4. What is your marital status? (Tick)

1. Single. 2. Married. 3. Divorced. 4. Widowed. 5 Other (please specify).

A5. What is your highest education achieved? (Tick)

1. No education. 2. Primary education. 3. High school. 4. Tertiary level.

A6. What is your total household income per month? (Tick)

1.< R2000. 2. R2000 to R 4500. 3. > R 4500. 4. Other (specify)

A7. How many household members employed and or not employed?

1. Employed..... 2. Unemployed.....

A8. What are sources of income for household members? (Tick)

1. Salaries and Wages. 2. Self-employment. 3. Child support grants. 4. Old age pension. 5. Disability grant. 6. Retirement pensions. 7. Remittances. 8. Other (specify).....

SECTION B: LAND USE AND TENURE

B1. Do you have access to farming land? 1. Yes.....2. No.....

B2. How big is your farm or land?
..... (hectares).

B3. How many hectares of this is this arable land?..... (hectares).

B4. How many hectares of this is this grazing land?..... (hectares).

B5. Under what form of tenure system do you fall under? (Tick)

- 1. Freehold. 2. Quitrent. 3. Leased State Land. 4. Leased Private Land. 5. Certificate to Occupy.
- 6. Leased land from community member. 7. Share cropping. 8. Other (specify).....

B6. Do you think your tenure system has an effect on your production? 1.....Yes. 2. No.....
Explain

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

B7. Is your farm investment influenced by your tenure system? 1.....Yes. 2.....No
Explain.....

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

B8. Are there any challenges you are facing as result of this tenure type? 1.Yes. 2.....No
Explain.....

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

B9. Which tenure system would you prefer?

.....
.....

B10. How long have you been farming in this farm or land?..... (years).

B11. Do you cultivate all your arable land? 1. Yes.....2. No.....

B12. If NOT, why is the land is not used?

- 1. Lack of productions inputs. 2. Lack of labour. 3. Tenure security. Share cropping. 4. Rented to other people. 5. Land resting. 6. Lack of capital. Lack of implements. Other specify).....

B13. Do you have enough land for farming? 1. Yes.2. No.....

B.14 If NOT enough land, what prevented you in getting more? (Tick).

1. Unavailability of land. 2. Lack of capital. 3. Tenure security. 4. Tribal authorities do not allow land to be bought. 5. Neighbours do not allow land to be bought. 6. Conflicts. Other (specify).....

B.15 Do you have access to grazing land? 1. Yes.....2.No.....

B16 If NOT explain why?

.....
.....

B.17 If yes is this private land or communal land with open access?

.....

B18. Do you have enough grazing land? 1. Yes.....2. No.....

B19. If NOT, explain why?

.....
.....

SECTION C: AGRICULTURAL PRODUCTION

C1. Please provide information about crops you grow during 2012/2013 growing season

Type of Crop	Irrigated		Yield per ha
	Yes	No	

C2. Have you experienced any changes in yield over the past three years? Tick

1. Yes.....2.No.....

C3. If yes, give reasons for changes in yields over the past three years

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

C4. What are the major constraints in your crop production? (Tick)

1. Labour 2. Pests 3. Inputs 4. Diseases 5. Transport 6. Capital
 facilities 8. Management skills 9. Drought 10. Other (Specify).....

C5. Do you have access to productions inputs? (Tick) 1. Yes.....2.No.....

C6. If yes, which inputs do you have access to? (Tick)

1. Seeds. 2. Chemicals. 3. Fertiliser. 4. Other (specify).....

C7. Do you have any challenge in accessing productions inputs? (Tick) 1.

Yes.....2.No.....

C8. If yes, what are the reasons?

.....

C9. Do you have access to agricultural implements? Tick 1.....Yes.....2. No.....

C10. If yes which agricultural implements do you have? (List them)

.....

C11. Do you have any challenges in accessing agricultural implements? 1.Yes.....2. No.....

C12. If yes, what are the reasons?

.....

C13. Do you keep livestock in your farm or household? 1. Yes.....2. No.....

C14. If yes, please indicate your livestock

Livestock	Number Owned	Own Used	Number Died	Number Sold	Number Stolen	Gross Income
Cattle						
Sheep						
Goats						
Pigs						
Chickens						
Other (specify)						

C14. What are the major constraints of your livestock production?

.....

C16. Do you encounter any of the following problems in farming? (Tick)

1. Shortage of fertilizer. 2. Shortage of seeds. 3. Shortage of chemicals. 4. Access to farm implements and equipment. 5. Lack of credit. 6. No market for farm produce. 7. Shortage of arable land. 8. Shortage of grazing land. 9. Poor soils. 10. Drought. 11. Pest and diseases. 12. Other (specify).....

SECTION D: CREDIT AVAILABILITY

D1. Have you used credit in the past three years in your farming? (Tick) 1. Yes.....2.No.....

D2. If yes, indicate source of credit used

Source of credit	Used Y/N	Which collateral was required	Which collateral was used
Banks			
Cooperative			
Neighbours			
Relatives			
Friends			
Government			
Other (specify)			

D3. What was credit used for?

