University of Fort Hare

Together in Excellence

Department of Agricultural Economics and Extension.

Faculty of Science and Agriculture

Effect of irrigation farming potential on commercialization of smallholder farming in the Eastern Cape Province of South Africa

BY

NOMAVA SIPOKO

DISSERTATION SUBMITTED IN PARTIAL FULFILMENT OF THE EQUIREMENTS FOR THE DEGREE OFBACHELOR OF AGRICULTURAL (MASTERS) IN AGRICULTURAL ECONOMICS

SUPERVISOR: PROFESSOR AJURUCHUKWU OBI

JUNE 2014

DEDICATION

To my lovely family

DECLARATION

I hereby certify that this dissertation is my own original work and has not previously been submitted to another university for the purpose of a degree. Where use has been made of the work of others, such work has been duly acknowledged in this text.

Signed …… Date: ……..
NOMAVA SIPOKO (200505660)

I,**Nomava Sipoko,** student number **200505660,** hereby declare that I am fully aware of the University of Fort Hare's policy on plagiarism and I have taken every precaution to comply with the regulations.

Signature: ……

I,**Nomava Sipoko** student number **20050660,** hereby declare that I am fully aware of the University of Fort Hare's policy on research ethics and I have taken every precaution to comply with the regulations. I have obtained an ethical clearance certificate from the University of Fort Hare's Research Ethics Committee and my reference number is the following:…….

Signature: ……

ACKNOWLEDGEMENTS

I wish to express my sincere gratitude to everyone who contributed towards the success of this dissertation. It would not have been possible without your input, time and support; I really appreciate your help.

My first and foremost thank you go to GOD ALMIGHTY who has given me strength and hope through the difficulties that I had and for opening up the way for me, you had it all planned. Thank you Lord for the wisdom, guidance and the power to sail through, you made it possible for me.

Professor Ajuruchukwu Obi, my supervisor, I would like to thank you for your mentorship, support, motivation and critiques during this study. You really helped me organize my thoughts; it would have been difficult without your help. I would also like to thank you for the efforts that you have made for me to get the tuition fees and funds for the research work. Continue the good work and God be with you.

To all the respondents, who took their time completing an ample and detailed questionnaire, I am thankful. Your contribution made it possible for me to compile this paper, it would have been impossible without your willingness to cooperate. For data collection, I would like to extend my gratitude to my fellow colleagues Mbongiseni Mhemhe and Anele Mayekiso.

My family, especially mom and dad, your faith in me pushed me to work harder. Thank you for your support and for believing as well. My brothers and sister, I would like to thank you for standing by my side and for your words of encouragement. Fellow colleagues and friends, sorry I cannot mention you by names because you are many, but I would like to thank you for the moral support that you provided.

Thank you all very much.

ABSTRACT

Enhancement of smallholder production to improve rural livelihood is an important policy goal in developing countries. Research findings indicate that smallholder production can be improved through establishment of new smallholder irrigation schemes, and the rehabilitation of abandoned ones. Smallholder irrigation has a potential to contribute significantly in shifting smallholder farming to commercial farming.

Although the roles of irrigating farmers are clearly defined, smallholder farmer'sdevelopmentresults in South Africa have been disappointing. The performance of smallholder irrigation is unsatisfactory. Smallholder irrigation has failed to improve the standard of living and livelihoods of smallholder farmersin South Africa. The majority of farmers are still producing at subsistence level.

This study, therefore, aimed to contribute to smallholder irrigation literature in two ways; firstly by evaluating the extent of irrigation participation of smallholder farmers towards commercialization in the study areas. The study also examined the determinants of irrigation participation among smallholder farmers.

A sample of 80 households was drawn by random sampling of smallholders in four villages as follows: 40 respondents from Mgxabakazi and Dinizulu villages and 40 respondents from Ncorha flats and Tshatshu. The sample included both irrigators and non-irrigators. Descriptive analysis shows that irrigators had better production and wellbeing than non-irrigators.

For the inferential analysis of the data, two models were employed namely, Binary Logistic Regression Model (BRM) and Truncated Regression Model (TRM). The Binary Regression model was used to predict the probability of farmers participating in irrigation schemes. Whether or not a farmer participated in irrigation was introduced as the binary dependent or response variable that could be explained bya range of explanatory or predictor variables such as source of water, land size, ability to sustain business, membership in the scheme, market access, availability of the irrigation system, willingness to irrigate, farming type commercial or subsistence and institutional support services. From these predictor variables, being part of the irrigation, ability to sustain business and market were found to be factors influencing

farmer's decision to participate.The second model required the in-depth investigation of the influence of irrigation participation as reflected by extent of commercialization. In order to do this, the level of commercialization was measured by calculating Household Commercialization Index. Then the truncated regression model (TR) was used to test the factors that affect the level of commercialization for the farmers who are participating in the irrigation schemes.Age, irrigated land, willingness to commercialize and gross value of production werefound to exert strong influence on the level of commercialization among farmers participating in irrigation.The study recommends that investments in smallholder irrigation should receive high priority, with emphasis on collective action, promotion of contract farming and strengthening the support services from government and the private sector, and ensuring enhanced access to market to all farmers.

Key words

Smallholder irrigation, commercialization, smallholder farming, Binary Regression, Truncated Regression and Household Commercialization Index.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST ACROYNYMS / ABBREVIATIONS

FAO	Food and Agriculture Organization
SPSS	Statistical Package for Social Science
NGP	New Growth Path
MDGs	Millennium Development Goals
NGOs	Non Government Organization
TRM	Truncated Regression Model
BRM	Binary Regression Model
WRC	Water Research Council
CI	Commercialization Index
IFPRS	International Food Policy Research Institute
IPTRID	International Programme for Technology and Research in Irrigation

CHAPTER ONE

INTRODUCTION

1.1 Background of the study

South Africa is experiencing a high poverty rate due to unemployment and people from rural areas are more susceptible. Gilimani (2005) said that the most vulnerable people are blacks who are residing in communal areas. Rural people of South Africa are thriving in different ways of living to make their standard of living better out of inconsiderate deprivation. In rural areas, there are no employment opportunities compared to urban areas, for this reason people migrate from rural areas to urban areas for better life. Perret (2002) stated that non-farm work provides better payment than agricultural sector. South Africa has dual farming structure mainly smallholder resource poor farmers and commercial farmers.

In the face of multiple challenges, it is small-scale farmers who feed the majority of the world, producing food for about 70 percent of the world's population (International Food Policy Research Institute (IFPRS), 2012). For many of these farmers, scarcity scenarios are nothing new. Because of the neglect of agricultural and rural development over past decades, secure land tenure and access to safe water and energy supplies have remained out of reach for many people, while national agricultural sectors have suffered structural deficits and low productivity (IFPRS, 2012).

Smallholder farmers reside in rural areas of South Africa and encompass subsistence farming specifically non-farming types who are very poor, pensioners and off farm workers that are earning other income elsewhere. They are livestock farmers, either full-time farmers or full time workers. In families where the women are

heads, subsistence farming activities remain scarce with low yields, some take place in yard animals in small portions and no marketing taking place. These farmers are characterised by little or no improved production technology. They do not generate enough income to maintain their households not to mention payment of their labourers (Kirsten and Van Zyl,1998). Aliber (2005) found that farming access to black South Africans was restricted as they were given, if at all small proposition of resources like land, water and technology to farm successfully. Lahiff and Cousins (2005) found that access of land to black farmers was restricted to homelands. Vink and D'Haese (2003), stated that only white people that were privileged because of the apartheid regime that enabled them to access natural resources, financial and rural infrastructure and still own some of those natural resources. Because there are no firms or factories in rural areas, those who remain in rural areas engage in agriculture primarily for their own consumption.

According to most of the studies and research that have been conducted, agriculture and agricultural related activities is the vehicle to rural development and are the most dominating sector that provides employment to rural people. Smallholder farmers dominate in rural areas, therefore development entirely depends on the performance of these farmers. Along with promotion of appropriate technologies for small farmers and particular crops they grow, commercialization of small family based agriculture is also considered as a key to stimulate agricultural growth in Africa and avert future global crises. Kandiji *et al*., (2006) argued that commercialization of smallholder farmers is an engine to reduce food crises, through food production and job creation. Smallholder commercialization is a crucial feature of the structural transformation process considered by most development economists. This structural transformation is considered to be the major pathway from a semi-subsistence agrarian society to a more diversified economy with higher general living standards (Jayne*et al*., 2011). Hence Sibale (2010) believes that smallholder farmers need to be supported to mend their production plan in order to develop into viable business that can generate sufficient income to sustain the needs of their households. Burger (2011) argued that smallholder support is needed in order improve household food security social stability and reduce the urbanization drive. Success of the farming business is determined by the ability of the business to market its produce profitably. The

marketability of the produce depends on the availability of factors such as infrastructure, capital as well as irrigation. Smallholders when effectively supported, could play a crucial role in rural development however, the majority of these farmers' produce do not meet the needs of the market because of poor quality and quantity. They only take to the market the surplus and the majority of the produce is consumed by the households. Common challenges striking livelihood and farming system of smallholder rural people include low productivity, insufficient resources, poor utilization of the available resources and lack of capital. This study will describe these socio-economic characteristics. Also evaluate the extent of commercialization of the farmers under the irrigation scheme.

South Africa needs to raise employment and reduce poverty, particularly among rural African people. The New Growth Path (NGP) released by the government in November 2010 was a response to the persistent unemployment problem. It aims to create five million new jobs by 2020. The NGP intends to create 300 000 of these new jobs through the establishment of smallholder farmer schemes (Department of Economic Development, 2010).

Murithi*et al*., 2010, discovered that commercialization of smallholder farmers is faced with many challenges that can be addressed by looking at number of aspects such as different group of rural people, gender, labourers and the most poorest people. They further argued that a research and debates have been conducted based on commercialization subject, however there are still issues that remained unresolved. Establishment of inference of different pathways for commercialization of smallholders can be addressed through thoroughly practical analysis of socio – economic factors limiting smallholder production. This will aid at clearly understanding of challenges faced by commercialization of farmers and provide an advice to policy makers on how to adequately address them.

According to Fraser (2009) developing countries are differentiated by incompetence of their marketing systems and this has a bad influence on response to marketing, if the farmer do not produce to the optimum level that reaches the economic returns from the sales, he tend to produce for only consumption. Development of the

incompetent marketing system of South Africa is demoralized by the shortage of supply of marketable products. He further argued that increase in agricultural produce will lead to increase in marketable surplus. However with limited water to produce high quantity and quality products that will enable the farmer to negotiate higher prices also retard the commercialization of smallholder farmers. That brings us to brief discussion of irrigation and irrigations systems of smallholder agriculture in South Africa. Water is a major issue for the farmers especially developing farmers residing in rural areas. With rainfall patterns becoming increasingly unpredictable, reliance on rain fed agriculture is becoming too risky. The water deficit caused by low and erratic rainfall and high evaporative demand limits dry land crop production in most of South Africa(Averbeke*et al*.,2011).Irrigation is a key component of concern's Integrated Livelihood Programme that seeks to improve irrigation infrastructure by supporting the establishment of irrigation schemes (Averbeke*et al*.,2011).
Assessments of smallholder irrigation schemes indicated that many of them also performed poorly (Bembridge *et al*., 2004; Tlou, *et al*., 2006; Mnkeni, *et al*., 2010). Yet, in water stressed South Africa, expanding smallholder irrigation is one of the obvious options to trigger rural economic development. Elsewhere in the world, particularly in Asia, investment in irrigation was a key ingredient of the green revolution, which lifted large numbers of rural Asians out of poverty and created conditions that were conducive for the industrial and economic development that has occurred (Averbeke 2012). A similar development trajectory has been recommended for South Africa and other parts of Sub- Saharan Africa (Lipton, 1996). So far, the developmental impact of smallholder irrigation in Sub-Saharan Africa has been limited (Inocencio *et al*., 2007).

Therefore, it is imperative that research like this one to identify the factors determining the participation (or non-participation) of smallholder farmers in irrigation which will enable the farmers to access output markets. Also to analyze what factors affects the degree of commercialization of irrigation participants, and evaluate if they are better-off in terms of productivity. Such analysis "will help to design appropriate policy instruments, institutions and other interventions for sustainable economic development of smallholder farmers.

1.2 Problem statement

1.2.1 Background to the problem

South Africa consists of deprived provinces, and according to many studies Eastern Cape is one of the poorest Provinces. Kwaru and Gogela (2002) argued that rural areas are endowed with resources for production especially land. Eastern Cape is covered with approximately 17 million of hectares. In support Gubu*et al*., (2005) discovered that Eastern Cape has potential to make enormous production, but yet remains the most poorest in South Africa.In addition to that Averbeke*et al.* (2011) noted that according to research findings the abundant resources such as human and natural resources available for most if not all smallholder irrigation schemes are underutilized. Thus, it is not possible for the smallholder farmers to produce both quantity and quality products to integrate with the market and enjoy the benefits of commercialization unless the already existing hurdles are removed and better environment is created (Bernard*et al*., 2007:1).

Majority of South African citizens are sitting in poverty line. About 75% of the poor reside in rural areas. They are depending directly or indirectly on smallholder agriculture for their livelihoods (World Bank, 2008). Smallholder farming has been identified as the engine for reducing poverty and ensuring household food security in these rural areas (Altman, Hart, Jacobs, 2009). in view of the fact that poverty is concentrated in rural areas, many researchers agreed that in order to reach the Millennium Development Goals (MDGs) of halving poverty and hunger by 2015, more emphasis should be given to smallholder agriculture (Smith, 2004; Matshe, 2009; Tshuma, 2012).

Govereh *et al*. (1999) argued that to improve wellbeing of rural people requires alteration of the current farming system of rural people that is characterised by low

income and low-productivity. Goitom (2009) agree that transformation is required to meet the challenges faced by smallholder to develop into commercial farmers. Transforming the subsistence-oriented production system into a market-oriented production system as a way to increase the smallholder farmer's productivity and thus its welfare outcomes, and reducing rural poverty, has been in the policy spotlight of many developing countries, for some time now. However, despite its potential, smallholder agriculture's poverty reduction results in South Africa have been disappointing (Liptone*t al*., 2003).

Poverty reduction and ensuring household food security are important policy goals in developing countries. (Sinyolo, 2013). Since 1990 the government has tried to make a major change in the nation's society and economy. The government vowed to upgrade the living standard of rural people of the population. Water Research Commission (WRC) has been focusing on smallholder irrigation schemes, when from about 1990 onwards it broadened its agricultural water focus from water as a production factor to water as a livelihood resource, against a backdrop of political change in South Africa (Averbeke*et al*. 2011).
The action programme declared in 2010 which stipulates the development and sustenance of communal people, the Millennium Development Goals (MDGs) and the New Growth Path (NGP) launched in 2011 are all aimed at reducing high poverty rate and ensure food security in South Africa.

In South Africa, food security can be improved through establishment of new smallholder irrigation schemes, and the rehabilitation of abandoned ones.In agricultural production, irrigation is required to double or multiple cropping and improve income and food security through diversification of agricultural production(Seid, 2002). Access to irrigation increases the area under cultivation and crop intensity, and decreases crop losses (Namara*et al*., 2010).Moreover, it leads to poverty reduction by expanding opportunities for higher and more stable incomes, and by increasing prospects for multiple cropping and crop diversification (Hussain and Wijerathna, 2004). Poverty alleviation and ensuring household food security in rural areas are major objectives for the establishment of smallholder irrigation in South Africa (Denison and Manona, 2007).

Therefore, smallholder irrigation has been endorsed as way of improving smallholder production across developing countries(WRC, 2011). A general consensus is that smallholder irrigation remains a feasible and key strategy for achieving improved agricultural production, household food security and rural poverty reduction in developing world (Kumar, 2003; Lipton et al., 2003; Hussain and Hanjra, 2004; Gebregziabher, Namara, Holden, 2009; Bacha, Nmara, Tesfaya, 2011, Govereh, Jayne and Nyoro, 1999). Participation in small-scale irrigation schemes has been found to provide one means by which these farmers can overcome some of the production constraints and expand production beyond subsistence needs (WRC, 2011). There is strong evidence that extent of supply of water determines whether and how fast households shift between traditional self-sufficiency goals and profit/income-oriented production (Chirwa & Matita, 2011). The potential of irrigated agriculture in enhancing food security and alleviating poverty has led the South African Government to prioritise irrigation development rehabilitation and revitalization(Denison and Manona, 2007; Van Averbeke et al., 2011).Goitom (2009)and Averbeke (2012) noted that smallholder irrigation has a role to play in agricultural and economic development. They agree that irrigated farming has the potential to contribute significantly to food security and income of participating homesteads. Backeberg, Bembridge, Bennie, Groenewald, Hammes, Pullen and Thompson (1996) in support argued that irrigation farming will create employment, both directly and through forward and backward linkages to primary production. Although irrigation development comes at a cost, and may have negative environmental and health consequences, it is one of the most important factors in increasing crop productivity and improving overall agricultural performance (Hussain and Wijerathna, 2004). The importance of smallholder irrigation schemes arises primarily from their location in the former homelands, which continue to be poverty nodes (Vink and Van Rooyen, 2009).

In addition the International Programme for Technology and Research in Irrigation and Drainage (IPTRID) (1999) states that irrigation also increases physical output and the value of production through intensification of cropping and innovation in crop choice. Riddell*et al*.(2006) also note that introduction of irrigation most commonly improves the overall level of quality of and leads to less variation in quality between

producers and from year to year.Farmers under irrigation schemes produce higher production than non- irrigation participants thereby standing chances of commercializing their production (Mahelet, 2007:1).

Nonetheless, many researchers have reported that, despite the potential, smallholder irrigation has failed to meet the rural development and poverty reduction objectives in South Africa. More recent assessments of the sector harmonize that the success of smallholder irrigation has been limited (Bembridge, 2000; Crosby *et al*., 2000). The majority of farmers are still producing at subsistence level. Averbeke*et al*. 2011) discovered that in spite of large scale investment, smallholder farming is only marginally effective. Irrigation is failing to provide high yields because it is affected by a whole range of socio-economic factors such as technical, management, training, agricultural policy, financing, etc. And challenges like hunger and unemployment still prevail mostly in rural areas and need to be attended to (Langat*et al*., 2011).

The developmental impact of smallholder irrigation in some of the developing countries for example Sub-Saharan Africa has been limited (Inocencio*et al*., 2007). Farmers do not procure good economic returns from production and therefore tend to produce just to maintain their wellbeing. Thus, it is crucial to identify and eliminate limitations to effective farming practices for more competitive and profitable irrigation farming.Thus, this study will look at contribution ofirrigation to commercialization of rural farming by looking at current farming status of rural farming, the extent of commercialization and the role played by irrigation in commercialization. However, it should be noted that the results are often location specific and are also influenced by host of other factors which make it necessary to carry out systematic investigation with respect to a particular location.

1.3Objectives of the study

The general objective of this study is to study the extent of commercialization of smallholder farmers and how are these farmers influenced by socio-economicfactors in the Eastern Cape Province.More specifically the study aim to;

- To determine factors influencing farmer's decision to participate in irrigation
- To evaluate the extent of irrigation participation of smallholder farmers towards commercialization in the study areas
- To make recommendations based on findings

1.4 Research questions

This research project sought answers to the following research questions:

- What are the challenges in commercializing smallholder production?
- What factors determines a farmer to participate (or not) in irrigation?
- What is the position of irrigators' in terms of productivity and commercialization when compared with their non-irrigation counterparts?
- What are the innovation strategies to improve the performance of smallholder farmers?

1.5 Hypothesis of the study

To achieve the general objective of the study, the following specific hypothesis is going to be tested:

H_0: smallholder irrigation participants in Port St John's and Intsika Yethu Local municipality have no access to irrigation and that hasnegative influence to commercialization.{ *ß=0}*

$H_{1:}$ smallholder irrigation participants in Port St John's and Intsika Yethu Local municipality have access to irrigation and that has positive influence to positive commercialization.{ *ß=1}*

According to the equation of the model, the dependent (Y) side of the model is reflected as irrigation participation in the research question. Irrigation participation will be procured as the binary response variable, which has two possible outcomes, (farmers either participate in irrigation or not). The extent of commercialization will be measured by sales index which is: Gross value of sales divided by the gross value of production. Independent variable will be factors affecting the dependent variable

(irrigation participation).H_O is the null hypothesis thus ß=0, that is if it not accepted the predictor variable will have no influence over the dependent variable. If it accepted the predictor variable have influence over the dependent variable.

1.6 Justification of the study

According to many research findings, agricultural activity has declined in many rural areas of South Africa. Many households have lost the tradition for farming and rely on non-Agricultural income like wages and pension fund for survival. Most viewers have revealed that the most determinant of food is cash in hand rather than agricultural production unless agricultural production moves out from smallholder production to commercial scale farming.

This clearly defines that the performance of smallholder farmers is not satisfactory. In rural areas farming is done by smallholder farmers who are residing there, therefore livelihoods of these smallholders will be given an overview.

The main challenge that government is trying to combat these days is poverty, therefore development of smallholders and the improvement of their performance through employment of new production techniques and promoting market access, provision of support services as well as financial support will ensure high productivity and employment opportunities to surrounding communities.Smallholder irrigation and adoption of new irrigation technology provide new opportunities to increase agricultural productivity. Irrigation can lead to a reduction in crop production risk and therefore, provides greater incentives to increase input use, increase crop yields, intensify crop production and diversify into higher yields.Most importantly, this study can give a better insight on the importance of irrigation farming in improving agricultural productivity and commercialization of smallholder production.

1.7Organization of the study

Chapter two of this research discusses the relevant literatures and theoretical framework of smallholder farming particularly on barrier to commercialization of smallholders and the impact of these constraints to development of smallholders.

More emphasis will be given to marketing as it has been identified as the major barrier to commercialization. How markets affect growth performance of smallholder production and processing. Chapter three will present the methodology of the research as well as description of the study. Chapter four will present the findings from the household questionnaire. Chapter five will be the discussion, recommendation and conclusion.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

Agriculture plays a significant role in improving wellbeing and the economy of rural people. Specifically, commercialization is a significant approach for improving income of households. Irrigation can reduce crop production risk and intensify production and revolutionize smallholder subsistence production into commercial production. This chapter review the literature on smallholder production and irrigation. This will be done by looking at generaloverview of smallholder irrigation. Definition of terms, brief history on establishment of smallholder farmers, socio – economic impact of smallholder irrigation in South Africa, current status of irrigation scheme in South Africa, conceptual framework, goals and aspirations. Smallholder commercialization and the process of commercialization, the drivers to commercialization will be looked at. Irrigation is seen as gateway to commercialization of smallholders but that is not guaranteed success of the smallholder farmers as there are other factors affecting production, therefore factors affecting commercialization are described.