Source of credit	What was the credit used for:
Banks	
Cooperative	
Neighbours	
Relatives	
Friends	
Government	
Other (specify)	

D4. In the past three years did you have any challenges in accessing agricultural credit?

1. Yes.....2. No.....

D5. If yes, what are the reasons?

.....

.....

 D6. If land was not used as collateral, what are the reasons for that?

1. You do not hold the title deed of the land. 2. Collateral is not required. 3. Creditors do not want land as collateral. 4. You do not want to use land as collateral. 5. Other reasons
-

SECTION 4: IMPROVEMENTS AND INVESTMENT

E1. Did you make any improvements on the land in the past three years?

Improvements	Made Y/N	Made on	Age (Years)	Functional Y/N
Fencing				
Improve pastures				
Irrigation				
Drinking troughs				
Dipping facilities				
Contour drains				
Dams				
Farm buildings				
Housing				
Storage facilities				
Other.....				

E2. If NOT, why there were no improvements made?

.....

E3. Indicate what investment made on capital equipment and other assets.

Assets	Investment made: Yes/Not	Number owned
Buildings		
Tractor		
Vehicle		
Truck		
Machines		
Trailer		
Generator		
Other (specify)		

E4. In the past three years have you ever wanted to make improvements and investment on your farm or land but could not? (Tick) 1. Yes..... 2. No.....

E5. If YES, what were the reasons for that?

.....

E6. Are you planning to make future investments in your farm or land? 1. Yes.....2.No.....

E7. If yes, what would you invest on?

.....

E8. If NO in E6 what prevents you from investing?

.....

SECTION F: OWNERSHIP OF ASSETS

F1. Please indicate ownership of the following assets

Asset	Yes/No	Number owned	Age	Functional Y/N
Car				
Motorbike				
Taxi				
Bakkie				
Truck				
Tractor				
Trailer				
Harrow				
Planter				
Cultivator				
Plough				
Generator				
Water pump				
Spray equipment				
Others:				

SECTION G: INSTITUTIONAL AND SUPPORT SERVICES

G1. Are you aware of extension services provided in your area? 1.....Yes.....2. No.....

G2. If yes to G1, do you have access to extension services? (Tick). 1.Yes.....2. No.....

G3. If yes, who provides extension services in the farm?.....

G4. What kind of extension service do you receive? (Tick).

1. Pest & disease management. 2. Water management. 3. Crop management. 4. Weed control.
5. Fertiliser/Manure application. 6. Record keeping. 7. Marketing. 8. Other,
specify.....

G5. How often do the extension officers visit you? (Tick).

1. Weekly. 2. Monthly. 3. Quarterly. 4. Annually. 5. Other, specify.....

G6. Do you have access to output markets? (Tick) 1. Yes..... 2. No.....

G7. If yes to G6, who do you supply?
.....

G8. Where do you sell your produce if you want to sell? (Tick).

1. Locally to neighbours 2. Local shops. 3. Hawkers. 4. Retailers. 5. Fresh
produce markets. 6. Agro –processors 7. Other, specify.....

G9. Do you have any problems with marketing of your produce? (Tick) 1. Yes..... 2. No.....

G10. If yes, what marketing problems do you experience? (Tick).

1. Poor roads 2. High transport costs. 3. Low prices. 4. Lack of transport. 5. Lack of market
information. 6. Other (specify).....

G11. Are you a member of any farmer organisations e.g. union or association?

1. Yes..... 2. No.....

G12. If yes what are the benefits of being a member?
.....
.....
.....

G13. If NOT to G18, please state reasons?
.....
.....
.....

G14. If NOT to G18 would you like to be a member? 1. Yes..... 2. No.....

G15. If yes why would you like to be a member of a farmer organisation?
.....
.....
.....

SECTION H: WATER SUPPLY AND IRRIGATION

H.1 Do you have access to the irrigation water? 1. Yes..... 2. No.....

H2. If YES, give status about your irrigation water.
1. Always enough. 2. Sometimes enough 3. Never enough

H3. If no what are the reasons?
.....
.....
.....
.....

H4. Are there periods of the year when water is not enough? (Tick) 1. Yes.....2. No.....

H5. Do you experience any problems with irrigation water supply? (Tick)
1. Yes.....2. No.....

H6.If yes to E5, specify the problem(s)
.....

H7. Do you have access to irrigation infrastructure & equipment? 1. Yes..... 2. No.....

H8. If NO to H7, please state the reasons?
.....
.....
.....

H9. Do you have access to drinking water for livestock? 1. Yes.....2. No.....

H10.If NO to E8, please state the reasons?
.....
.....
.....

General

- Apart from production constraints what other problems do you encounter as a farmer?
.....
.....
.....

- In your own opinion what do you see as possible solution to the problems?
.....
.....

-
.....
- What role do you think the Government and other stakeholders should play to assist your situation?
-
.....
.....

Thank you for your cooperation, participation and your time.