2.2 Overview of smallholder irrigation

Seid (2002) discovered that the development and management of irrigation systems, access to agricultural inputs including fertilizers, pesticides, seeds, etc., increased agricultural productivity. South Africa is characterised by large scale commercial farming with great net export of food products. However smallholder farmers only own 11% while 70.5 is owned by whites. This means that transition from subsistence to commercial farming is delaying (Perret, 2002). Irrigation development is a special

case of agricultural development in which technology mediate to provide control for the soil moisture regimes in the crop root zone to achieve a high standard of continuous cropping (EVDSA 1996).Yokwe (2005) discovered that South Africa has approximately 1.3 ha of land under irrigation for both commercial and subsistence farming. Tekane and Oladele (2011) noted that out of the 1.3 million hectares of land under irrigation, only 0.1 is utilised by smallholder producers. Agricultural production depends, among other things, on climatic factors such as temperature range, length of growing season and the amount, frequency and distribution of rainfall. Endeavouring to control the variable aspects of these factors, farmers discovered that the moisture plants need could be supplied by irrigation. This knowledge enabled human beings to become independent of the vagaries of natural rainfall and enabled them to grow crops in arid and semi-arid regions. Therefore, applying water to soil for plant is irrigation. Role played by irrigation in improving the production of poor resource farmers and factors affecting access in profitable markets will be discussed in details in this study.

2.3. Definition of terms

2.3.1 Smallholder farmers

Ellis (1998) as cited by Machingura (2007) defined smallholder farmers as farm households relying primarily on family labour for production and produce for their own consumption and often little for marketing. According to Lahiff and Cousins (2005), smallholder farmers are located in wide range of locations, including deep rural areas of the homelands, in township and cities are normally producing staple food for their household use. They further said that smallholder agriculture is mostly characterized by gender, race, and class and in deep rural areas large number of smallholder farmers is poor black woman who practice farming mainly for their households. Machingura (2007) defined smallholder farmers as farmers with limited resources bequest in comparison with large farmers. For the purpose of this research smallholder farmers are defined as the disadvantaged farmers in terms of land, working capital, infrastructure, agricultural complimentary services, production

technology and information. But the emphasis is on black farmers who are residing in rural areas because they are mostly susceptible to the limiting constraints.

2.3.2 Smallholder irrigation

In South Africa the term smallholder or small-scale irrigation is mainly used when referring to irrigated agriculture practised by black people (Backeberg 2006a; Van Averbeke[and] Mohamed (2006) and Machete *et al*., 2004). Averbeke (2008) defined smallholder irrigation schemes as irrigation projects larger than 5 ha in size that were established in the former homelands or in the resource poor areas by black people or agencies. Smallholder irrigators have been categorised into four groups, namely, (i) farmers on irrigation schemes; (ii) independent irrigation farmers; (iii) community gardeners; and (iv) home gardeners (De Lange, 1994:2; Crosby*et al*., 2000; Du Plessis*et al*., 2002:6)

Agricultural commercialization is a process from smallholder production to semi-commercial and then to a fully commercialized agriculture. Pingali and Rosegrant (1995) defined commercialization as the transition from which the subsistence farming is transformed to commercial agriculture. It is increasingly recognized that the commercialization of output from small-scale farming is closely linked to higher productivity, greater specialization, and higher income. In smallholder production, the farmer's objective is food self-sufficiency by using mainly non-traded and household generated inputs. The objective and the input sources change in semi-commercial farms into generating surplus agricultural outputs and using both traded and non-traded farm inputs. In a fully commercialized agriculture, however, inputs are predominantly obtained from markets and profit maximization becomes the farm household's driving objective. Jaleta*et al*. (2007) observed that agricultural commercialization is not only about producing for marketing but also determined by whether the farmer made decisions based on profit maximization. While according to Langat *et al*. (2011) commercialization of smallholder farmers means the effective involvement or improvement of capability of smallholder farmers to partake in output market.

2.4 Brief history on the establishment of smallholder irrigation

All available evidence indicates that irrigation was an innovation that was introduced after colonisation. The first era of smallholder irrigation development occurred during the 19th century. The third period of smallholder irrigation development can be referred to as the independent homeland era. This era in smallholder irrigation development lasted from about 1970 until 1990 and was an integral part of the economic development of the homelands. Irrigation development during this era was characterised by modernisation, functional diversification and centralisation of scheme management. Typical examples of large schemes (>500 ha) developed during this era were found mainly in the Eastern Cape and included the schemes at Keiskammahoek, Tyefu, Xonxa and particularly Ncora (Van Averbeke *et al*., 1998). The irrigation and farming technology that was implemented on these large schemes was amongst the most modern that was available at the time.

2.5 The current status of smallholder irrigation schemes in South Africa

For many decades smallholder irrigation schemes have generated public interest, mainly because their establishment and revitalisation were made possible through the investment of public resources. The highly positive review of the performance of these schemes by the Commission (1955) has not been repeated since. More recent assessments of the sector concur that the success of smallholder irrigation has been limited (Bembridge, 2000; Crosby *et al*., 2000).

Factors that contributed their modest performance were poor infrastructure, limited knowledge of crop production among smallholders, limited farmer participation in the management of water, ineffective extension and mechanisation services and lack of reliable markets and effective credit services (Bembridge, 2000; Crosby *et al*., 2000). Another factor that constrained the economic impact of smallholder irrigation was the predominance of subsistence-oriented farming. Backeberg *et al*. (1996) reported that

37 % of farmers on smallholder irrigation schemes were commercially oriented, whilst the remaining 63 % were mainly engaged in subsistence production. The results of the recent survey by Arcus Gibb (2004) painted a similar picture. It pointed out that economic success through market-oriented production has not always been the objective of these projects (Van Averbeke *et a*l., 1998), nor should the measuring of success ignore the importance of food security through own production. As Perret (2002) points out, food security remains the major objective for many plot holders and subsistence-oriented crop production patterns have never been changed. For this reason it is important to also assess the success of smallholder irrigation from the perspective of smallholder farming and their livelihoods. The table below show the available schemes in South Africa operational and non operational as well as those not known. From table 2.1, the largest number of smallholder irrigation schemes is located in Limpopo Province (about 56%), followed by the Eastern Cape Province (about 23%), and then KwaZulu-Natal Province (about 12%) (Denison and Manona, 2007b; Van Averbeke *et al*., 2011). The above-mentioned percentages indicate that 80% of smallholder irrigation schemes in South Africa are located in these three provinces, while the remainder are scattered across the other provinces. As reported in Van Averbeke *et al*. (2011), smallholder irrigation sustainability is a major challenge in South Africa. Of the 296 smallholder irrigation schemes with known operational status in 2011, above 30% were not operational.

Table 2.1: Operational status of smallholder schemes by provinces in South Africa in 2012

Province	Number of operational schemes	Number of non operational schemes	Number with not known operation schemes	Total
Limpompo	101	69	0	170
Eastern Cape	51	16	5	72
KwaZuluNatal	35	0	1	36
Mpumalanga	7	2	0	9
Western Cape	7	1	0	8
Northern Cape	2	1	0	3
Free State	1	1	0	2

North West	2	0	0	2
Total	206	90	6	302

Source: **Van Averbeke *et al*. (2011).**

From table 2.1, Eastern and Limpopo provinces have high non operational schemes than other provinces. KZN has no non operational schemes, all the available schemes are known and 7 are operational and only that is non operational. In Mpumalanga, Western Cape, Northern Cape, North West and Free State all the available schemes and their status are known.

The total of operational schemes is 206 compared to 90 of non operational schemes and the 6 not known operational skills. This implies that, as highlighted by Van Averbeke (2012), there is a higher chance of gravity-fed smallholder schemes to remain operational compared to those involving pumping water. The overheard costs associated with pumps, and high maintenance pump costs make them unsustainable for smallholder irrigation schemes (Van Averbeke, 2012).

2.6 Socio economic impact of smallholder irrigation in South Africa

Backeberg (2006a) noted that South Africa has about 1.3 million ha under irrigation, of which 0.1 million ha is in the hands of smallholders. Backeberg (2006) estimated the number of South African smallholder irrigators to range between 200 000 and 250 000, but most of these were farming very small plots, primarily to provide food for home consumption. South African smallholder irrigation schemes are multi-farmer irrigation projects, larger than 5 ha in size that were either established in the former homelands or in resource-poor areas by black people or agencies assisting their development. Using this definition, Arcus Gibb (2004) counted 287 smallholder irrigation schemes in South Africa in 2004. Estimates of the combined command area covered by South African smallholder irrigation schemes range between 46 000 ha and 49 500 ha (Bembridge, 2000; Backeberg, 2003; Arcus Gibb, 2004; Denison, 2006). This represents about 47 % of the total smallholder irrigation area and 3.6 % of the 1.3 million ha under irrigation in South Africa (Backeberg, 2006a). The importance of smallholder irrigation schemes in South Africa arises primarily from the number of participants involved (Bembridge, 2000). In 2003, Arcus Gibb (2004)

estimated that the land on smallholder irrigation schemes was held by about 31 000 plot holders, representing about 15 % of the total smallholder population. By comparison, the 1.2 million ha of irrigated land in South Africa, which is referred to as large-scale commercial, is held by about 28 350 land holders (Backeberg, 2006a, 2006b).

Most smallholder irrigation schemes are found in the former homelands of South Africa, where the incidence of poverty peaks (May, 2000; Aliber, 2003). In these particular socio-economic environments, smallholder irrigation schemes present an attractive opportunity for the development of local livelihoods. According to Chambers and Conway (1992) livelihoods consist of four parts, namely, (i) people and their livelihood capabilities; (ii) assets, including both the tangible (resources and stores) and intangible (claims and access), which provide the material and social means that are used to construct livelihoods; (iii) activities, i.e. what people do; and (iv) a living, which refers to the outcomes of what people do. When viewed from this livelihood perspective, smallholder irrigation schemes are assets. They can be used to increase and diversify the livelihood activity of plant production, resulting in improved livelihood outcomes, either directly in the form of food or income for plot holders, or indirectly by providing full or partial livelihoods to people who provide goods and services in support of irrigated agriculture on these schemes.

2.7 Conceptual framework for analysis of effects of irrigation on commercialization

The conceptual framework illustrates how irrigation can influence farmer‘s willingness to diversify, their production from small scale production to commercial production. Adoption of irrigation system is thought to improve socio-economic wellbeing of famers. Government NGOs and other stakeholders are implementing irrigation systems for smallholder producers to advance their production. However not all of the smallholder farmers are interested in joining irrigation scheme, some of the reasons were that health status, unavailable infrastructure, lack of managerial skills etc. Understanding critical relationship between the factors that affects commercialization of famers is essential for identification of efficient intervention

methods of improving irrigation schemes. Following is the conceptual framework showing a model analysis showing introduction, adoption and implementation of irrigation, efficient allocation of resources, production factor analysis, marketed surplus analysis, income earning model, food consumption model and the model explaining nutritional status in the context of poverty situation.

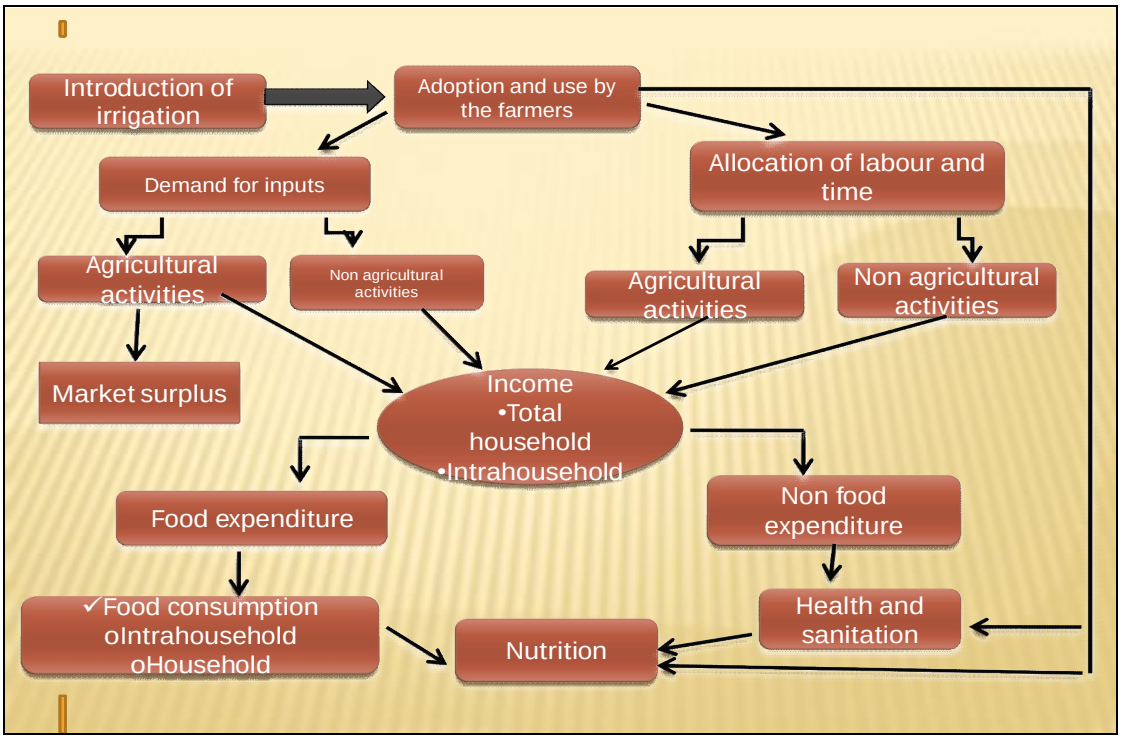

Figure2.1: Conceptual framework for analysis of irrigation effects on commercialization
Field Source: (2013)

Introduction and implementation of new irrigation technology affects the allocation of resources to that enterprise because irrigation requires incremental labour. The labour deployed within the household on agricultural and non agricultural activities will bring income. Irrigation introduction also increase the demand for inputs increases as more land will be cultivated. The same inputs are required for both on-farm and off-farm activities. Effect change in output level and output composition are traced back their income and marketed surplus effects. Both activities are expected to bring income. The income is required to maintain the welfare of households. Effects of food consumption are traced back to nutritional status of the individuals. Income generated is utilised in food and affects nutritional status of an individual also is allocated for non food items for health and sanitation.

Irrigation system is a technological tool used to improve smallholder production so as to improve the economy of rural people. Irrigation indirectly affects farmer's interest in commercialization in that farmers are able to increase their output and get surplus to be marketed. Irrigation can reduce poverty especially in low income households by increasing production and lowering the risk of crop failure. Through irrigation, smallholder producers are able implement more cropping models, and transform from subsistence production to commercial production.(Webb, 1991).Increased budget increases the amount of capital available for investment. High investment in the business increases both quality and quantity of production, this means farmers are able to meet the market requirements. Employment opportunities are reached. This all positively affect farmers interest in irrigation participation. Use if irrigation to improve income growth, employment creation, economic growth, livelihoods improvement and poverty alleviation is clear as evidenced that irrigation can improve rural livelihoods. Commercialization has been traditionally associated with large scale producers, growing opportunities are making it inevitable for smallholders to be integrated into the market economy. To achieve all-inclusive growth, smallholders therefore need all-stakeholder support to deal with constraints and participate in commercialization opportunities to realize its full benefits.

2.8 Goals and aspiration

Agricultural intensification is presumed to be a necessary pre-condition for the development of the agricultural sector in South Africa. Various government and Non-Governmental Organizations (NGOs) among others initiated smallholder irrigation schemes throughout the country. Nevertheless smallholders are particularly found to be reluctant to participate in smallholder irrigation schemes.

Studies revealed that income, gender, access to market information and health condition of households were found to be important determinants for participating in small scale irrigation schemes. Hence, improving rural farm households' access to market information and health services, are likely to improve participation in irrigation schemes thereby improving of small holder farmers income.

2.9 Role of irrigation on wellbeing of smallholder farmers

The objectives for the establishment of the scheme was to provide for continued improvement of the quality of life for all stakeholders in remote areas through the creation of jobs, improvement of food security of rural households and the efficient utilization of resources through sustainable economic farming and agribusiness enterprises (Tapson, 1999). Literature that examines the impact of irrigation on agricultural performance, household income and poverty is mixed. Many researchers have discovered that irrigation is of great significance for household welfare and many studies have used poverty as an indicator of household welfare. Pender (2002) showed that the impacts of irrigation development on input use and the productivity of farming practices controlling all other factors were insignificant. In line with irrigation and poverty linkage, there are a number of studies in different countries which show that irrigation has served as the key driver behind growth in agricultural productivity and in increasing household income and alleviating rural poverty.

Asayehegn*et al*. (2013) discovered that irrigation can reduce poverty, through increasing production and income and reduction of food price. This helps very poor households meet the basic needs associated with improvements in household overall economic welfare protection against risks of crop loss due to erratic unreliable or insufficient rainwater supplies, promotion of greater use of yield enhancing farm inputs and creation of additional employment, which together enable people to move out of the poverty cycle.

Narayanamoorthy (2001) discovered that irrigation scheme not only increase cropping intensity and productivity of crops, the intensive cultivation of crops due to timely access to irrigation, increase the demand for agricultural labourers and hence wage rates for those who lived below the poverty line in developing countries. He concluded that improvement in access to irrigation and investing in human capital development, are the two most important factors for agricultural growth and rural poverty reduction in deprived countries. In addition Fan *et al*.(1999) when looking at linkage between government expenditure, growth and poverty discovered that government is spending on productivity enhancing investments, such as irrigation,

research and development in agriculture, rural infrastructure(including roads, electricity, and education) which target the rural poor, have all contributed directly to the reduction of rural poverty. They found that irrigation development, in addition to raising agricultural productivity, also encourages private investment. Empirical evidence from studies carried in Australia shows that a dollar worth of output generated in irrigated agriculture generates more than five dollars worth of value to the regional economy, which suggested irrigation development has a strong multiplier effect on other sectors of the economy (Ali and Pernia2003). Shah and Singh (2004) found in India that more irrigation means fewer people below the poverty line. Moreover, Zhaan (a), Zhang(b) (2000), in their study on the role of public investment on growth and poverty, noted that government expenditure on productivity enhancing investment which includes investment in irrigation, has played a significant role in poverty reduction and enhancing productivity in rural China.

From the discussion above it is clear that irrigation has significant role in improving rural livelihoods, however it is often characterised by inefficient water use, high capital and recurrent cost, lack of sustainability and inequity in the distribution of land. The following conclusion can be drawn based on the findings and focusing on the objectives of the study that the higher the age, males educational, income and socio - economic status of the farmers the higher the household welfare. The availability of financial and human capital also contributes to a higher household welfare. The male-headed household has a significant relationship to the household welfare while the female and child headed household lower household welfare. Unavailability of natural and physical capital lowers the household welfare of farmers on the irrigation scheme.

2.10 Smallholder farmers and commercialization

In general, the productivity of smallholder farmers is low due to factors such as lack of information, lack of access to market and poor access to support services (Aihoon*et al*., 2009; Ngomezulu 2010 and Banga, 2002). These factors are challenges in the improvement of smallholder production and because of them, smallholder producers are finding difficulties in commercializing their production.

2.10.1 Differentiation of smallholders and commercial farmers

The difference between smallholder and large farmers is clear from the discussion above. Smallholders are those farmers that produce at subsistence level mainly for household consumption on approximately 1 – 10 hectares while commercial farmers are farmers that produce on a large scale approximately 100 hectares and the majority of their produce is marketed. And the commercial farmers are privileged farms with access to agricultural support services and market share, compared to smallholder. According to Pundo (2005), commercial farmers are coupled with extensive skills and knowledge, have better access to credit access and have good competitive skills and knowledge on markets of their produce. While black farmers are challenged by lack of access to market, credit, support services and low productivity (Salami*et al*., Kamara and Brixiova, 2010). According to Aliber (2005), 46 000 of largely commercial farmers occupy 87% of the land while on the other 2 million black households have to make their living out of 13% of the remaining land. He further argued large commercial farmers are characterised by high capitalization and increasingly integration to global markets while black farmers only produce for household consumption.

2.10.2 Commercialization

2.10.2.1 Process of commercialization

Jaleta*et al*. (2009), observed that smallholder commercialization is part of an agricultural transformation processes in which individual farms shift from a highly smallholder-oriented production towards more specialized production targeting markets both for their input procurement and output supply. Pingali*et al*. (2005) argued that the production of marketable surplus of food over what is need for livelihood initially is the most important form of commercialization in peasant agriculture. He added that this is so because smallholder farmers often find it difficult to commercialize due to poor public goods provision that prohibits market trade and new set of transaction costs that come out because of food systems featured by difficult rules, regulations and players. Smallholder commercialization can be seen

as a pathway to the overall economy's structural transformation in which larger proportions of economic output and employment are generated by the non-agricultural sectors. To attain this essential goal of structural transformation through a smooth process of smallholder agricultural commercialization, policy and strategy interventions to improve the functioning of input and output marketing, improvements in service provision, and the development of infrastructure are important. For successful commercialization policymakers may also need to target the types of agricultural commodities to be promoted and which markets to focus on.

As revealed above that smallholder production plays a role in reduction of poverty and sustainability of household's livelihood. Jaleta *et al*. (1999) noted that this will not remain the case in the long run. They argued that wellbeing from market oriented production result from specialization that builds on and creates comparative advantages, potential for large-scale production, and from dynamic technological, organizational and institutional change effects that arise through the flow of ideas due to exchange based interactions. Smallholder commercialization also typically promotes an increase in variety of marketed commodities at a national level and increased specialization at regional and farm levels (Pingali and Rosegrant 1995).

2.10.3 Drivers to commercialization

2.10.3.1 Market access

Most smallholder producers are eager to participate in marketing, however they are being hindered by many constraints, one of them being deprived access to markets. Commercialization is an option that could assist smallholder producers to enter the markets. Markets where smallholders participate are weak, thin and interconnecting. Langat *et al*, (2011) explained that in the Eastern Cape Province it is often difficult for smallholder farmers to partake in market due to a number of obstacles that reduce the motivation for partake. These may be reflected on the hidden costs that make access to markets and productive assets difficult. The major challenge to commercialization is how smallholders can step and participate in markets (FAD 2011). According to Omiti*et al*. (2006), market orientation of smallholder producers gives an opportunity for addressing the number of challenges that characterized

subsistence production such as low productivity, high degree of uncertainty, lack of the ability to meet every changing consumer preferences, high transaction costs, lack of reliable and timely market information and absence of economics. They further argued that lack of access to markets contributes to poor agricultural development and prevent smallholders from using domestic and export opportunities to uplift their well being.

2.10.3.2 Asset accumulation

Gabre-Madhin (2009) stated that asset ownership or access to private endowments is amongst the most important dimensions of poverty, which impacts the extent to which households benefit from market reforms. Having access to the required assets for production motivates smallholder producers to transform their subsistence production into commercialised production. Asset ownership impacts the gains from market improvement both because it affects transactions costs and productivity. Access to information, such as market information systems and grades and standards, is amongst the key assets, which impacts transactions costs.

Limited access to assets has several implications for the commercialization strategy that the poor adopt (Gabre-Madhin, 1999). He also discovered asset ownership impacts gains from reforms by increasing transactions costs and has important implications for productivity. Asset ownership like access to credit, remarkably impacts productivity of existing assets, which would allow the poor to expand scale of present activities, or enter into value added activities. In addition to asset ownership, the sustainable livelihoods has focused only on assets whereas risk and vulnerability are also key dimensions of poverty, and have recently been brought to the fore as well as the ability to cope with hardship (Dercon, 2001). Assets in general serve as means to cope with risk in smallholder farming. Poor smallholder farmers are particularly exposed to natural disasters, seasonality, year-to-year variability, and commodity price volatility. Given their limited ability to cope with risk due to resource constraints and absence of formal risk insurance markets, the poor are left vulnerable. With limited options to manage risk through formal market mechanisms, they experience significant fluctuations in income and makes consumption smoothing difficult. With enough assets the farmers stands a chance of having a

good productivity, maximum profit and that promote capability of the farmer to with stand risk.

2.10.3.3 The need for commercialization

Commercialization of smallholder farmers can lead to a decline in food prices due to increase in competition and lower costs in food marketing and processing. These changes improve the wellbeing of smallholder farmers by declining food prices enabling the reallocation of limited household incomes to high value non-food agribusiness sector and off-farm enterprise while in consumers it lowers food prices thereby increasing the purchasing power of food (Omiti, Mc Cullough, OAtien, Madam, Nyanamba, Murage, 2006). As indicated earlier that commercialization increases the chances of market participation of smallholders and this improve the competitive advantage of the farmers. Through commercial farming smallholders could have the privilege to form various types of produce organizations to compete for market access, service delivery of for example input supply, training and extension services (FAD, 2011).

One of the objectives of this study is to determine factors that influence farmers participation, model of commercialization is used in understanding the concept of commercialization to provide a condensed overview of the whole concept by summarizing key components of commercialization and how they are inter-related. It arouses attention to salient aspects like the multiple drivers, two-sided nature of determinants, strategy options, measurement elements and multi-faceted nature of effects. This enhances comprehensiveness in planning, implementation and assessment of commercialization programs. Process of commercialization is explained below.

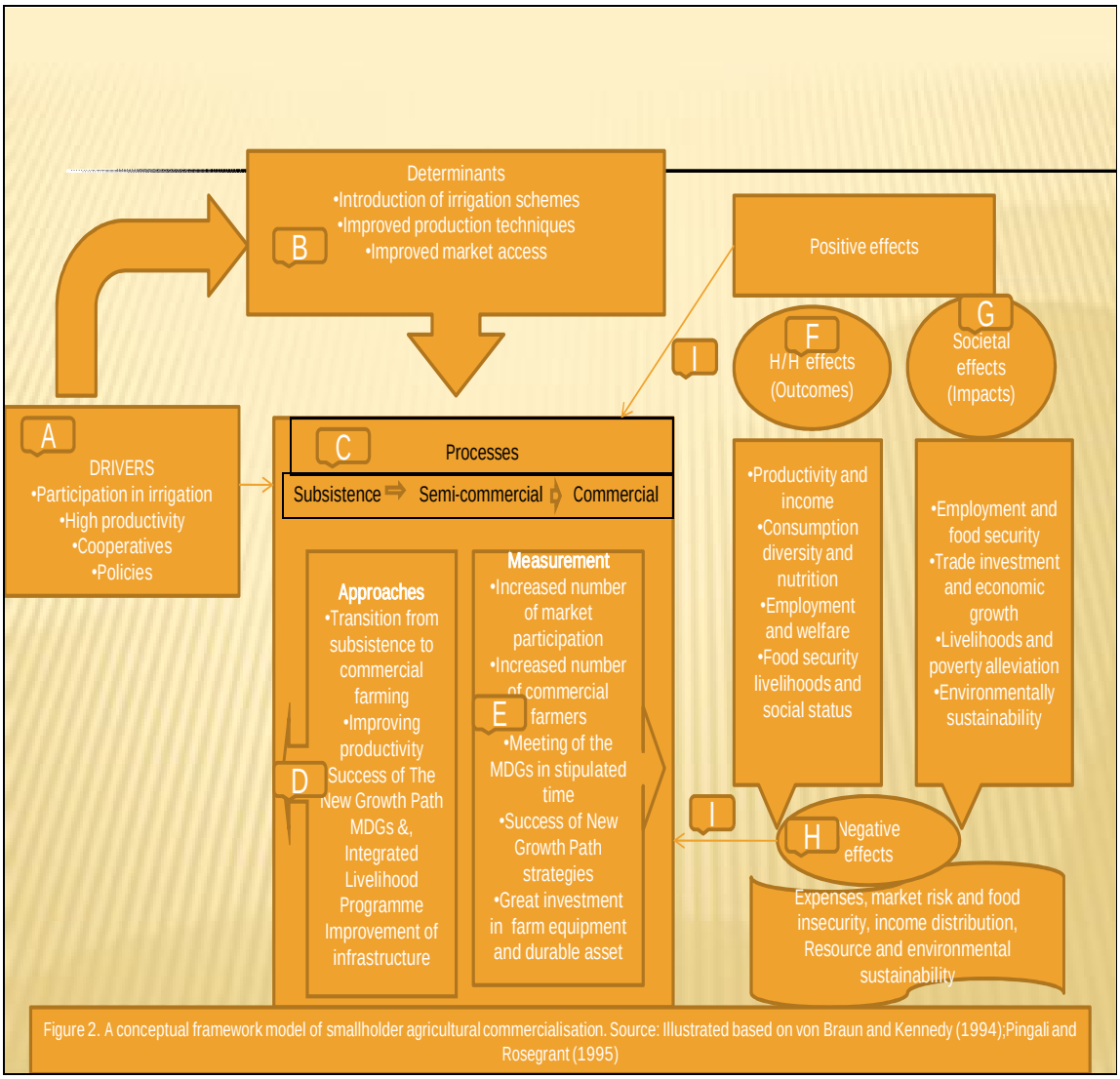

Figure 4.22: A conceptual framework model of smallholder commercialization. Source: illustrated based on von Braun and Kennedy (1994), Pingali and Rosegrant (1995)

The discussion on smallholder agricultural commercialization has identified key interrelated components of the concept such as drivers; determinants (enablers and constraints); processes; approaches (strategies), indicators (measurement elements) and effects (positive and negative household and societal). These can be condensed into a conceptual model useful in planning, implementation and review of commercialization programs (Figure 4.22). Multiple drivers (A) trigger the process by increasing demand (like urbanization); making the environment more enabling (like policy, resources); pushing for new farming approaches (like climate change);

making operations more efficient (like technology) or making farmers more committed (like entrepreneurship). For instance, when demand attractively grows, producing for the market becomes necessary and when appropriate technology is accessed, production for the market becomes more efficient. As smallholders progress from subsistence towards market orientation, the success and failure of the process is influenced by several environmental (like socio-economic factors), farm level (like farm resources) and individual (like skills) determinants (B) whose effects are also influenced by the drivers. When these factors are favorable, they facilitate / enable the process making it successful, but when unfavorable hinder the process causing its failure. The process (C) implies that farmers progressively substitute subsistence practices decreasing) for commercial practices (increasing) until they fully commercialize. The process is approached differently based on the leading agent of change or the primary driver or any combination of them.

The strategy (D) adopted determines key players, key activities and the role of producers. Most successful cases are based on collaborative efforts as successful commercialization has proved difficult without partnerships and all-inclusive approaches. Progress is measured / indicated (E) by some production purpose and orientation, nature of enterprise decisions (like resource allocation and technology) and extent of market participation (input and output) Ultimately, successful commercialization is expected to yield positive outcomes (F) at household level (like income) and positive impacts (G) at societal level (like food security). At the same time, some negative and unintended effects (H) can also emerge (like market risk) depending on contexts and strategies adopted. Lessons picked from the results feed into future programs and strategies (K).

2.11 Factors affecting commercialization in Eastern Cape Province

According to many researchers, the major constraint to smallholder commercialization is the marketing systems that smallholders employ for their products to reach the market. The overall of this section will discuss the major marketing constraints to smallholder participation in markets. Most reviews have revealed that smallholder producers have limited access to factors of production, credit and formal markets and are often constrained by inadequate property right and

transaction costs. According to Ngomezulu (2010), smallholder producers are characterized by resource base such as little modern technology, underdeveloped infrastructure, weak institutional support and low production levels. He further argued that these challenges have been accredited to strong legacy of the apartheid era such as forced resettlement and betterment planning. To give a detailed discussion on these constraints, marketing systems, market access and its barriers, entrepreneurial and marketing skills, poor infrastructure and lack of capital will discussed.

2.11.1 Market access

Market access is the main determining factor of commercialization. Smallholder farmers normally produce without having an assurance of market to supply and that result to their surplus not reaching the market. Market access is often difficult due to the remoteness, poor infrastructure and small number of active farmers. Those that have identified the market their marketing strategies are affected by a number of factors such as high production risk and lack of economies of scale, high marketing risk, high transaction costs, low bargaining power and lack of human and social capital. Gabre-Madhin (2009) added that access to information, particularly for communities far from markets, impacts smallholder's decision to commercialize. There is relatively large number of subsistence farmers especially in rural areas because of these limiting constraints and those that participates in markets they do in margins (Poutone*t al*. 2006 and Barrett 2007).

Difficult and variably applied rules, absence of information, and difficulties in financial support, among other factors, all constitute barriers to entry, especially for small market players (Bienabe*et al*., 2004). However this study will focus on poor infrastructure, high transaction, lack of information and low bargaining power which were identified as the major constraints to access the market. They observed that having access to the markets is not enough for a successful commercialization, he argued that a market oriented farmer need to have land and be in a position to develop a capital intensive system and that the business of a market orientated farmer needs to be sensitive to international input and product price fluctuation. He further argued that smallholder access to markets depends on the structures of the

market location of the farmers and their function in the supply chain and the size of the flow.

2.11.2 High transaction costs

According to Nkhori (2005), transaction costs originate from several sources such as information irregularities, negotiations and monitoring and enforcement of trade agreements. He further argued that these barriers have effect on farmer's choices. Ngomezulu (2010) argued that transactional costs are barriers to the efficient participation of farmers in different markets. The transaction costs are generally high for smallholder producers because of poor road infrastructures and the distance between the farm and market and a producer cannot use a marketing channel that its value is overweighed by costs of using it. Most commonly experienced transaction costs by smallholder farmers include market and information search costs, bargaining costs, transfer costs, monitoring cots, enforcement costs (Jaffe and Morton, 1995). Because smallholder farmers are producing on small plots, have lack of production knowledge with poor access to the markets and infrastructure communication and transportation, the returns from their production are generally low, making it difficult to finance the transaction costs. Gabre-Madhin (2009) observed that high transactions costs increases inadequate access to standardized system of grades and standards, which can provide a greater level of certainty about the quality of produce, also increases search and screening costs.

2.11.3 Lack of financial support

Increasing the access of poor rural people to financial services and markets is one of its three major thrusts (IFAD 2001), titled "Enabling the Rural Poor to overcome their Poverty". Monde, undated agreed that poor access to finance to smallholders has caused steady production in rural areas and added that financing smallholder producers is important as they are role players in poverty reduction. One of the biggest challenges in smallholder production development is the access and utilization of agricultural finance. In farming business capital is required to invest in smallholder production, to innovate production and or productivity, to store produce and wait to utilize high prices.

Smallholders normally found it difficult to access funds because of for example the strict requirements to obtain the loan, formal bank sectors are reluctant to finance smallholders because of risks involved in agricultural sector and the bad reputation of smallholders being unable to refund the loan. It also difficult to access funds from other organizations such as NGOS and government due to low productivity, commodities, unprofitable enterprises that makes borrowing unprofitable, farmer's poor track record in managing the farm and the loan repayment, lack of collateral, market risk, unexploited linkage opportunities, lack of risk alleviation for production, high transaction costs, poor timing of the payment of funds, a negative attitude of the financial institutions that consider smallholders non-bankable (Nyamutule and Ayessaki 2009).

De Craen (2010), in his case study on financial support programme, he argued that success of financial support programme to increase market access for smallholder, and thereby their participation in commercialization is measured by the sustainability in the long run of the initiative that was granted for the support. He discovered that it is possible to achieve fruitful results from the limited budget as long the support is granted to a sound business, however financial support programme is not enough for prosperity of smallholder producers, it has to be accompanied by integrated approach with technical business support services. Gabre-Madhin (2009) added that the importance of financial capital is particularly evident for the underlying competitiveness of the poor in land markets. Imperfect credit markets, subject to information and moral hazard problems, lead to credit sharing for small and near-landless farms. Hence, the rural poor may not be able to compete for land, and moreover, face a severe disadvantage in improving the productivity of their land and labour without access working capital.

2.11.4 Lack of information

In many countries, market information systems perform poorly or are non-existent due to inadequate financing and the ability of government agencies to collect reliable market information (Chaudhury and Banerji, 2001 and Jones 1998 cited by Gabre-Madhin, 2009). Lack of information flow at the communal level has a great effect on

poor development of smallholder farmers. Smallholder producers make decisions based on assumptions or unreliable sources and this has a great effect on poor performance of their production. Bienabe*et al*. (2004) agreed that smallholder's market decisions are determined by the urgent family needs and social events, such as school fees, diseases and funerals. He further stated that information is a key factor, every step in the production process has to be made based on relevant information.

According to Kawa and Kaitira (2007), smallholder farmers are faced with weak and inadequate market linkages among key stakeholders, including farmers, processors, consumers, exporters, and importers. These weak links cause a disparity between the supply chain and market demands. As a result, smallholder farmers, unlike large-scale producers, are supply oriented and slow in adapting to changes in market demands. Ngomezulu (2010) argued that poor availability of agricultural information is the key to factors that has significantly limited agricultural development in the developing countries. Information is required in farming business in order to make rational and relevant decision and to strengthen the negotiating ability during transaction with the buyers. Moustier (1998) and Kawa and kaitira (2007) pointed that smallholder farmers normally lack information on product price at the both local and consumer lever, about the quality requirements, about the place and the good time to sell their produce and the potential buyers. Farmers lack information about potential markets, financial institutions available to support them and information about prices (Porter and Scully 1987; Stefano, 2004).

Kawa and Kaitira (2007) also added the lack of information on how to access credit is a major problem, they do not have enough credit to store their product and sell out of season at higher price. In addition Musemwa*et al*. (2008) discovered that information on quantity, demanded product, production techniques, marketing conditions, type of the product demanded is often lacking in smallholder producers. Smallholders often find it difficult to acquire information especially on marketing demand (Ngomezulu, 2010). Smallholders may get information though it might not be endorsed through contacts with other actors. Lack of information reduces ability to trade their products efficiently and get full benefit from the marketable part of their low productivity. Although improvements like telephone, cellular phone networks and

internet has been made to disseminate information at communal level smallholder remain uninformed about the new production techniques and some do not have access especially to the internet. The other barrier is the language used in these network communications, the communal people only understands their home languages. Gabre-Madhin (2009) argued that inadequate access to market information implies that smallholder producers are unable to plan their production, harvesting and sales according to market demand, or to sell their products in the most lucrative markets.

2.11.5 Poor Bargaining power

Bargaining power means the capacity of different farmers or actors to obtain favorably return from the transaction. Bargaining power is the good strategy to access to the markets, information, to produce at a distance and to the perishability of the product (Moustier, 1998). Smallholder farmers normally lack the bargaining power because they operate individually and their linkage with market is weak (Kawa and Kaitira, 2007). The bargaining of smallholder farmers is generally low since they have poor access to market information and limited access to financial markets which may lead them to under-value their products and procure a small share of the added value created in commodity chain. Their bargaining power is particularly low when they are operating in long supply chain (Bienabe*et al*., 2004). Poor market linkage between the smallholder farmer groups and other market chain actors result to poor improvement of smallholder returns and the development of these links takes time (Kawa and kaitira, 2007). Information asymmetry also impacts the power relations between poor producers and traders, and lowers the bargaining power of the former (Gabre-Madhin, 2009).

2.11.6 Poor road infrastructure

Smallholder commercialization is critically affected by poor transport infrastructure. Farmers with close proximity to the roads and have access to transport are better integrated than their oppose parts (Goitom, 2009). In Africa as whole lack of access to poor infrastructure is one major barrier to market access (World Bank, (2007: 17)

as cited by Goitom, 2009). Poor market infrastructure like rural roads and access to rural community roads rigorously impedes smallholders' access to markets and significantly increases transaction costs (Kawa and Kaitira, 2007). Ngomezulu (2010) argued that poor road infrastructure hamper the transfer of skills, knowledge from extension services and has a direct effect on high transaction costs.

2.11.7 Entrepreneurial and marketing skills

Smallholder farmers lack adequate level of entrepreneurial skills and ability to cope with market changes. For example many smallholder farmers are still producing the same crops that they traditionally produce and do not consider what the markets want, and only consider about the market concern when the produce is ready to be sold. These skills also lack in other actors like traders and processors. Inadequate entrepreneurial and management skills among these various actors could be another cause of an ineffectual marketing system. Smallholder's commercial management capacities are generally rather limited because they are used to the controlled marketing structures for inputs and fixed prices for outputs (Kawa and Kaitira, 2007). Most smallholder farmers lack managerial skills, adequate information and adequate extension services and when these weaknesses are incorporated they result to high production costs and low productivity. Education and experience of the farming business is needed when managing the farm in order to make accurate and relevant decisions. Efforts of smallholders on commercialization depend on further increase in productivity and improvement of managerial skills which enhances the transfer of technology and efficient farm management.

Poor entrepreneurial and managerial skills of not only smallholders but also local service providers, farmer organization have impact in poor participation of farmers to the markets. Nyamatule and Ayessaki (2009) observed that limited skills, information, technology in production for marketing of smallholder farmers make it difficult for them to compete with the national and international markets. They argued that there is a need to build skills and knowledge of smallholder producers in order to successful link with the potential markets and for them to produce what they can sell rather than selling what they have produced. For farmers to be competitive they need new technology information, information and improved skills that allow them to

sustain more extensive market orientated production and to overcome production constraints. Experiment on these difficulties provides farmers an opportunity to out range the alternatives means of removing the constraints and adapt them to their situation and circumstances and build local capacity to find solution to production problems.

Since smallholders have history of being isolated by the apartheid government policies, they are still deprived even in terms of management skills. As indicated from the previous chapter that smallholder farmers have the ability to produce productively just like commercial farmers do. To farm profitable smallholder producers require development of business support service and strong full support on market institutions. According to Kanganzi *et al*. (2008) development of smallholder's farmers' skills and knowledge will encourage entrepreneurial culture in smallholder production and make the available markets work for them. However the success of this requires the sustained intervention of various stake holders, like government and private sectors.

2.12 Impact of the constraints to smallholder development

Many research findings indicated that smallholders are the key role players to poverty alleviation and they are the centre of attention globally. Constraints to the development of smallholder farmers have been researched for, yet they still prevail. Smallholder farmers are still poor because they are exposed to limited technical and economic opportunities. Baloyi (2010) investigated that lack of access to agricultural resources and services to smallholder production affect or delay the way in which these farmers can benefit from new opportunities in agricultural markets. Lack of access is not only affecting smallholder farmers but also the outside stakeholders. Constraints to successful agricultural production are the major barrier to access the high-value markets and it is often significant to overcome them.

Poor access to markets of smallholder farmers has lead to smallholders being excluded from agricultural vale chain. Policy makers are also intimidated by the poor access of smallholders to agricultural markets. Their major challenge is when assisting the smallholder farmers to create an enabling environment and empower them to produce higher volumes with good quality on a regular and sustainable

basis. Many studies have tried to indicate how smallholders can have access to the markets but have failed to indicate how to improve the standard of living through access to profitable markets. Accessing the markets should be the main concern, when addressing the issue of markets but also the sustainability, because it may be easy to find the markets but difficult to preserve it due to constraints along the value chain, like access to credit.

According to Karrani (2007) financial access to rural households did not improve. He argued that poor access to financial services have led to household's reinforcement self-sufficient methods through informal arrangements. This mechanism according to the study carried in Tanzania has few defaults as composed to that of formal commercial credit practises. For successful development it is of great importance to address all the constraints for example financial institutions may try to rectify the financial inequalities but things like outreach, good quality services from smallholders will always hamper their development.

2.13 Chapter summary

Smallholder production Eastern Cape is mainly performed by smallholder producers who are characterised by low levels of production techniques and technology and small sizes of farms to produce at maximum for both self consumption and marketing. Smallholder farmers normally lack information to benefit to all the opportunities that are available for agricultural producers due to lack of information. The discrimination of smallholders by apartheid policies and the current scenario has created a great difference between smallholder farmers and commercial farmers and it has been discovered that apartheid era has influence to the present situation. This mentioned scenario has created barrier to smallholder commercialization. Smallholder farmers find it difficult to commercialise because of certain constraints of which market access is the major one. However because of the prevailing opportunities such as modernized technology, introduced market opportunities and increase in the demand on high value product smallholder farmers are keen to transform their production into a commercial production. Challenges like poor access to markets because of poor infrastructure, high transaction costs, low bargaining power and lack of information, poor market infrastructure, poor entrepreneurial and

management skills and lack of financial support are obstacle to the commercialization of these farmers.

These challenges that prohibit the development of smallholder production are well known and because smallholder farmers are the key players to poverty alleviation, their production innovation are among the priorities in the developing countries. - Smallholder commercialization is possible provided that smallholder's farmers have access to all the required aspects when commercializing subsistence farming. Democratic government has tried since 1994 to improve the production standard of smallholders in different ways such as Land Reform Programmes, financial assistance. Successful development initiatives need to include techniques and approaches that the community can manage and utilize after the development team has departed. Smallholders should be the key players to their improvement, however assistance from the government private and public organization are the needed to ensure the success their success

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter gives a background of the areas where the research was conducted as well as the research method that was used to conduct the research. This chapter will briefly describe the areas of study, the model used, analyse the data and describe the methods of data collection and Instruments. The chapter touches on the geographic features, demographic features, and agricultural activities taking place in the name and Mgxabakazi and Dininkosi villages as well as Ncorha and Tshatshu villages.

3.2 Description of the study areas

The research was conducted in the Eastern Cape Province, because of the numerous smallholder farmers in this Province which were the targeted farmers. The Eastern Cape is located on the South Eastern seaboard of South Africa and is the second largest province with an area of roughly 17 million hectares and represents 14% of South Africa's land mass. The study was conducted in villages with two irrigation schemes one in Mgxabakazi village in Micosa Agricultural cooperative under Port St John's local municipality and another in Ncorha irrigation scheme in Intsika Yethu local municipality. Two communities around each irrigation scheme were selected. Below is the map showing the study areas

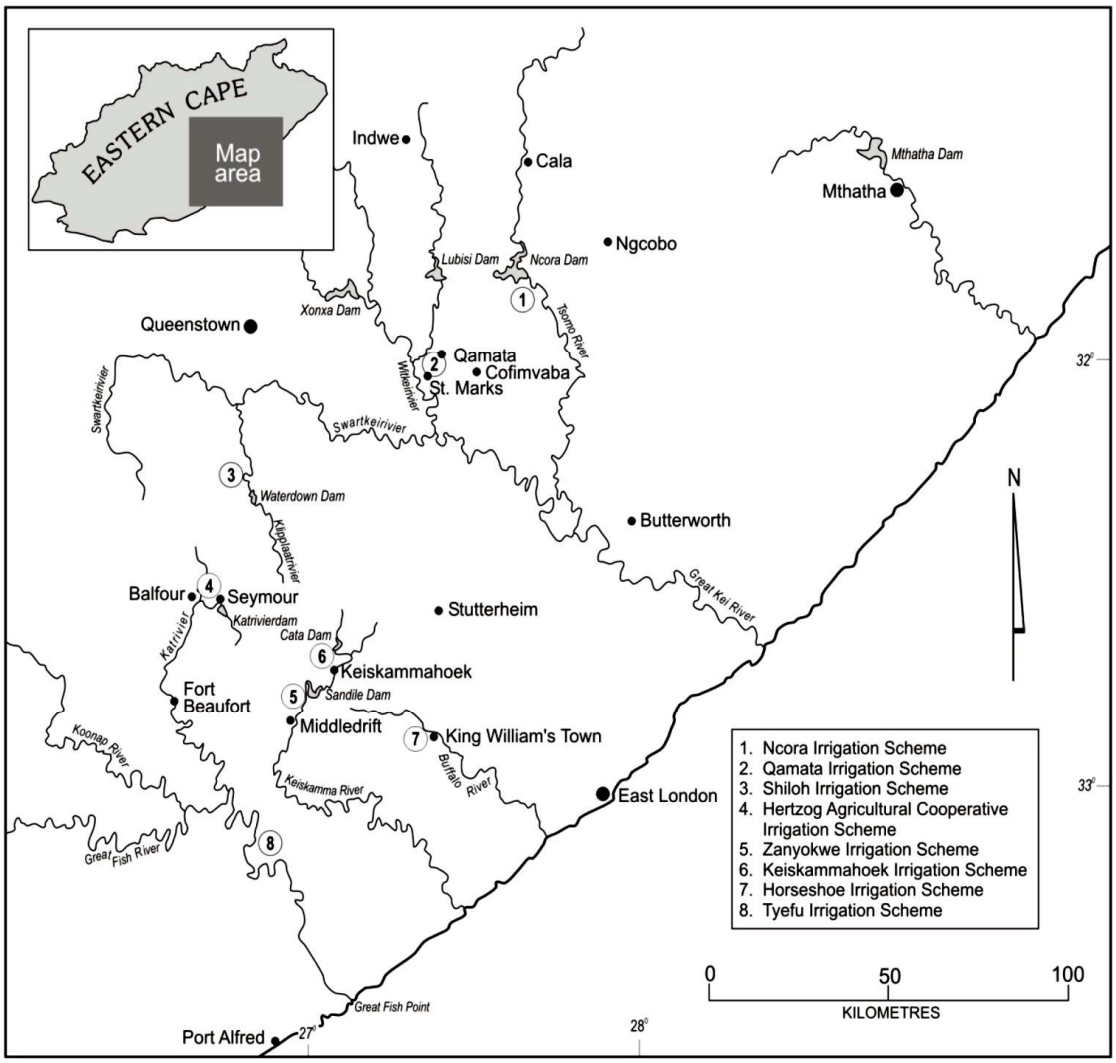

Figure 3.1 Major Irrigation Schemes in the Former Homelands in the Eastern Cape Province
Source: Kodua-Agyekum (2009)

The studies were conducted particularly in Chris Hani District Municipality (CHDM)under the Intsika Yethu local municipality and in OR Tambo District Municipality under Port St John's local municipalities. These two locations were selected because of their potential to agriculture with regard to smallholder farmer's and are confronting different constraints in producing and marketing of their products. Secondly, the area qualified for this study because these areas are characterised by smallholder farmers. Smallholders in these areas are showing interest in production and have the most commonly constraint land, but they are not producing to market their products. Survey in these areas will give clear information into to barriers to commercialization of farmers in these areas. Two different districts

have been selected the study because farmers might be failing to produce commercially because of challenges faced by the municipality such as lack of capacity to plan, budget and implement for the planned projects. And producing for the market requires production resources, including production means such as land, water, on-farm and off-farm infrastructure, labour force, capital, and good management of these resources. Some of the information that specifically describes the villages could not be found, therefore information of the municipality will be discussed to give an idea of the chosen study areas.

Kodua-Agyekum, (2009) noted that Ncora irrigation scheme is located in Intsika Yethu Municipality part of Chris Hani district in the Eastern Cape Province. The municipality is composed of two major towns, namely Cofimvaba and Tsomo. Further, the municipality comprises 213 villages scattered throughout. Topographically, the municipality is located in the Grassland Biome with hilltops of the same altitude and Valley Rivers flowing in between these hills The Lubisi, Xonxa, Ncora and Tsojana rivers form the major sources of water mainly connected to valley water dams for irrigation farming The municipality experiences both hot summer and cool dry winters with some snowing mainly on hilltops. Further, the area experiences low summer rainfall ranging between 700mm and 800mm annually. Sometimes it rains heavily during the beginning of summer resulting into gully soil erosion (Intsika Yethu Municipality, 2008).

3.2.1 Intsika Yethu Municipality

Ncora irrigation scheme is located in Intsika Yethu Municipality part of Chris Hani District Municipality (CHDM) in the Eastern Cape Province. The municipality is composed of two major towns, namely Cofimvaba and Tsomo. Further, the municipality comprises 213 villages scattered throughout. Topographically, the municipality is located in the Grassland Biome with hilltops of the same altitude and Valley Rivers flowing in between these hills (Kodua-Agyekum, 2009). The Lubisi, Xonxa, Ncora and Tsojana rivers form the major sources of water mainly connected to valley water dams for irrigation farming (Kodua-Agyekum, 2009). The municipality experiences both hot summer and cool dry winters with some snowing mainly on hilltops. Further, the area experiences low summer rainfall ranging between 700mm

and 800mm annually. Sometimes it rains heavily during the beginning of summer resulting into gully soil erosion (Intsika Yethu Municipality, 2008).

3.2.1.1 Brief history of Ncorha irrigation scheme

The Ncora or Tsomo River Irrigation Scheme was reported upon in 1975 by the Africa Institute as “the biggest in the Transkei which will irrigate 5 700 ha of the Ncora Flats.(11) The scheme cost R19,5 million at the time. A reduced 3 600 ha of irrigated land was handed over to the Ncora Trust in 1994, and at most only 500 ha is under irrigation today (Du Toit, 2007) . Then in 1978 the scheme was developed using water transfer (20 million m3/a) from Ncora Dam on the Tsomo River. Ncora Scheme consists of 1000 ha of irrigable land. The feasibility of the scheme depends on the water availability from Ncora Dam. Previous estimates show that the available water from the dam would support some 3000 ha of irrigation which was the area developed at the time. Du Toit, (2007) discovered that Ncora Irrigation Scheme is one of the largest community-owned irrigation schemes in the Eastern Cape. Situated in the Cofimvaba district, the scheme is approximately 80 km from Queenstown. However, for various reasons this once very successful scheme has not prospered in recent years and it is estimated that less than 25% of the area is currently been used. The scheme’s dam is only 30% full because 60% to 70% of the water within is leaking into the ground. The 900mm irrigation pipes leak 24 hours a day, and have been leaking non-stop for years now. One observer saw 15 leaking pipes in a row. Although the authorities have known about the leaks for a long time, nothing is done to repair the holes in the pipes.

Proposals for revitalizing this scheme and possibly extending it are presently being considered. The Ncora Irrigation Scheme so far had received an allocation which amounted to R20 100 000. Installation of feed-mill had been completed and was sufficient to feed the number of cows in the dairy farm. The provincial department of agriculture, along with other local and regional governance structures are engaged in the process of restructuring the irrigation scheme into a viable business entity comprising dairy, cropping, milling, workshop and a guesthouse facility. The irrigation

scheme services about 5,000 ha of land, of which 3,500 ha are under irrigation. The physical infrastructure includes equipment and buildings. The Department of Public works and provincial government are prepared to look at a range of options, including public-private partnerships, contract farming and others.

Ncora irrigation scheme is one of the study areas or location where the data will be collected. This area was chosen because it best fits the study as it is characterized by smallholder irrigating farmers.

3.2.1.2 Location and Geographical features

According to Intsika Yethu Local Municipality (2008), due to its rocky sandstone of the Clarens Group, the soils in the area are categorized as shallow to moderately deep and highly weathered. Beyond the shallow soils are red and purple mudstones together with shale. The shale soils can be described as fine-grained, clastic sedimentary rock composed of mud made-up of flakes of clay minerals and silt-sized particles of other minerals, especially quartz and calcite (Blatt and Tracy, 1996). The dry winter periods, high water evaporation due to high temperature, low rain falls, gully soil erosion and unpredicted weather patterns, they are a threat to agricultural productivity and profitability (Intsika Yethu Municipality, 2008). The major economic activities carried out on land include livestock grazing and smallholder farming. Most land near the homesteads is heavily degraded due to 124 overstocking, poor veld management and farming techniques. Villages in Intsika Yethu Municipality still have huge tracts of uncultivated arable land (Insika Yethu Municipality, 2008).

3.2.1.3 Vegetation and land degradation

Area of CHDM is covered by South-eastern Mountain Grassland and Subarid Thorn Bushveld vegetation types. Eastern Mixed Nama Karoo, South-Eastern Mountain Grassland and Moist Upland Grassland also cover significant areas of the CHDM

3.2.1.4Settlement Patterns and Land tenure System

The study areas are characterised by privately owned land received through inheritance. Some are land owned by government and are leased. The land in these areas is communally owned. Residential stands are allocated by the headman while grazing land is communally owned. The village is located on high plateau and is serviced by gravel roads. There are rivers and dams around where the livestock drink. Additional water for domestic use is also harvested from house roofs into storage tanks during rainy days and municipal water tanks.

3.2.2. Port St John's local Municipality

Port St John's Municipality is located in the Eastern Cape. It is under the jurisdiction of the OR Tambo District Municipality. Port St John's is a coastal area of the former Transkei approximately 90 km from Umthatha. The Municipality comprises of an urban area and 130 surrounding rural villages. The municipal area currently has 16 wards covering a total area of 1239 square kilometers.

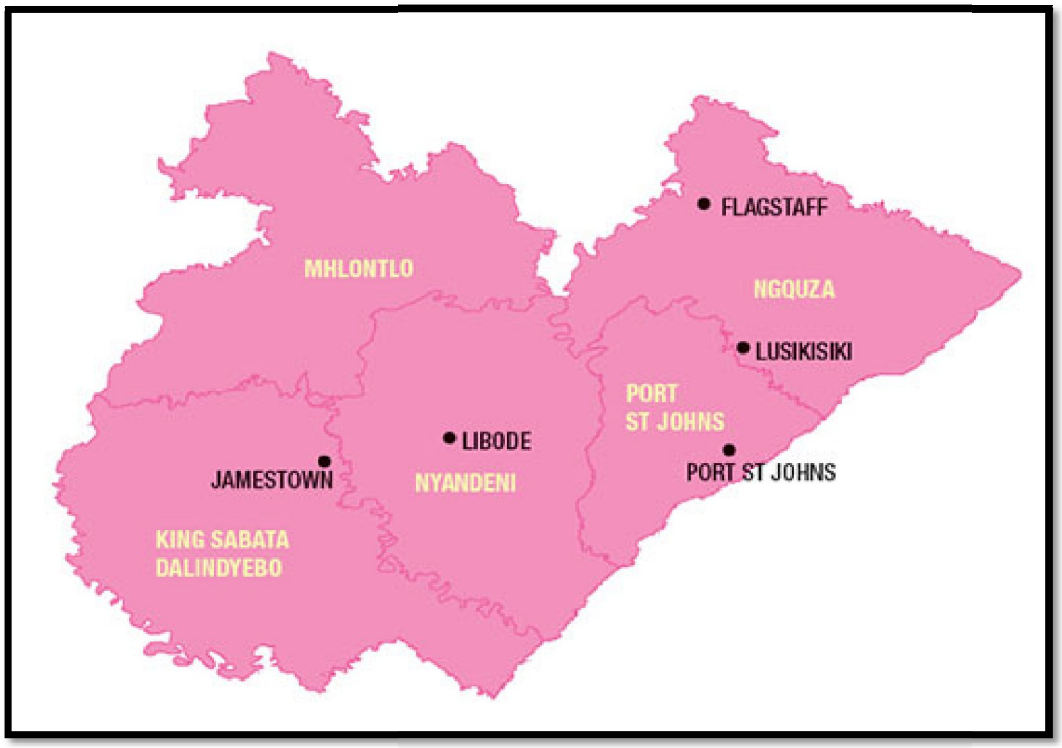

Figure 3.2: OR Tambo Tambo District Municipality map showing the study areas
Source: Google map (2013)

3.2.2.1Climate

Port St. John's is characterised by a moderate, humid and subtropical coastal climate. Summer temperature varies from an average maximum of about 25°C to an average minimum of 20°C, whilst winter the maximum and minimum is 21°C and 8°C respectively. The annual rainfall varies between 1100 and 1400 ml per annum and occurs mostly during the summer months (October to March). Port St. John's enjoys fairly favourable weather conditions throughout the year, but extremes in climate and local variation are not uncommon.

3.2.2.2. Topography

The study area is mainly characterised by mountainous terrain with hills, cliffs, beaches and sandy dunes. The slopes are as steep as 1:3 or steeper, making development in the area very expensive. The areas in close proximity to the ocean and rivers have a lesser gradient and are susceptible to flooding. The main urban centre is located on a flat shelf adjoining the river 3m above sea.

3.2.2.3 Rivers and drainage

Three main rivers are found in Port St. John's. The largest river is the Umzimvubu River. These rivers flow from the north to the Indian Ocean in the south. They separate the area into 3 catchments. Ward boundaries in some wards are determined by these rivers. These rivers have an impact on the mobility and safety of the communities, with many communities citing frequent drowning as a result of inadequate infrastructure to cross the rivers in the form of boats and bridges. Drainage in the area is generally poor, depending on the tides, storm conditions and river levels.

3.2.2.4 Vegetation

Natural vegetation plays a vital role in the economic performance of the area as it is one of the main attractions for tourists. Unlike most regions in the country, much of the natural vegetation in the Port St. John's has not been touched. It is imperative

that communities understand the value of this and be encouraged to conserve it and use it in a sustainable manner. Conservation and sustainable utilization of forest reserves is particularly important. Port St John's is characterised byCoastal Forest Thornveld found along coastal area, covering most of PSJ town, Coastal Bushveld Savannah mostly found in the central part of the region.

3.2.2.5 Geology and soils

Geological studies of various urban areas in the Port St. John's region have been conducted to date. Although the details of these studies are not included in the Integrated Development Plan (IDP), their significance is noted. Future development must take cognisance of these studies. According to the available Geological Map, the study area is underlain by Sedimentary rock of the Karroo sequence (Eccaand Beaufort group are the most important groups occurring). Sandstone formations of the natural group are also present. The region is characterised by euthopic brown with megalithic soils. These soils are suitable for intensive cultivation and vegetable gardening.

3.2.2.6. Settlement pattern

The landscape is of such a nature that many areas are inaccessible which leads to sparse rural settlement patterns. Port St John's town is the only urban area, and acts as a regional service centre supplying the surrounding rural villages with commodities and services. The centre serves as an administrative and service centre. The majority of the population of Port St. John's Town is settled in Mtumbane located between the central area and second beach. Natural vegetation plays a very big role in the development of the land (topographical features) and urban areas. Informal settlements also occur on the periphery of the formally settled areas.

3.3 Farming activities

Agricultural activities have been practised as a norm by rural settlements of the study areas. Cora villagers engage in both crop and animal production. Crop production is practised in home gardens that range from 0.2-9 ha in size. Most commonly

produced crops include maize, beans, pumpkin, sweet potato, potato, spinach, cabbage Livestock that is commonly produced include goats, cattle and few households also keep sheep to lesser extent and these are feeding on grazing lands with no camps. Livestock is normally kept for household rituals and sold locally. For the past few years before the arrival of swine flu, pigs have been playing a role in livelihoods of people in Ncora and Tshatshu location, however recently the percentage of households who are keeping pigs is very low, but the value of the piggery has inclined due to consumer preferences and the scarcity of piggery in the surrounding areas.

Poultry production is also practised, they mostly produce indigenous chickens. Few households produce broilers for selling. Poultry keeps rear a day year old chicks and raised them as broilers and sell them at the age of 6 weeks in pension points. Also males and horses are available. Farming in this area is traditional, some of the reason for this could be lack of information about the potential of the area, lack of agricultural production resources and lack of the agricultural farming business sight. However, there are new development programmes that are being introduced like the cooperatives and some have already adopted into the program.

3.4 Methods of Data Collection and Instruments

In this section sampling methods, data collection and data analysis tools that were used during the course of the research will be discussed. The section will describe the sampling procedure followed during the study and the survey instruments used to extract data at each level. Sampling frame and selection of the study area

The study was conducted in Port St John's local municipality OR Tambo district and in Intsika Yethu local municipality under CHDM. And preference was given to communal areas where the smallholders are residing. These two areas were selected because they are both characterized by irrigation participants and non-participants. In addition they are both homogeneous and share the same economic settings. For the purpose of this study the smallholder irrigation participants and non participants from the two study areas were selected. Some of the irrigation

participants receive institutional support from the government. The targeted farmers are producing both crops and livestock.

3.4.1Observation schedule

Prospective respondents were visited prior finalizing the sample of the respondents. The purpose of the visit was to ascertain that each farm business during the interview stage as an operational commercial emerging enterprise and also to identify specific issues to be clarified. The following aspects were considered during the observation phase.

- The farming households and available smallholder irrigation schemes at the study area observed
- The level of farming whether is it commercial or subsistence farming. This assessment was done through, assessing source of irrigation and the type of irrigation used, assets owned, type of and market used.

3.4.2 Sampling procedure

The data was collected using a profitability sampling method which according to Castillo (2009) is a sampling technique wherein the individuals are gathered in process that gives all individuals in the population equal chances of being selected. As indicated above, sample population is classified into two groups: irrigation participants and non participants.

Both areas were characterized by types of farmers that the study is looking for, therefore systematic random sampling method was used whereby each and every household was given a room for participation. The sample size that is believed to be the representative and can generate reliable information was chosen. The sample size was80 households, 40 from irrigation participants and 40 from irrigation non participants.

3.4.3 Work schedule for data collection

The field work was completed over a period of two weeks, from September 02 to 13 September 2013. Four enumerators were employed to conduct the survey under the close supervision of the researcher. The enumerators were the fellow colleagues who have been working in irrigation projects. These enumerators were chosen because of their knowledge and that assisted the research to get questionnaire filled properly.

3.5 Methods of Data Collection

3.5.1 Sampling procedure

The sample of this study was non – probabilistic since there was a deliberate intention of obtaining respondents that were part of irrigation scheme and those that depends on rainfall. Because this study seeks to evaluate the extent of commercialization of irrigation participants and non-participants therefore, purposive sampling method was considered as the best procedure due to the knowledge of a population and the purpose of the study. The respondents were chosen because they met the targeted characteristics. Purposive sampling also called judgment sampling, is the deliberate choice of an informant due to the qualities the informant possesses (Tongco, 2007). Field researchers are often interested in studying extreme or deviant cases. By studying the deviant cases, researchers can often gain a better understanding of the more regular patterns of behaviour. This is where purposive sampling often takes place. For instance, this study seeks to understand effect of irrigation on commercialization of smallholders, the researcher is going to sample those who are using irrigation. They were purposively selected because they met the targeted characteristic. Nevertheless a sufficient number of respondents were required for random selection.

3.5.2 Sample size for the research

A total of 80 households were sampled and interviewed. The random sampling consisted of 40 respondents from Mgxabakazi and Dinizulu from Port St John's local municipality OR Tambo district municipality and 40 respondents from Ncorha flats and Tshatshu in Intsika Yethu local municipality under Christ Hani District municipality.

3.5.3 Questionnaire

For this study both quantitative and qualitative data from primary sources and secondary data were gathered and analyzed. Primary data, key informant interview, and secondary data methods in combination were employed during the data collection process of this study. A structured questionnaire was developed and used as a tool for data collection. The respondents were interviewed face by face. Brown, 2000 revealed that face to face interview method is selected because of its advantage such as getting more information from the respondent during interviews, through e.g. reading the facial expression, enables the researcher to explain where necessary. Furthermore the presence of interview increases the quality of responses because interviewer can probe more specific answers. In all use of one on one interview ensures minimal loss of data compared to other methods.

3.6. Scope and Limitation of the study

This research intends to assess the effect of irrigation to commercialization of smallholder farmers in Intsika Yethu and Port St John's local municipalities. There are possible limitations to the study. For example, household survey by itself is complex and to get reliable data especially on household land holding, volume of production, income, number of livestock as well as other variables which have close economic and social implications are not always free from error. Respondents used to see and understand everything in light of relief assistance. As a result, they might be reluctant to give information on their socio-economic status and they normally

under-report what they actually own. Hence informant interviews were used to crosscheck the data gathered through questionnaire interview. Enumerators should be willing to visit the farmers in their working fields as they might not be available in their homes. Lastly capital and time was the constraints, as there ups and downs that resulted to the extended period of data collection. As a result, not all aspects of the household in the area were dealt with. Moreover, transport facility and other necessary research inputs were major constraints in this research.

3.7 Variables

A variable is anything that can take different values for different people or for the same person at different times. There areindependent and dependent variables. Independent variable is what can be manipulated for example a treatment or program or cause whilst dependent variable is what is affected by the independent variable that is the effects or outcomes (William, 2006).

In this study irrigation participation and the extent of commercialization have been identified as the dependent variable size of the irrigated, source of water, membership of the organization, lack of access to the market and its information and lack of skills, methods of cultivation, institutional support etc have been identified as the independent variables that as the variable that have an effect on the commercialization of smallholder farmers. The study utilizes both dummy and continuous data. Table 3.1presents a summary of the data collected during the study. In the table, the variables used are indicated and described also the method that has been used to measure it with its respective percentage of the overall factors of the variable.

Table 3.1: Summary of variables and their measurements

Variables	Variable description	Method of measuring
Dependant variables		
Participation	Irrigation participation	Times the farmer irrigates per season
commercialization	Extent of commercialization	Gross value of production
Independent variables		
Household gender	Dummy	Household is either male or female
Household age	Continuous	Measured in actual years
Household size	Continuous	number of households
Level of education	Dummy	The respondent may have obtained primary, secondary or tertiary education.
Source of labour	Dummy	Measure by the available labour source to the household
Land size	Continuous	Measures by the hectares that the household have access on
Method of cultivation	continuous	Commercial farmer is likely to use tractors while smallholders are likely to use animal traction.
Human capital endowment	continuous	Measured in years of experience
Source of water	Dummy	Measured by the availability.

Type of water source	Continuous	Type of irrigation used
Membership	Dummy	Participation on irrigation schemes
Willingness to commercialize	Dummy	Willingness to partake in irrigation
Type of farming	Continuous	Type of production
Market access	Dummy	Measured by the availability of market, access to the market and the ability to market the products successfully
Market Information	Dummy:	sources of media to transmit information and Constant dissemination of marketing information in the language understood by the farmer
Transport	Dummy:	The mode of transport (refrigerated, or trucks) and roads used in transporting the produce may be used to determine whether a farmer has the transport or not.
Institutional support services	Dummy	Loans, Distances of financial institutions from the farmers, credit history and collaterals.
Infrastructure	Dummy	Measured by the type, condition and available infrastructure that is available, coded 1 if viable and 0 if not
Extension services	Dummy	knowledge of the existence of services, access to the services and the services provided
Major problems	continuous	Measured by the recorded challenges

3.8.1 *Methods of Data Analysis and Presentation*

This section discusses how the data was analyzed and both descriptive and inferential analyses have been employed.Qualitative data was analyzed through systematically organizing the information and giving attention to local situations opinions, perceptions and preferences of households at the study areas. This quantitative data analyses was carried out using simple and relevant statistical methods such as average, percentage and frequency distribution and T-test for Means. Statistical Package for Social Scientist (SPSS) was used to run the data collected from the smallholder farmers in two areas. To analyze the data descriptive, Binary Regression model (BRM) and Truncated Regression model (TRM) were used to test the hypothesis. These models were determining factors influencing the probability of smallholder's farmer's participation in irrigation. In order to see effect of irrigation and other the socio-economic impact to commercialization comparative analyses was made between irrigation and non-irrigation households.

In this study, two groups were studied and the research also evaluated the difference between these two groups. TRM was found to be fit because, it is used when part of the data is missing. This research looked at the data for irrigators to determine their extent of commercialization also to test factors that affect the level of irrigation participation; therefore data for non-irrigators was missing.

3.8.2 Descriptive analysis

Descriptive analysis is aimed at addressing the first objectives and the socio-economic characteristics of the farmers of the study area are discussed. The main descriptive indicators that were employed were frequencies and mean values. These are useful in analyzing socio-economic characteristics as well as analyzing the relationship between variables.

3.8.3 Inferential analysis

For inferential analysis, two models have been used, binary regression model and truncated regression model.BR model is typically used when the dependent variable is dichotomous and the independent variables are either continuous or categorical variables. Logistic regression is best used in this condition. In other words BR model was used because the study deals with situation whereby the observed outcome for a dependant variable has only two possible types which are participation or non participation in irrigation schemes Logistic regression analysis examines the influence of various factors on a dichotomous outcome by estimating the probability of the event's occurrence. It does this by examining the relationship between one or more independent variables and the log odds of the dichotomous outcome by calculating changes in the log odds of the dependent as opposed to the dependent variable itself,and Snell (1981) revealed that BR model can be used when dependent variable is dichotomy and in binomial dependant variables are coded 1 and 0. In a particular observed outcome for dependant variables (irrigation participation) is a noteworthy possible outcome and it is coded as 1 then non participants as zero. In binary regression, the probability of a success is related to explanatory variables: the corresponding concept in ordinary regression is to relate the mean value of the unobserved response to explanatory variables because the aim is to assess the variables that have an influence on the productivity and the proportion sold by the smallholder farmers. Binomial regression model attempts to analyze relationship between parametric and metric independent variables. The table below summarises the variables that in when running the models

Binary regression model has been chosen because it allows one to analyze data where participants are faced with two mutually exclusive choices. In this case smallholder's farmers are faced with two choices which are to participate in irrigation or not to participate in irrigation. Objective number 1 seek to assess the current level of irrigation involvement and the irrigation farming potential and factors that may hamper irrigation participation. Therefore method of estimation has been guided by the form of dependant variable considered in this research. Jari(2009) indicated that Binary regression is used to predict the probability of occurrence not necessarily getting a numerical value for a dependent variable. There are other methods that can

be used to explain the relationship between dependent and independent variables, however the underlying assumptions are different.

In Binary regression model, irrigation participation is a function of the probability. Decisions are dichotomous criterion variables meaning farmers are ought to take one of the only two possible choices, whether to participate in irrigation or not while source of water, land size, availability of the irrigation system, willingness to participate, farming type commercial or subsistence) and institutional support services are parameters or predictor variables.

In BR the motive is to estimate the regression coefficients in a model, given a sample of (X, Y) pairs. In the case of logistic regression, the X's can be numerical or categorical, but Ys are generally coded as 0 (for those who do not have the event) or 1 (for those who have the event). The simple logistic model is based on a linear relationship between the natural logarithm (ln) of the odds of an event and a numerical independent variable. The form of this relationship is as follows:.

$$L = \ln(0) = \ln(\frac{P}{1-p}) = \beta_0 + \beta_1 X_1 + \varepsilon \text{...(1)}$$

Where

Y is binary and represent the event of interest (response), coded as 0/1 for failure/success,

P is the proportion of successes,

O is the odds of the event,

L is the ln (odds of event),

X is the independent variable,

$\beta_1 and \beta_1$are the Y-intercept and the slope, respectively, and

ε is the random error.

In this study P is the probability of the event and the odds of the event are:

$$Odds = 0 = (\frac{P}{1-p}) \text{...(2)}$$

We defined L = ln (odds of event Y), sometimes called the "log odds" or logit of Y.
We can write L in terms of p, Probability (Y=1), as follows:

$$L = \ln(0) = \ln(\frac{P}{1-p}) \text{.....(3)}$$

Laws of exponents and logs are used and some algebra to express p (the proportion of successes or risk of the event) in terms of L:

$$\ln 0 = \ln(\frac{P}{1-p}), \text{then } e^i = 0 = (\frac{P}{1-p}), \text{so, so } p = e^i - pe^i, \text{.....(4)}$$

and hence $(\frac{e^i}{1+e^i})$.....(5)

Irrigation participation P is the predicated probability of the event recurring which is coded with 1 (irrigation participants instead of 0 for non –irrigation participants), 1-P is the predicted probability of other decision and X..... represents predictor variables which include the total number of predictor variables used in this research. Odds of P=1increases by a factor of$e^{\square}$per unit change in Xi..

Farmer participation in irrigation is described as whether the farmers use the irrigation system or not. The considered dependant variable takes the form of a binary variable (meaning either 1 or 0), where 1 indicates a farmers participation in irrigation and 0 stands for none irrigation participants.BRL is more advantageous in that it is used to ascertain the probability of an event (are farmers participating or not) because of its categorical dependent variable. In BRL model also normally distributed error terms are not assumed. In other words randomness in a logistic regression model comes from the fact that these are bernoulli trials, not from there being errors in the success probabilities.

3.8.4Truncated regression model

Participation in irrigation systems determines the extent of commercialization of famers. The level of commercialization is measured by the crop output of smallholder farmer. The ratio of gross value for crop sales to gross value of all crop production of household is included in the measure of irrigation participation adopted. The ratio is defined as a household consumption index. Randela, Alemu, Groenewald, 2008

indicated that calculation of the household commercialization index can be achieved by employing the following relationship

$$HCI = \frac{Gross\ value\ of\ crop\ sales}{Gross\ value\ of\ all\ crop\ production}$$

Truncated regression model (TR) was used to test the factors that affect the level of irrigation participation of smallholder farmers. The truncated regression model can be used when part of the data is missing. For example in this case the study is interested in finding the level of irrigation participation of smallholder farmers, this implies that people who are not participating are not included from the sample, so that neither the dependent nor the independent variable is known. Thus the data would be missing for all the farmers who are not selling their produce. Thus to find the relationship between level of irrigation participation and explanatory variables

3.8.4.1 Model Statement

The two equations below represent the theoretical framework of the determinants of commercialization decision and their effect on food crops production. The farm households' cash crops commercialization function is given by:

$$Clt = \alpha_0 + \alpha_1 Xt_i + \alpha_2 Zt_i + et_i \quad \text{.....(1)}$$

t = year (2011,…2012)and the conditional production function of food is:

$$Yt = \beta_0 + \beta_1 Xt_i + \beta_2 Ct_i + \beta_3 Zt_i + .Vt \quad \text{.....(2)}$$

Where:

CI$_t$ commercialization index

Y$_t$ food product/productivity

X$_t$ explanatory variables

Z$_{ti}$ instrumental variables, respectively.

When using the time series data, the aggregate production of all the households' production in the year. $\mathbf{X_i}$ is a vector of exogenous variables that include credit, labor force, areas cropped, and rain fall, whereas $\mathbf{Z_{ti}}$ is a vector of education index, labor index, credit and CPI. Note that, $\mathbf{Z_{ti}}$ in equation (1) is included as a vector of exogenous variables, too.

These exogenous variables are included in our model to estimate their affects on the commercialization index. This commercialization of agriculture is presumed to have an impact on the production of food crops.

CI is the cash crops commercialization index, this is an endogenous variable, in the first equation and exogenous variable in the second equation, and it is computed by the gross value of cash crops divided by the value of all crops produced in the agricultural year. To compute the **CI** for each year, we take the major four crops, millet and sorghum as main food crops and groundnuts and sesame as the most important cash exportable crops in the study areas. This index measures the extent to which households' crop production is oriented towards commercial agriculture (Strasberg *et al.*, 1999*),* **e** and **v** are residual or disturbance terms. The exogenous variables in equation (1) and (2) were driven by the hypothesis that, these variables are strongly related to both cash crops commercialization and food production decisions.

TR model was chosen because it best fits analysis where the study is interested in finding the level of a particular condition. In addition, the effect of truncation occurs when the observed data in the sample are only drawn from a subset of a larger population. The sampling of the subset is based on the value of the dependent variable. In this case a study of the determinants of irrigation participation, only households using irrigators were part of the sample.

3.9 Chapter summary

This study was conducted in Mgxabakazi location and in Port St John's local municipality and Ncorha flats and Tshatshu at Intsika Yethu local municipality. Face to face interviews were done. From the visit, it can be concluded that both areas are populated with black farmers who are producing individually. Most of the producers are smallholder farmers with few proportions that are commercial orientated. All the

producers have small plots so called home gardens that are mostly used for vegetable production and field where maize is grown.

Most commonly produced enterprises include crops, vegetables and both small stock and large stock. However none of these farmers have access to formal markets and the productivity is reduced by weather conditions, mostly drought problems.

CHAPTER FOUR:

PRESENTATION OF RESULTS

4.1 Introduction

The data was collected from 80 smallholder producers and data on socio-economic measurement that might have an impact on low productivity and participation in market was collected. This chapter begin by explaining demographic characteristics of the sampled household which are crucial when analyzing socio-economic factors as they influence the household economic behaviour and will be then followed socio-economic characteristics of the areas that have an effect on the productivity of these farmers. The results will be interpreted using descriptive statistics and inferential analysis. Table 4.1 shows the summary of socio-economic variables. The descriptive and inferential studies are presented below. In the descriptive analysis The discussion is based on the objectives of the study that are aimed at (a) determining factors influencing farmers decision to participate in irrigation (b) evaluating the extent of irrigation participation of smallholder farmers towards commercialization in the study areas.

4.2 Demographic characteristics of the household

In this section the characteristic of the household such as gender, age, educational level and the number of household will be discussed. These aspects are crucial in analysing the performance of the farmers as many studies have discovered that, these aspects also contribute to failure or success of smallholder producers as they effectively contribution in farming activities. The area and the respondents of the areas are described in terms of their farming practices, potential and capability as well as resource endowment, knowledge, and financial services that are necessary for the improvement of these farmers productivity. Following is table 4.1 indicating the socio-economic variables of the sampled households

Table 4.1: Summary of socio-economic characteristics of the household samples

Variables	Sample Size	% of total
Sex	**80**	
Irrigators		
Male		76
Female		24
Non-irrigators		
Male		56
Female		44
Household size	**80**	
Irrigators		
3 -5		22.5
6 -8		45
9-11		25
12+		7.5
Non-Irrigators		
3 -5		12.5
6 -8		55
9-11		22.5
12+		10
Level of education	**80**	
Irrigators		
No education		15
Primary education		35
Secondary education		50
Non-Irrigators		
No education		20
Primary education		57.5
Secondary education		22.5

4.2.1 Gender distribution

FAD (2003) noted that there is a gender-linked distribution of economic roles in the rural economy of the Eastern Cape. Males are said to the best in managing the farms and are also physical fit to perform the farm duties. For this reason, males are more engaged in agricultural females than females. Irrigation involves more physical work, this may lead to less participation of females. The results for gender distribution are presented in figure 4.1 and table 1.

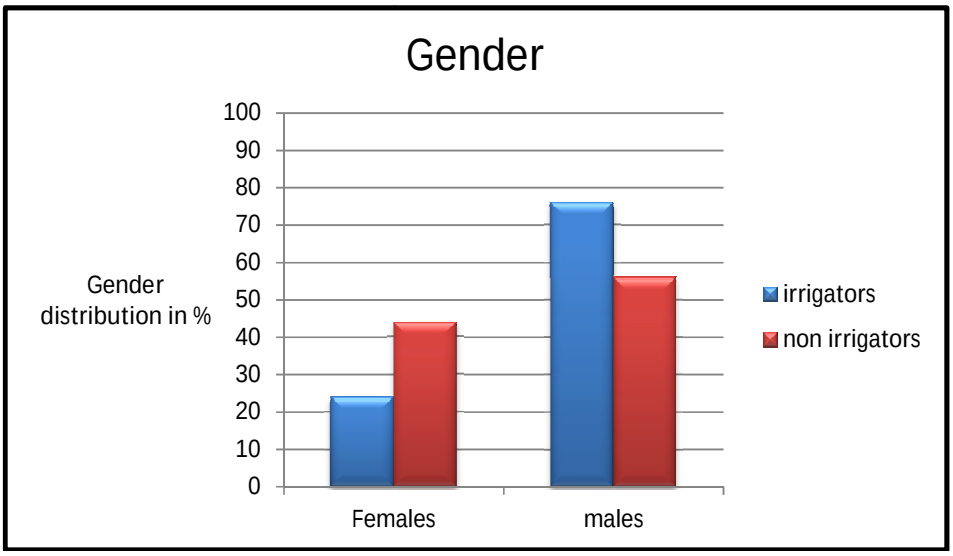

Figure 4.1: The gender distribution of the household heads in the areas of study
Source: **Field Survey (2013)**

Results from figure 4.1 shows that males interviewed were higher (76%) than females (24%) for irrigators. This is the case even in non irrigators with 56% males and 44% females. Females engaging in agricultural activities are few than males. Sisto, 2004 noted that lately gender is recognized as a major principle on sustainable management of water resources. Females has big role in poverty reduction and irrigation. Women play an important role in water management. They are most often the collectors of irrigated and rain fed crops. Nevertheless, in many cases water resource policies and programmes have proven unfavourable to women's water rights and to their sustainable management and use of water, often overlooking their needs. Irrigation interventions have often failed to take into consideration the existing imbalance between men and women ownership rights, division of labour and incomes; caused by the mistaken conceptions of the intra-household organization of

production (Sisto, 2004). He explained that women and men have differential incentives for investing time, labour and capital in irrigation related activities, reflecting gender differences in responsibilities, their access to and control over productive resources, including water and the benefits from irrigated agriculture. This may change this perception of gender inequality in agricultural participation.

4.2.2 Household size

Household size has an influence in the production of the household, the greater the number of the household size the larger the labour available to perform the activities the greater the productivity. According to Ngomezulu (2007), large number of household size will only have a positive influence to the productivity if the members of the household are old enough to perform the duties. Asayehegn et al. (2013) in the research findings discovered that labour availability is an important factor influencing household's decision to participate in small-scale irrigation. Household survey findings ar presented in the figure below

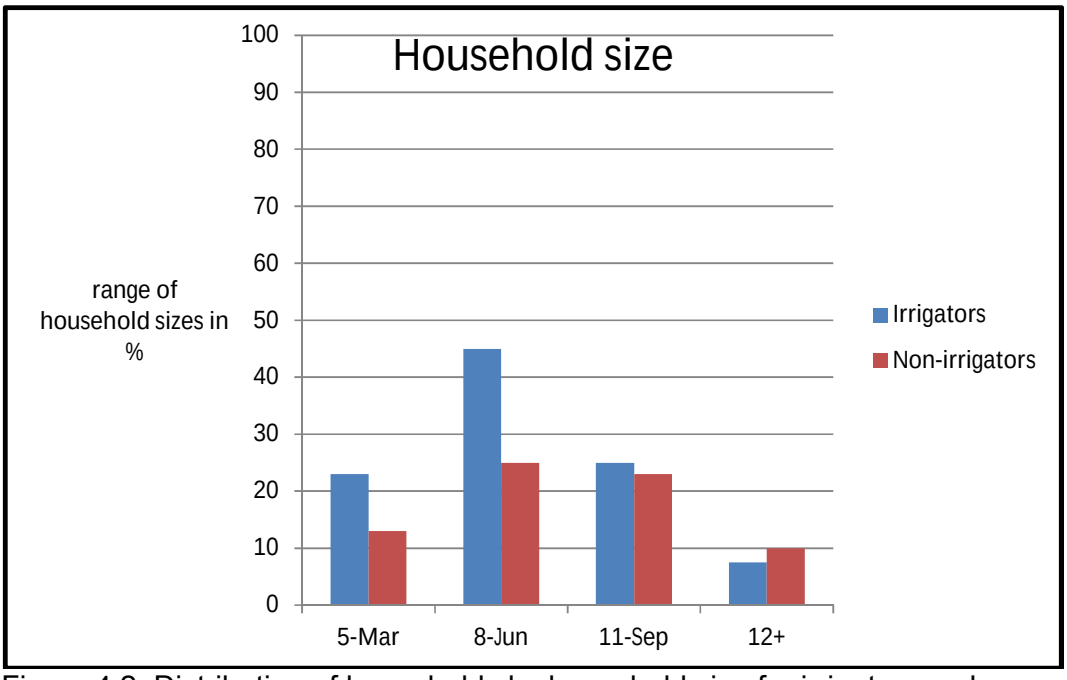

Figure 4.2: Distribution of households by household size for irrigators and non-irrigators

Source: Field Survey (2013)

Figure 4.2 indicates that the lowest household size(12 and above) was 7.5% under irrigation and 10% in non – irrigators. The largest number of household size was between 8-10 members with 45% of members under irrigation and 25% members who are non-irrigators. According to this data, farmers with large members within the household are expected to produce more at least costs because of low or no labour costs. Haji, 2013 also noted that with more household members it means that labour increases, the household will not experience.Family labour of an experienced adult increases, the total income of the household increases, which in turn contributed to improved well-being, further providing an evidence for the importance of labour availability in influencing the participation decision of households in small-scale irrigation (Asayehegn, et al. 2013).

4.2.3 Household age of the respondents

Age of the household head is a very crucial factor since it reflects whether the household benefits from the experience of the older person or has to base its decisions on the risk taking attitudes of younger farmers and also determines the physical working ability of the household (Makhura and Mokoena, 2003). The results below explain the household age in relation with irrigation.

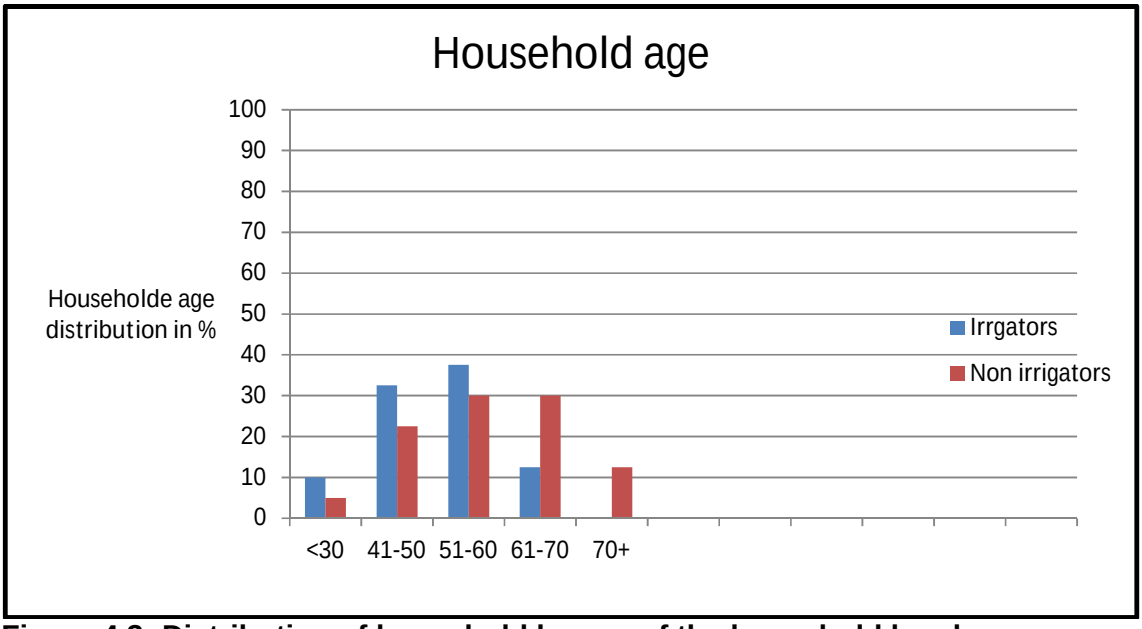

Figure 4.3: Distribution of household by age of the household head
Source: Field Survey (2013)

The figure shows that under irrigators37.5% of respondents between the ages of 51-60 were interviewed and this was the highest group interviewed compared to0% of the interviewed respondent at age of70years and above. While in non-irrigators the highest group interviewed was between 51-70 with 32.5% compared to 22.5% of members between age of 30-40 and 70+. High age usually is accompanied by high level of experience in production therefore as the majority of people are at that age it means that their production maybe of good quality because of their experience and expertise in the production. The youngest respondent was 30 years old while the oldest was 78 years old.

4.2.4. Level of education

In this study, the highest educational level achieved by the household head was recorded to determine the human capital level of households and the ability to interpret information. People with higher educational levels are more able to interpret information than those who have less education or no education at all (Mather and Adelzadeh, 1998). Thus, education levels affect market information interpretation and hence, market participation level of farmers.The results below explains the level of education in relation with irrigation.

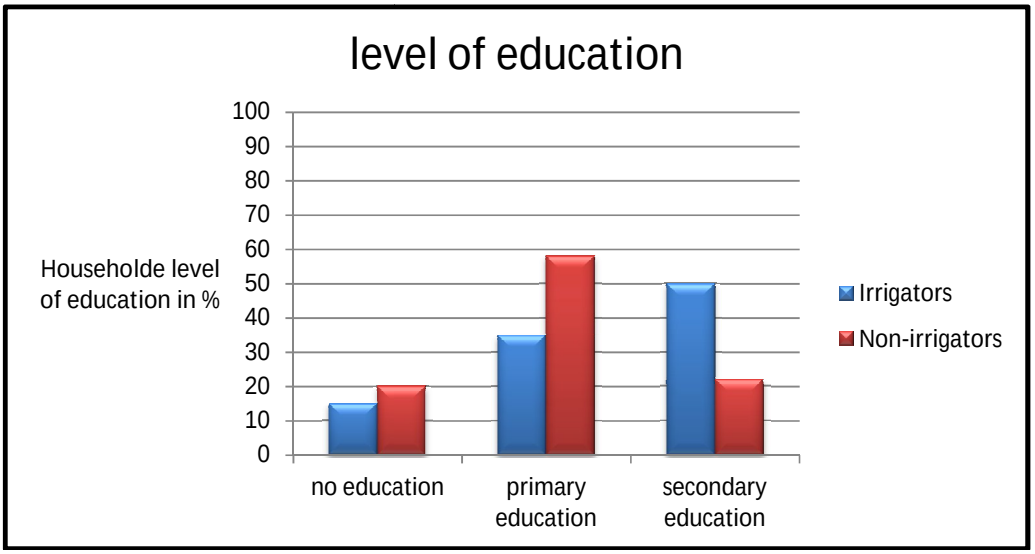

Figure 4.4: Distribution of household by education level of the household head
Source: Field Survey (2013)

This figure indicates that the majority of non irrigating famers are not well educated as they have primary school education. In the study areas 58% of non-irrigators of the respondents have primary education and 22.5% have the secondary education and 20% have no education at all. Poor education of these farmers contributes to the poor production because of poor adoption of production technology. While in farmers under irrigation 50% of them have secondary education compared to only 15% of farmers with o education and 35 % of famers with primary education. Most previous studies indicated that the possibility to adopt and apply new methods of farming increased along with education level. Education level has positive correlation with irrigation participation, the high the level of education there more the good chances of adopting new technology such as irrigation (Haji, 2013).

Most previous studies indicated that the possibility to adopt and apply new methods of farming increased along with education level. Asayehegn *et al*., (2013) noted that education plays a key role for household decision in technology adoption. It creates awareness and helps for better innovation and invention. Education level has positive correlation with irrigation, the high the level of education there more the good chances of adopting new technology such as irrigation (Haji, 2013; Asayehegn *et al*., 2013). High education level of irrigating farmers can be the reason why these farmers are involved in improved agricultural production technique such as the adoption of irrigation scheme.

4.3 Socio-economic analysis of smallholder production in the Eastern Cape Province

Smallholder production takes place in rural areas of the Eastern Cape and involves agricultural activities on small holdings where production is for family use and only the surplus is marketed. Smallholder farmers are characterised by lack of modernised production technology and techniques and most have not received training on farm business management, thus lack good management skills. Ngomezulu (2007) and Salami e*t al*. (2010) agreed to this note, they discovered that communal areas are characterised by resource base such as little use of modern technology, underdeveloped infrastructure, weak institutional support and low levels of production inputs. Smallholder farmers have different defined goals depending on each farmer's perspective on the farming business for example, production for

household consumption, for profit maximization etc. In meeting their goals they are affected by different aspects like commercial farmers do, but the mostly the managerial ability of the farm (Ngomezulu, 2007). Bryceson (1993) as cited by Manona (2005) suggested that the increasing growth in population density put a pressure on available resources in rural areas like land making them scarce. The majority of smallholder farmers are susceptible to economic conditions and global warming (Ton and Meijerink 2007).

4.3.1 Land tenure system and area cultivated

Land tenure describes the relation between the communal people and the land they are living in as well as other natural resources available in the area. Backeberg (2006a) noted that South Africa has about 1.3 million ha under irrigation, of which 0.1 million ha is in the hands of smallholders. Backeberg (2006) estimated the number of South African smallholder irrigators to range between 200 000 and 250 000, but most of these were farming very small plots, primarily to provide food for home consumption. In rural areas, land is privately owned by the rural dwellers. Smallholders that were interviewed own their plots and they obtained through inheritance from the elders. South African smallholder irrigation schemes are multi-farmer irrigation projects, larger than 5 ha in size that were either established in the former homelands or in resource-poor areas by black people or agencies assisting their development. Using this definition, Arcus Gibb (2004) noted 287 smallholder irrigation schemes in South Africa in 2004. Estimates of the combined command area covered by South African smallholder irrigation schemes range between 46 000 ha and 49 500 ha. The importance of smallholder irrigation schemes in South Africa arises primarily from the number of participants involved (Bembridge, 2000). In 2003, Arcus Gibb (2004) estimated that the land on smallholder irrigation schemes was held by about 31 000 plot holders, representing about 15 % of the total smallholder population. By comparison, the 1.2 million ha of irrigated land in South Africa, which is referred to as large-scale commercial, is held by about 28 350 land holders (Backeberg, 2006a, 2006b).

4.3.2 Land size

Farming under the smallholder systems is characterized by low level of production technology and small size of farm holding ranging from > 1 - 10 hectares per farmer; with production primarily for subsistence and little marketable surplus. Land is likely to be one of the major causes of constraints that prohibit commercialization of smallholder's producers because it inhibits farmers from taking profitable and environmentally sound investment (Enki, Belay and Dadi, 2001). Figure below presents the results on field survey on land sizes.

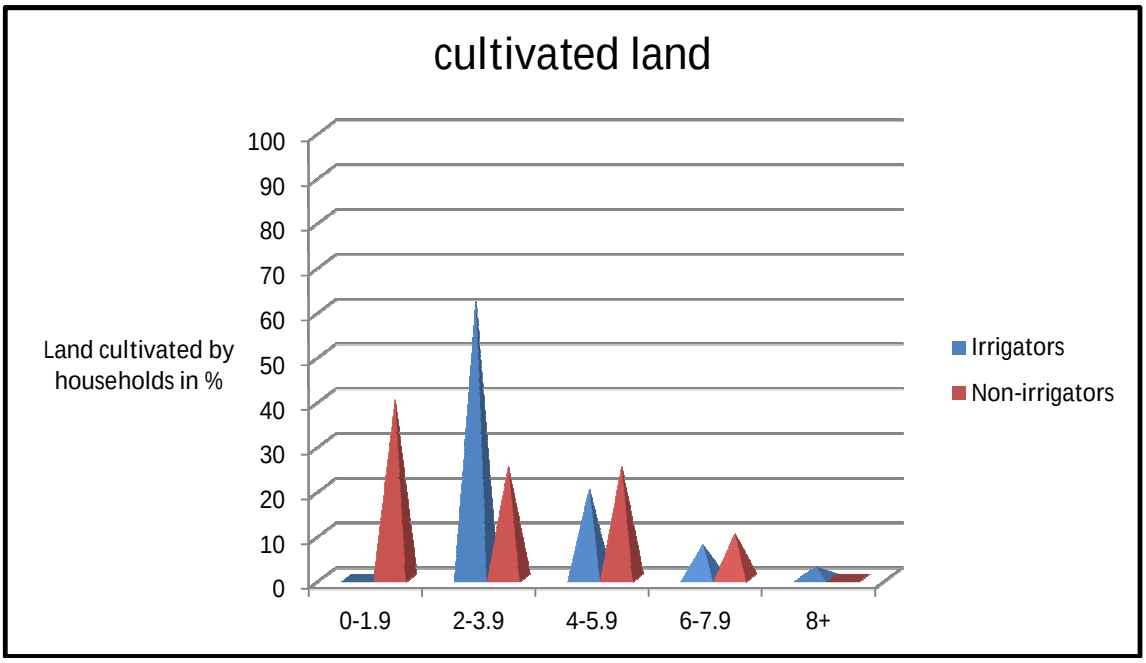

Figure4.5: Distribution of land cultivated by the households
Source: Field Survey (2013)

Figure 4.5 shows the size of the land in groups under which the farmers are producing their crops. The graph indicates that highest percentage which is 40% of non-irrigating farmers are holding between 0 and 1.9 hectares land, with 0% farmers holding land between 8 hectares and above. This is an indication that land is another constraint that limits farmers from producing for sales, because production on 1.9 or less can only sustain the households. 25% of these non-irrigators are holding lands between (2-3.9) – (4-5.9). In irrigating farmers 62.5% which is the highest percentage are producing on 2-3.9 hectares and only 2.5 is producing on land between 8 hectares and above.20% is operating at 4-5.9 hectares while 7.5% is operating at 6-7.9%.

4.3.3 Land under irrigation

Not all the land available to irrigating farmers is irrigated, there are many factors that could be the result of such case eg some of the areas owned are far from the irrigation system. The majority of respondents are operating in one farm where there is irrigation scheme and that leaves their gardens with no irrigation. The graph below indicates the total number of land used for irrigation.

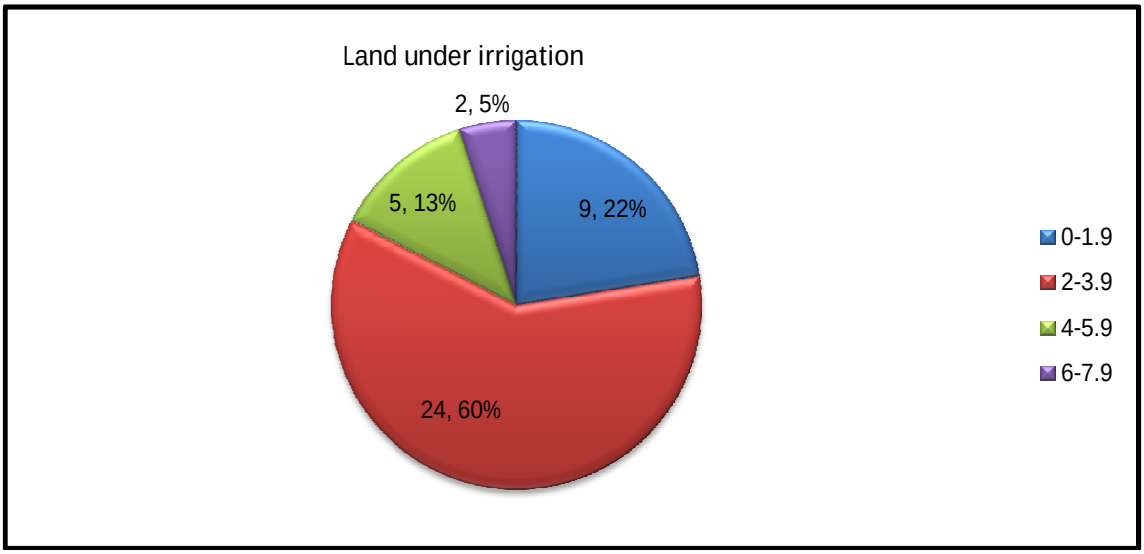

Figure 4.6: The total number of land irrigated in assortment
Source: Field Survey (2013)

From the figure above it is clear that the majority of land irrigated range between 2-3.9 hectares with only 2.5% of hectares between 6-7.9%, 9.22% at between 0-1.9% and 5.13% between 4-5.9 hectares. This figure also proves that not all the land available to these famers is irrigated, for reasons some mentioned above. For example no farmers irrigating 8 hectares of land or more whereas the survey indicate that there are farmers with 8 hectares and above. Also from the irrigating farmers 7.5% is operating at 6-7.9% while only 2.5 hectares is irrigated.

4.3.6 Source of water

Seid (2002) discovered that the development and management of irrigation systems, access to agricultural inputs including fertilizers, pesticides, seeds, etc., increased agricultural productivity. The most commonly used water source is rain fall. However in areas where rainfall is scarce like in arid-semi arid regions dams or lakes,

boreholes have become main sources of water. Figure 4.9 shows type of water sources available for households

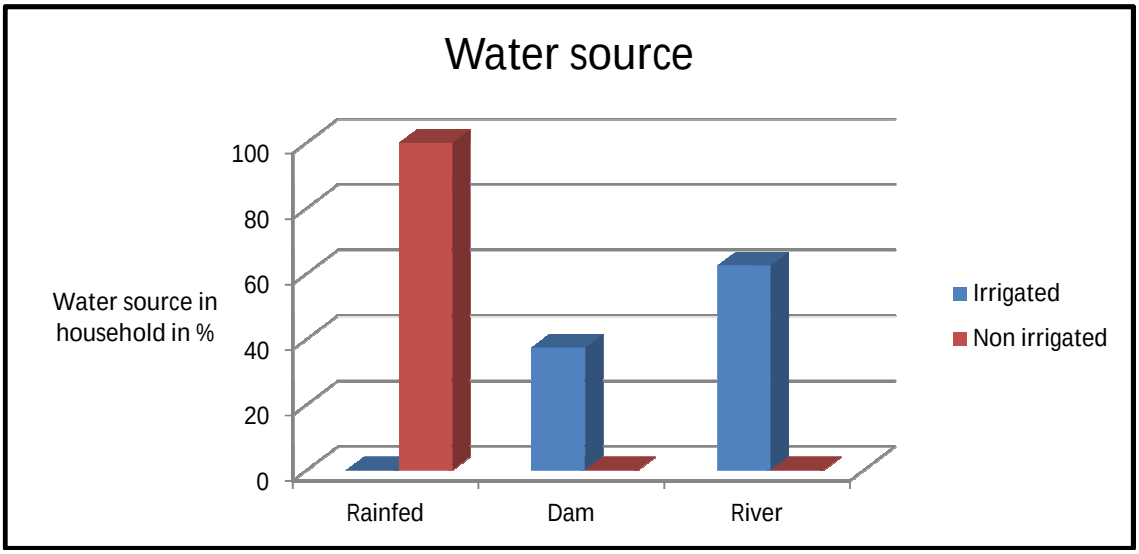

Figure 4.9: Distribution of water sources by the interviewed households
Source: Field Survey (2013)

From the figure above, 100% of non irrigators depend on rain-fed, while irrigators are using rainfall, dams and rivers. The diagram shows that the majority are using rivers, this is evidenced by 62.5% and the remaining 37.5% is using dams. From these results, it is clear that water is a scarce resource to smallholder farmers, as they have no other source of water. Therefore during drought seasons, these producers might harvest nothing. These farmers are producing at risk.

4.3.7 Membership on the farmer association

Irrigators and non irrigators engaged in different farmer organizations such as cooperatives, irrigation schemes etc. The ratio of smallholder irrigation user to non user of the irrigation scheme is high (Asayehegn, et al., 2013). Irrigation participants have greater chances of assessing influential factors such as information about marketing information and accesses. The figure below presents the results of the field survey of the households.

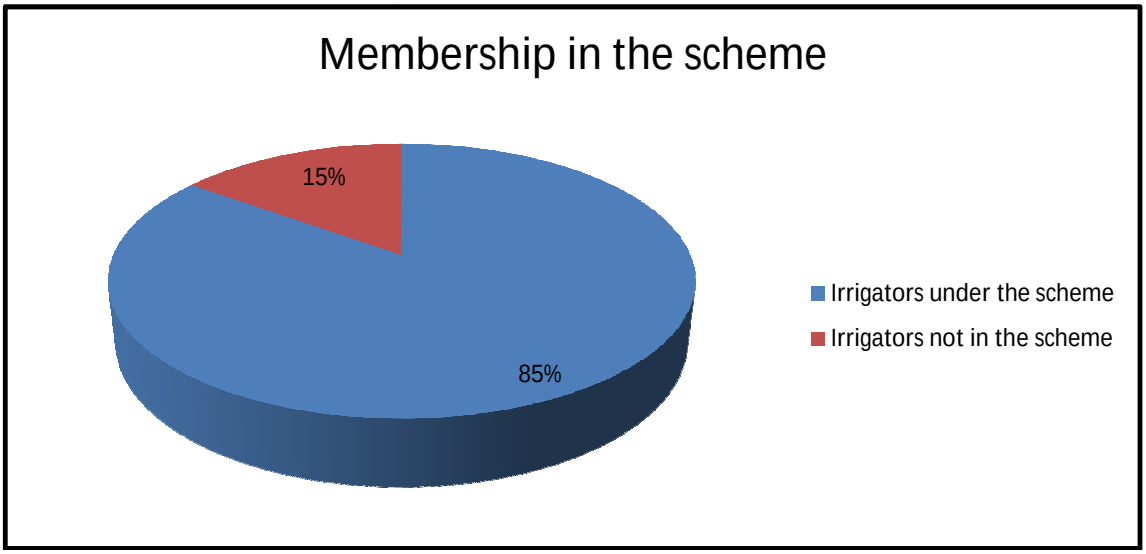

Figure 4.10: Distribution of farmers in irrigation the scheme
Source: Field Survey (2013)

This figure shows that 85% of irrigating famers engaged in irrigation scheme, while 15% of the farmers belong to other farmer associations. Being a member of the scheme is an advantage to the farmers. Farmers are able to increase yied, by sharing the production costs. Members belonging to the association do not only benefit from irrigation scheme but also receive support in the form of cash, subsidies and developmental programs such as workshops.

4.3.4 Irrigation participation outcomes

Irrigation contributes to poverty reduction, through increased income and employment opportunities and reduced food insecurity. Hussain and Hanjira (2004) confirmed that irrigation benefits the poor through higher production, higher yields, lower risk of crop failure and high diversified cropping patterns. This enables farmers to switch their production from subsistence to high value market orientated production. Then increased output makes food available and households' income to increase. The figure presents the average production formaize, potatoes, spinach, cabbage, carrot, beetroot, butternut and pumpkin production for irrigators and non-irrigators.

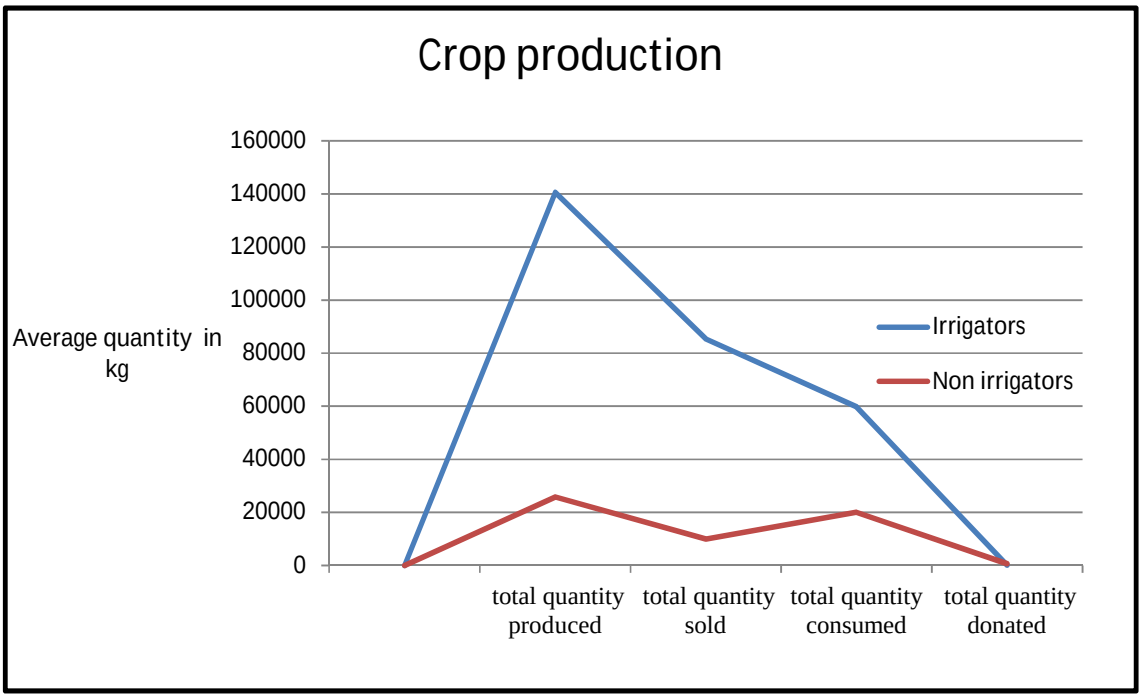

Figure 4.7: Proportions of quantity produced, consumed and sold
Source: field survey (2013)

Willingness to participate is influenced by various factors which include, availability of land, irrigation scheme and water source, infrastructure, managerial skills, market availability, farming purpose, willingness to commercialize production etc. In areas where the survey was carried farmers had different reasons for not participating irrigation which were unavailability of the scheme in their surround, some were saying its expensive to join, some their land sizes were small, some is because of unavailability of labour and some were saying they are too old to handle agricultural activities. However there are farmers who are successful irrigators. In both areas a group of farmers or villagers are renting a large area where the area is divided amongst the beneficiaries. The production of these irrigating farmers is high compared to that of non irrigators.

4.3.5 Willingness to commercialize

NGOs and other stakeholders can do all they want to shift smallholder farming to commercial farming but if the farmers are not willing to shift, then smallholder farmers will remain poor, not realizing the benefits of owning enormous amount of

land that they have access on. Figure 4.8 shows the difference between non irrigators and irrigators' willingness to commercialize production.

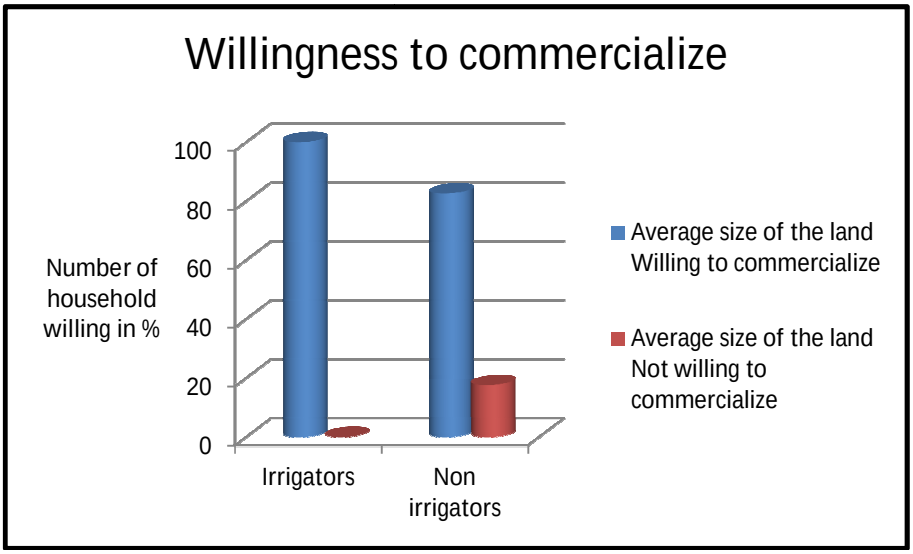

Figure 4.8: Farmers willingness to commercialize
Source: Households Field Survey (2013)

Figure above evidently indicates that 100% of the irrigators are willing to commercialize while it is 82.5% of non irrigators who is willing to commercialising with 17.5% of farmers who are not willing to shift their production. When asked those farmers with no intentions of commercializing they responded that, lack of have skills to produce extensively, resources such as infrastructure and water are limiting factors. From this explanation it clear that if the efforts of improving smallholder production can reach all the poor people, then their production, social wellbeing, local, nationally and global economy can improve.

4.4Farming systems

The agricultural potential of the areas remains largely untapped due to limited resources that restrict the producers. Agriculture production varies from subsistence to market orientated producers. Type of enterprises produced include, small stock, large stock, poultry, maize and vegetables. Markets used include both informal and formal markets with a later to a lesser extent.Most of the studies carried indicate that the development of irrigation system and water management has significantly improved the production of so called smallholder farmers. The availability and

adoption of improved agricultural technology and high quality agriculture inputs including fertilizers, pesticides, seeds, etc., increased agricultural productivity; land productivity has also been improved deriving from the increasing of mechanization and new tools.

Working and investment capital through rural banking services and credits began to expand production. These transformations of the rural economies in lowland areas enabled farm families to produce agricultural surpluses; achieving food security as well as increasing farm incomes through selling their surpluses in local, provincial and regional markets. In contrast, poor farmers who have not yet implemented new improved agricultural practices such irrigation schemes, mechanization etc. and consists of underdeveloped infrastructure contributed to low levels of market access and technology penetration. Level of access to markets, credit, technology, inputs and irrigation systems is also very low in these farmers. Therefore this resulted in reduced farming systems productivity which is a possible mean of transforming from subsistence to commercial production leading to food insecurity, depressed farm incomes as well as environment issues.Therefore, specific development of irrigation schemes has been adopted to enhance the divergence from subsistence farming to commercial farming.

4.4.1 Produced enterprises

Eastern Cape Province is characterised by crop and livestock production. The survey was carried in areas that produce mainly livestock e.g. cattle goat and sheep as well as poultry and piggery, and vegetables such as cabbage, spinach, beetroot, potatoes, beans, butternut, pumpkin, and the carrot as well as maize. The figure below represents the different types of enterprises produced by irrigators and non-irrigators.

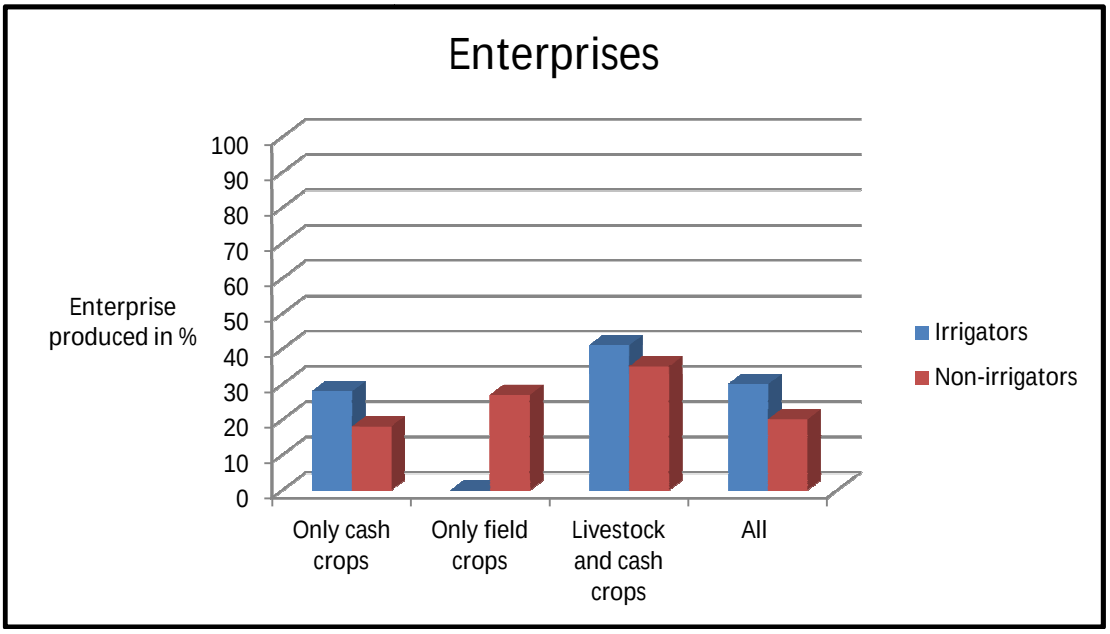

Figure 4.11: Types of enterprise produced by the households
Source: Field Survey (2013)

The diagram indicates that 35% of non-irrigating respondents are farming with cash crops and livestock, followed by 27% of field crop farmers, then 20% of farmers farming with cash crops, field crops as well as livestock. While its only 125 producing only crops.On the other side, 41% of irrigators are producing for both cash crops and livestock, followed by 30% of irrigators producing all the enterprises. There was 28% of irrigators indicated that they only focus on crop production. Only 1% only focused on field crops

4.4.2 Farming purpose

Smallholder farmers are mainly producing for food security, because of small areas of production that they are holding and also because of lack of resources. However with the efforts of transforming smallholder production into a commercial production, some smallholders are also producing for sales.

.

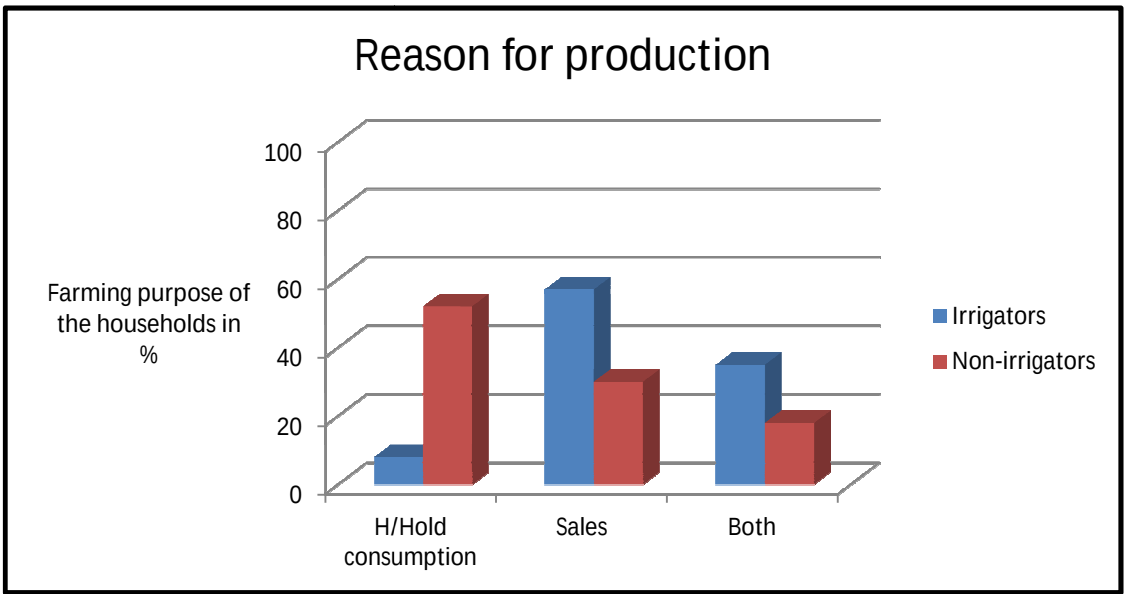

Figure 4.12: Distribution of farming purposes by the households
Source: Field Survey (2013)

Figure 4.12 shows that the majority of interviewed non-irrigating farmers are producing for household consumption, at 52.5% of total. On the other hand, 30% of the households reported producing for sales while 17.5% reported producing for both consumption and sales. Irrigators on the other hand are producing mostly for sales with 57.5% reporting that they produced for the market while those that produced for both sales and consumption constituted 35% of the total and only 7.5% of farmers produced exclusively for household consumption. The non-irrigators in the study areas are producing primarily for home consumption because they are deprived and more dependent on agricultural production for food security. These results indicate that there are smallholder farmers in the study area that are not market oriented. However irrigators on the other hand are showing evidence of market orientation as 57.5% of irrigators are producing mainly for sale.

4.4.3 Type of crops planted

The study was carried in the Eastern Cape Province, which is characterised by more or less similar enterprises. Maize, beans, spinach and cabbage are the most commonly grown crops. Different crops are perfoming. These are the crops are suitable in areas of the Eastern Cape, they are well known crops and may be easy to

manage. These are the crops that play role in balancing the diet of poor people of the Eastern Cape.

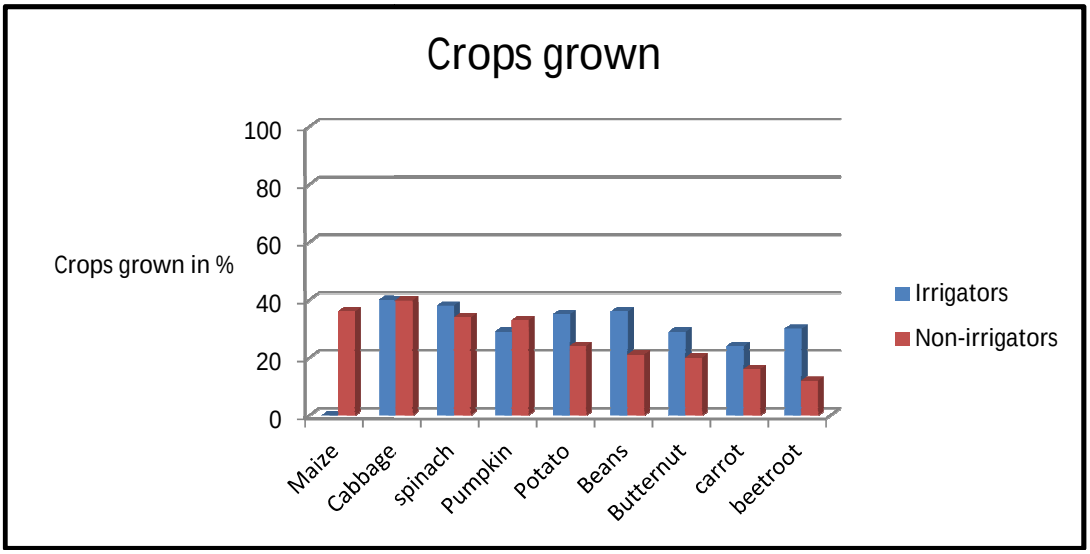

Figure 4.13: Proportion of household crop production for irrigators and non irrigators
Source: field survey (2013)

According to the figure above all the farmers (irrigators and non irrigators) interviewed grow maize and cabbage that is evidenced by 100% shown in the figure. The next commonly grown crop is spinach (95%) then bean (90 %,) followed by butternut and potatoes which are at 87.5%, then be (75%) and lastly carrot which is at 60%.

Figure 4.13shows difference in production, sales and household use of the product. The averages were used in order to determine these figures. In the diagram above, it is clear that the amount production and quantity of irrigators sold outweighs that of non irrigating farmers. However the average total land used by the irrigators was higher than that of irrigators. Irrigators were producing on 127.8 hectares while non irrigators were producing on 135.92 hectares. However there are other factors that may have contributed to high production of irrigators such as different management skills levels of irrigation, farming purpose when looking at their total quantity sold and infrastructure. Nevertheless this production shows that irrigating farmers are commercial orientated than non irrigators.Below is the table that illustrates the production in percentages. The table below shows proportion produced, consumed and sold by the two type of farmers.

Table 4.2: Production of irrigators and non irrigators in percentages

Item	**Output in percentages**			
	% sold	% consumed	% donated	**Total (%)**
Irrigators	61	38.92	0.08	100
Non-irrigators	21.4	76	2.6	100

Source: Results from Field Survey (2013)

According to the Table 4.2, 61% of irrigators sold their production and consume 38.92% and they donate only 0.08%. The production of these farmers is high seeing table 4.2 and that leads to high percentage sold. Because these farmers are from the geographic area Eastern Cape, crops grown are more or less similar and the socio economic factors under which these farmers are operating are similar, a conclusion can be made that the irrigation system adopted by these has contributed towards their output. This addresses the part of objective number one which assess the irrigation potential towards commercialization and research questions number which looks at the position of irrigators' in terms of productivity and commercialization when compared with their non-irrigation counterparts. Non irrigators sold only 24% of their output.

4.4.4Types of irrigation system used

Use of irrigation contributes to the improvement of production especially is arid to semi-arid regions. Participation in irrigation is believed to have a significant impact in the production. One of the objectives of the study is to assess the irrigation potential in improving smallholder production thereby commercializing it. There are different irrigation systems used by the respondents in the study areas which are sprinkler, drip irrigation some are using both. Results presenting types of irrigation methods used are on the figure below.

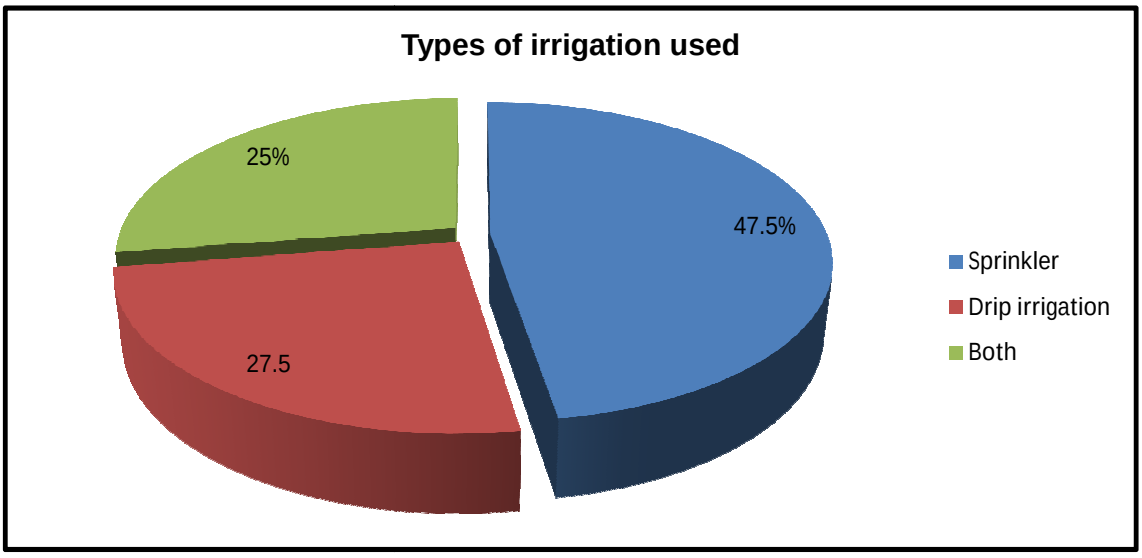

Figure 4.14: Types of irrigation used by the households
Source: Field Survey (2013)

From this figure, it is clear that the majority of farmers are using sprinkler irrigation, this is shown by the highest amount of 47.5% of farmers. Their second choice is drip irrigation which is indicated by 27.5%. About 25% of these farmers are using both drip and sprinkler irrigation. In the case where they use both, farmers will be using drip irrigation for field crops and sprinkler for their crop production.

4.5 Human resource and capital endowment

Human capital general means the trait obtained by the farmers either through experience or education. This is normally portrayed by individual's competencies, knowledge in the ability to perform labour to produce at economies of scale. Human capital in this study will be described in terms of experience and the skills obtained. Asayehegn, Yirga, Rajan, (2013) noted that resource ownership and farm experience have great influence on participation decision behaviour of farmers.

4.5.1 Household skills and experience

The skills and the experience of the farmers are related, the more the experience the farmers has, the more the skills whether acquired through experience or formal

training. The figure below explains the relationship between skills and experience of the household sample.

4.5.1.1Skills obtained

Nyamatule and Ayessaki (2009) observed that limited skills, information, technology in production for marketing of smallholder farmers make it difficult for them to compete with the national and international markets. They argued thatthere is a need to build skills and knowledge of smallholder producers in order to successful link with the potential markets and for them to produce what they can sell rather than selling what they have produced. The following figure, shows different types of skills obtained by the households.

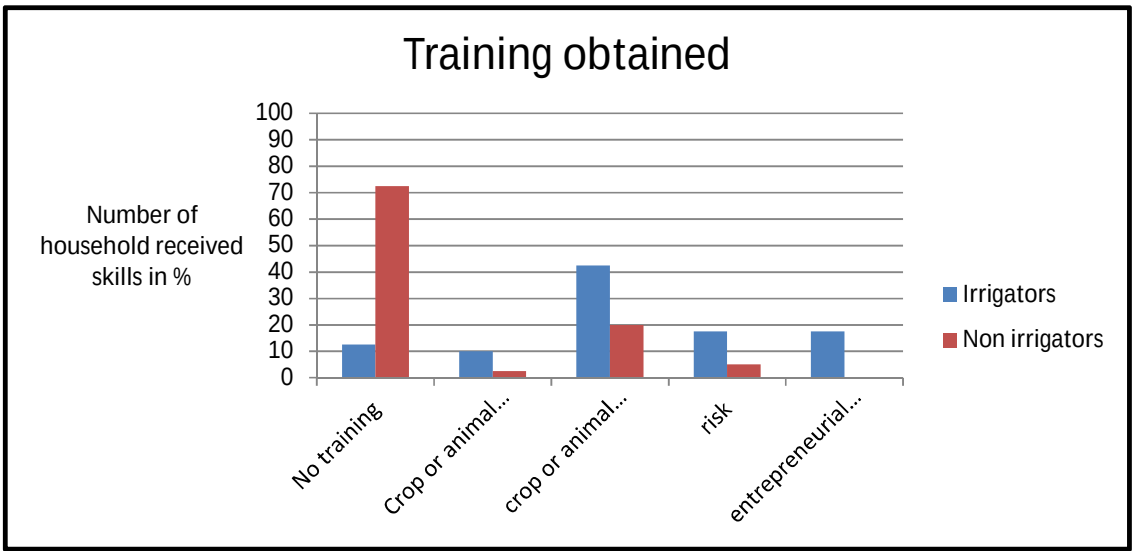

Figure 4.16: Production skills obtained by irrigators and non-irrigators
Source: field survey (2013)

From the survey, it was discovered that farmers have received different skills and about 72.5% of non irrigating respondents did not attend any form of training, while its only 12.5% under irrigating farmers that did not attend training. In irrigating farmers 42.5% attend some basic production skills such as crop and animal production and its only 20% of non irrigating farmers received such skills. This data is an indicator that farmers do benefit from the farmers association that they are part of, because they mentioned that training was provide to the scheme at large.Several

reasons were suggested by the respondents for not attending the training, some included age, they were too old to attend trainings, no need for the training some were claiming that experience they are having is enough, and others because they do not know where to obtain the training and some did not because trainings that they could not afford to pay the registration fees.

4.5.2 Ability to sustain production

The ability to maintain the farm is determined by the available resources as well as skill and or experience that the farmer possesses. Education facilities have considerably improved over decades. Farmers now are equipped with basic production skills and farm business management skills. This enables farmers to be able to run their businesses profitable.

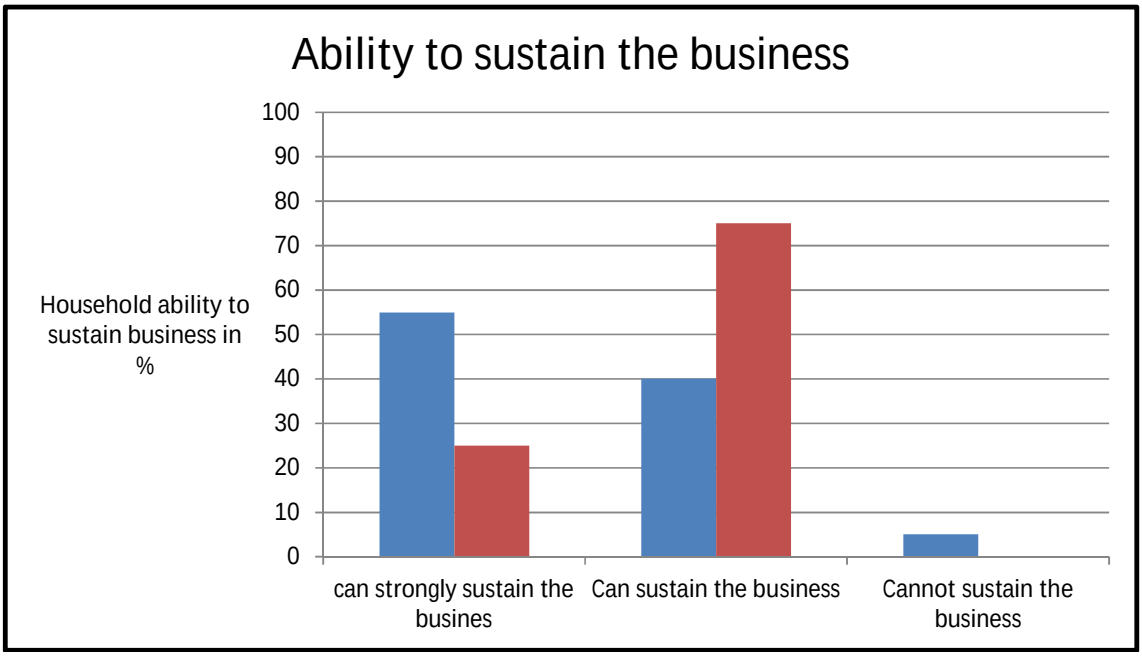

Figure 4.17: Irrigators and non-irrigators ability to sustain business
Source: Field Survey (2013)

The diagram below indicates that all of the irrigating farmers can sustain their business with 57.5% who can strongly maintain the business and 42.5% who can partially sustain the business. This is in indication of transformation of subsistence production to commercial farming. On the other hand 60% of non irrigating farmers

can partially maintain their business and 25% who can strongly maintain the business, its only 5% who is unable to sustain the business. The training and experience play a major role in helping these farmers to cope with their production.

4.5.3Experience in relation with age

Agriculture in rural areas is practised as norm, each household is likely to have a piece of land where crops or vegetables are produced. Most of smallholder farmers grew up working at the farms. The household head 'age can be used as a alternative to explain the farmer's experience in farming, the older the individual the more is the experience.

Table 4.3: Farming experience

Age groups	Average farming experience in years	100%
Irrigators		
30 – 40	10	10
41 – 50	20	32.5
51 – 60	25	45
61 -70	30	12.5
70+	42	0
Total	**80**	**100**
Non-irrigators		
30 – 40	5	5
41 – 50	9	22.5
51 – 60	12	30
61 -70	18	30
70+	37	12.5
Total	**80**	**100**

Source: Field Survey (2013)

This figure is significant in showing the relationship between age and farming experience. The older the farmer, the more the experience the farmer possesses.

Respondents that are old have more experience than young respondents. It can be observed that respondents aged 70 years and above have up to 42 years of farming experience compared to the younger respondents aged 30 – 40 years. However it should be noted that experience can be influenced by the change in focus on farming activities to non-farming activities, for example with the change of time, there has been a shift from agricultural activities to non agricultural activities which has resulted to young generation not growing up in the farming environment like their more elderly relatives.

From the observation and discussion above, even though some farmers never received any form of training but as they are growing old they obtain traditional farming experience. Nevertheless if the farmers are to commercialize their production they need formal skills in all aspects including those were not mentioned above such as record keeping, financial management and most importantly marketing, those with negative effect on the commercialisation. From the survey it was also discovered that some farmers do not know the opportunities of improved skills experience and value market chain and that is why they have not trained or have not been involved in formal markets.

4.5.4 Source of labour

Labour in smallholder production is provided by the family members. In smallholder production labour is mainly provided by the householder members, Asayehegn, Yirgaand Rajan (2013), in their research discovered that labor availability is an important factor influencing households' decision to participate in small-scale irrigation schemes. Household survey findings are presented in the figure below.

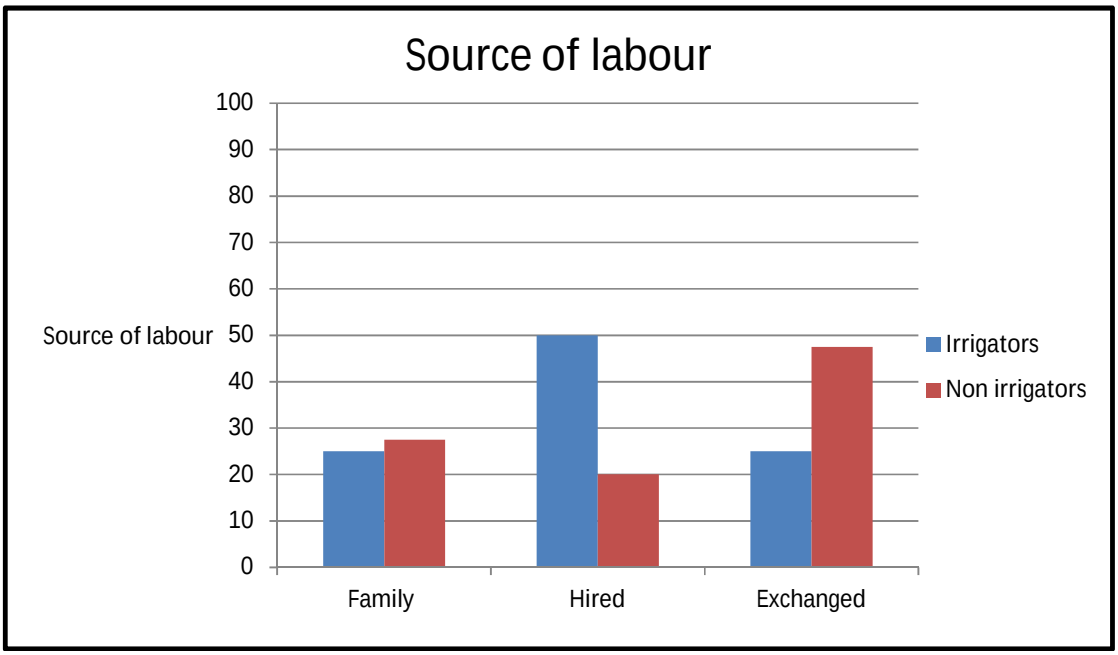

Figure 4.19: Type of labour utilised by irrigators and non-irrigators
Source: Field Survey (2013)

This figure shows that 50% of the irrigators use hired labour, then use 25% of family and exchanged. Irrigating farmers are employing labour as a way of improving their local economy. In contrast non-irrigating use 47.5% of exchanged labour followed by family labour which is 27.5%, then least labour use is hired labour and is 20%. Irrigation labour force is the amount of labour needed for irrigation activities. Rain-fed and irrigated agriculture required different labour force both in quantity and technically quality (Asayehegn et al., 2013).

These results illustrate that only 20% of labour is hired by non-irrigators and 50% is hired from irrigators. This means that irrigators face labour shortage.In both cases labour is hired during weeding and harvesting period. The highest amount of labour from non irrigators could be that these farmers are sharing other resources such as machinery therefore as a way of renting or paying for resources borrowed they exchange labour. This technique is very common in rural areas.

4.5.5 Asset ownership

All stages in the farming business are influenced by the available assets, starting from the production until the distribution of the product (Stroebel, 2004). This implies that farmers with access to all the required assets for production are likely produce and market their produce effectively. Most Available asset to the interviewed household include, planter, plough, hand hoe and spades. The condition of these farming machineries varied from fair to poor and 100% of the respondents have access to these machineries *(see table 4.1).* Major assets that have been discussed include land ownership and area cultivated, farming implements, storage facilities and fence.

4.6 Marketing

Market access is essential in order to obtain high income from the production. There are formal and informal markets. Informal markets are characterized by informal transaction costs between the farmers and the consumers. While formal markets are characterized by clearly defined safety standards, quality requirements and the price is negotiated and sometimes determined by the market. Smallholder farmers normally find it difficult to access formal markets because of low poor productivity to meet the quality standards of the formal market, high transaction costs, lack of market information and low bargaining power.

Smallholders in the areas of the study also experience the same challenges. Firstly none of the respondents had access to the formal market, all the respondents are using informal markets for both crops and livestock markets. Challenges to these farmers include lack of access to formal markets, lack of market information, the location of the markets and market transport.

Table 4.3: Marketing factors of the sampled households in the study areas

Variable		Frequency	Percent	Valid Percent	Cumulative Percent
Used market					
Farm gate	.0	6	7.5	7.5	7.5
Nearest town	1.0	47	58.8	58.8	66.3
Farm gate &Nearest town	2.0	23	28.8	28.8	95.0
Around the village	3.0	4	5.0	5.0	100.0
	Total	80	100.0	100.0	
Access to Market information					
Yes	1.0	41	51.3	51.3	51.3
No	2.0	39	48.8	48.8	100.0
	Total	80	100.0	100.0	
Contract agreement					
Yes	1.0	16	20.0	20.0	20.0
No	2.0	64	80.0	80.0	100.0
	Total	**80.0**	**100.0**	**100.0**	
Transport produce					
Own transport	1.0	10	12.5	12.5	12.5
Hired transport	2.0	37	46.3	46.3	58.8
Buyer transport	3.0	33	41.3	41.3	100.0
	Total	**80**	**100.0**	**100.0**	
Marketing problems					
Lack of transport	.0	10	12.5	12.5	12.5
Small size of the transport	1.0	2	2.5	2.5	15.0
Higher transport cost	2.0	14	17.5	17.5	32.5
Market access and high transport cost	3.0	34	42.5	42.5	75.0
Lack of transport & market access	4.0	20	25.0	25.0	100.0
	Total	**80**	**100.0**	**100.0**	

Source: Field Survey (2013)

4.6.1 Access to market information

Access to market information is important if the farmers want to actively engage in profitable markets. It enables the farmer to be able to make a rational decision in terms, searching the buy, who to sign the contract with, price, market requirements, market prices. A survey conducted showed that there are farmers with access to market information however some did not have access to the information.

Reasons for poor or no access to market information mentioned by the respondents included failure of the extension services and other relevant stakeholders and that the farmers do not engage with other farmers or farmer organizations.

Table 4.2 above shows higher percentage of farmers with market information (51%) compared to those without market information (48.8%). This higher percentage is the results of farmers that are part of farmer association. Access to market information is a challenge that could have is the great contributor to the failure of these farmers. Respondents have their own strategies of disseminating the information, those strategies should be considered because standard format of disseminating information might not work in all different areas.

4.6.2 Market transport

Market transport is important when running business, because it links the markets to the producers secondary and ensures that produce is delivered on time compared to a situation whereby farmers depend on hired transport.

Table shows that, 41.3% of the respondents rely on buyers transport to transport the produce and 46.3% depend on hired transport in transporting their produce. Only 12.5% use their own transport to transport their produce. Challenges incurred in producing include high transport costs and lack of transport.

4.6.3 Access to market

Market access is the main constraint to commercialization of smallholder producers. Smallholder farmers normally produce without having an assurance of market to supply and that result to their surplus not reaching the market. Market access is often difficult due to the remoteness, poor infrastructure and small number of active farmers. Below is the figure with information about the market availability and accessibility in the areas of study.

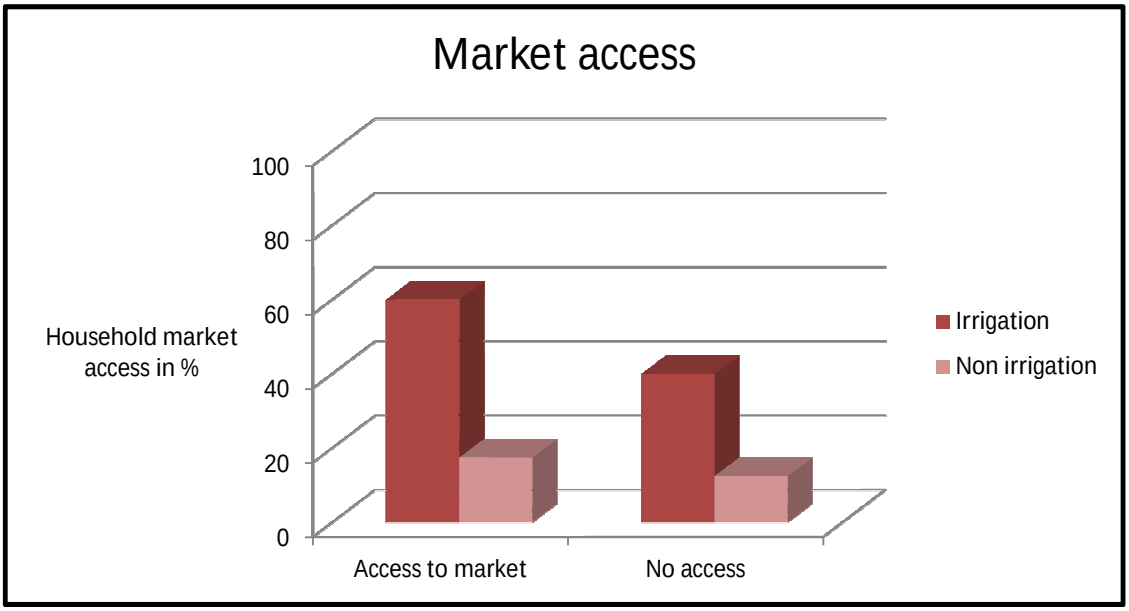

Figure 4.20: Market accessibility by irrigators and non-irrigators
Source: Field Survey (2013)

The figure above indicates that 60% of irrigating farmers have access to formal market and 40% have no access. While in non irrigating farmers 82.5% which is the number have no access to formal markets, its only 17.5% that has access. This proves that there are areas which need extensive development. However farmers need to be aspired to change from their traditional production focus to advanced and improved production focal point.

4.6.4 Type of the market

The markets used determine the level of commercialization of the farmers, as indicated above farmers need to have a formal market in order to commercialize their production. Having access to formal market is a get way to commercialization.

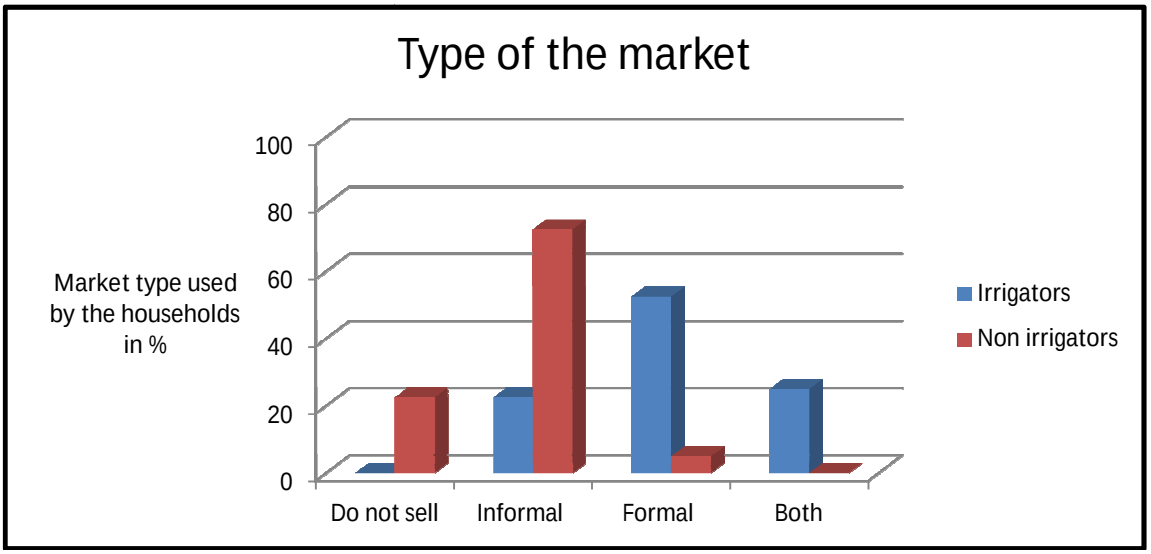

Figure 4.21: Market used by irrigators and non irrigators
Source: Field Survey (2013)

According to the figure above the majority of non irrigators are using informal market, this is evidenced by 72.5%.There are 22.5% which do not sell at all. Only 5% is using formal markets in non irrigating farmers. Whereas majority of irrigating farmers is using formal market, this is evidenced by 52.5% which is the highest percentage then followed by 25% which is for those farmers who use both formal and informal markets. There are only 22.5% farmers that use merely informal markets. Irrigating farmers sell all their produce.

4.7Institutional support services

During the survey the respondents indicated, there are support services provided by institutions but the primary focus of these institutions are those producers that are part of an organization. There are supports services from Lima (NGOs)that assist farmers with training, inputs and accessing markets and from the department such

as monitoring and evaluation. In both areas, assistance in the form of production inputs such as seedlings, poultry feed, chemicals have been received.

Extension services are the most reliable source so f information to the farmers. Although some respondents indicated that extension services are not available but the majority has responded that extension services provide support in the terms of for example production and management and marketing to a lesser extent.

Table 4.4: Frequency of services provided by the extension officers

Variable		Frequency	percent	Valid percent	Cumulative percent
Extension availability					
Always available	1.0	9	11.3	11.3	11.3
Available sometimes	2.0	65	81.3	81.3	92.5
Never available	3.0	6	7.5	7.5	100.0
	Total	**80**	**100.0**	**100.0**	

Source: Field Survey (2013)

During the survey 81.3% of the respondents indicated that extension services are available sometimes and 11.3% is saying extension officers are always available when required however 7.5% is saying they are never available. They provide assistance in the form of advice on production techniques. They also assist in challenges like diseases in the production. In engaging with these farmers on challenges they indicate that extension workers are biased towards farmer that belongs to an organization. The reason that 7.5% of the respondent is never available is because they are not aware when the extension officers are available because they are not members of any organization.

Challenges mentioned included the distance location of the agricultural offices that makes it costing to visit the farmers. To combat with this situation, head villagers would call for a meeting and ask the officer to visit but the extension officer does not show up.

4.8Infrastructure

4.8.1 Farm equipment

Poor infrastructure has become the character of smallholder farmers because it existed years ago and yet still the challenge. Poor infrastructure in smallholder production greatly influences the productivity of the farmers. Agricultural infrastructure include road, marketing and production infrastructure. Most commonly available infrastructure in both villages include machinery like planter, plough, ploughing disc, wheel barrow, fork spade and hand hoes, storage facilities , transport, roads and fence.

4.8.2 Road

The road was rated from fair to bad, because the areas are located in rural areas with poor or far link to the tar road.

4.9 Marketing challenges

Market challenges are the major barrier to the development of these smallholders' farmers. Different marketing problems were given by the respondents. Like in any rural areas that are far from towns, the major constraints in marketing are the access to the market. This challenge is faced by many producers and market to access is normally difficult because of market low productivity any poor quality of the produce. This table show that the farmers of the study areas have problem of marketing their production, and farmers have are faced by different challenges. The most common challenges include lack of transport, small size of the transport, high transport cost and market availability and in ability to meet the standards of the market. According to the table 12.5% of the respondents are challenged by lack of transport, 2.5% which is the lower percentage is constrained by small size of the transport, 17.5% is challenged by high transport costs, 42.5% which is the highest percentage is

Table 4.5: Frequency and cumulative percentage of marketing problems

Variable	Frequency	Percent	Valid Percent	Valid percent	Cumulative Percent
Marketing challenge					
Lack of transport	.0	10	12.5	12.5	12.5
Small size of the transport	1.0	2	2.5	2.5	15.0
High transport cost	2.0	14	17.5	17.5	32.5
Market access and high transport cost	3.0	34	42.5	42.5	75.0
Lack of transport and market access	4.0	20	25.0	25.0	100.0
	Total	**80**	**100.0**	**100.0**	

Source: Field Survey (2013)

challenged by market access and high transport costs while 25% is challenged by both lack of transport and market access.

4.10Problems faced by farmers in general

The major agricultural production problem faced by these smallholders is the source of water. These farmers are poorly developed and in their areas of production areas there are no constructed dams they entirely depend on rainfall for irrigating their crops. Source of water like rivers and streams are far from the villages and during drought seasons water is unavailable. During severe drought government usually intervene by giving municipal water tanks and supply water weekly however water provided is not sufficient for the livestock. Other common problems include livestock disease and crop diseases that are changing because of the weather conditions.

Table 4.6: General production challenges faced by farmers

Variable		Frequency	Percent	Valid percent	Cumulative percent
Business challenges					
Drought	1.0	18	22.5	22.5	22.5
Disasters	2.0	9	11.3	11.3	11.3
Both	3.0	53	66.3	66.3	100.0
	Total	**80**	**100.0**	**100.0**	

Source: Field survey (2013)

Table 3.5 shows that smallholder production is challenged by both drought and natural disasters. This is evidenced by 66.3%, for both factors. Drought is the major challenge by 22.5%. Government, stakeholders and NGOs have identified the problem of drought in developing small producers and development of irrigation schemes to supplement during dry seasons has been proven as the best strategy. This study also agrees with that notion according to the discussion above irrigators farmers are performing better than non irrigating farmers consequently they manage to commercialize their production.

4.12 Inferential analysis

4.12.1. Specification of the models

The binary regression model developed in chapter 3 explains the relationship between the output generated by the producers and the various socio-economic factors in which the producers operate under. In the model, output represents the dependent variable that measures the proportion produced given the set of described socio-economic constraints. The socio-economic characteristics described are those viewed as having major influence on the production.

4.12.2.3 Implication of factors affecting the irrigation participation thus commercialization

BRM was fitted to determine factors affecting farmer's decision in participating in irrigation. In other words in bivariate data and Logit were employed since all the variables used are categorical.Results from the SPSS where recorded, below is the table showing the results.

Table 4.7: Result of the binary regression model

Variable	B	S.E	Wald	Df	Sig	EXP(B)	95% C.I for EXP(B)	
EDCLVL	-.754		0.349	1	0.555	0.470	Lower	Upper
Age	-0.047.	1.276	0.914	1	0.339	0.954	0.866	1.051
MEMRSHPSCHM	2.509	.049	11.417	1	0.063	13.814	0.870	219.215
Step 1[a] SUSTPROD	2.626	.743	3.466	1	0.063	13.814	0.870	219.215
MRKACCESS	2.143	1.410	10.167	1	0.001	11.163	2.533	49.188
CONSTANT	-1.697	.757	0.177	1	0.674	0.183		

Nagelkerke R Square = 0.688
Cox & Snell R Square =0.515
Log likelihood value = 52.793
Hosmer and Lemeshow = 0.284

From the table 4.7, the Omnibus Tests of Model Coefficients gives us a Chi-Square of 58.110 on 5*df*, significant beyond .000. This is a test of the null hypothesis that adding the education level, age, market access, ability to sustain and membership in the irrigation scheme variables to the model have not significantly increased our ability to predict the decision to participate in irrigation. The -2 Log Likelihood statistic measures how good the model predicts the decisions, the smaller the statistic the better the model. The 2LL estimate the likelihood that the observed values of the DV may be predicted from the observed values of the IVs.Our predictor model had a small -2 Log Likelihood statistic of 52.793 meaning the model was good. Also the goodness of the model for its fit is shown by .516 of Cox & Snell R2 which is less than 1 and the Nagelkerke *R2* which is .688 which is not close to 0.

Hosmer and Lemeshow are used to test the significance of the logistic model. As seen in the table Hosmer and Lemeshow, shows that the model is insignificant (.284). Hosmer-Lemeshow measures the goodness of fitness of the model. If the H-L goodness-of-fit test statistic is greater than .05, as we want for well-fitting models, we fail to reject the null hypothesis that there is no difference between observed and model-predicted values, implying that the model's estimates fit the data at an acceptable level. That is, well-fitting models show non significance on the goodness-of-fit test, indicating model prediction that is not significantly different from observed values. As seen in the table below Hosmer and Lemeshow, shows that the model is insignificant (.284) suggesting that it does fit the data. The table presenting BRM results follows

The table above indicates that membership in irrigation scheme was significant at 1% and market access was significant at 5% and ability to sustain the business at 10%. Following is the discussion of the variables that were found significant.

4.12.2.3.1 Membership in irrigation scheme

Involvement in irrigation scheme is expected to transform the subsistence farming into market orientated farming. Farmers in irrigation scheme are likely to improve their production both quantitatively and qualitatively, increase their access to profitable and thus commercialise their production. Members in irrigation not only improve their production quantity and quality but also receive support in the form of cash, subsidies and developmental programs such as workshops. According to the research, findings involvement in irrigation scheme has a strong influence in determining whether the farmers should participate in irrigation. This is shown by a highly significant value of .000.

4.12.2.3.2 Market Access

Producers are encouraged to have to their own markets to ensure that their products will reach the market at the end of production. To smallholder or rather farmers' in remote areas, having contract agreement is not the only problem they have no

access to profitable market. Some of the possible reasons is that they are far, they produce poor quality products which do not meet market requirements or they have no information as to where to find such markets. Therefore access to market has an impact in irrigation participation because this will improve the production in order to gain access to the market. The results from the binary regression also indicate that, market access has influence on whether to participate in irrigation or not. With access to market, farmers are motivated to participate in irrigation as their output stand a chance of reaching profitable markets.

4.12.2.3.3 Sustainability of the farm

Farmer's ability to sustain the business is determined by the level of experience and trained received by the farmer. From the results in the table, it is discovered that ability to sustain the business has influence in commercializing. When the farmers are able to sustain their production, it means that they are able to manage their production costs

4.12.3 Truncated Regression Model

Truncated regression (TR) is used to model dependent variables for which some of the observations are not included in the analysis because of the value of the dependent variable.TR model was used to address the first objective of this study, which looks at degree of commercialization of smallholder irrigation farmers. This was done by delineating the relationship between commercialization index and food production for irrigated lands of smallholder producers of Eastern Cape.

Table 4.8 presents the results of the HCI determination of field and vegetable crops added as explanatory variables, to fine tune the function to realism of the regions covered in the analysis. HCI was used s an indicator to measure smallholder commercialization, determined as the ratio of the gross value of all crop sales per household per year to the gross value of all crop production was used. Agwu, Anyanwu and Mendi noted that, Govereh *et al*. (1999) and Strasberg *et al*. (1999) have used the HCI before to determine the extent of commercialization

In these tables of coefficients, there are truncated regression coefficients, the standard error of the coefficients, the Wald z-tests (coefficient/se), and the p-value associated with each ztest and 95% confidence interval for the coefficients. The log likelihood of the fitted model is used in the Likelihood Ratio Chi-Square test whether all predictors' regression coefficients in the model are simultaneously zero.

For model analysis, maize, cabbage, spinach and potato were analysed. The aim was to measure the proportion of output of each crop in order to determine if the farmer is commercializing or not.

Table 4.8: Results of the truncated regression model

HCI maize	Coef.	**S.E.**	Z	P>lzl	[95% conf.	Interval]
Type	-3.182303	2.27198	-1.40	0.161	-7.635302	1.27696
Age	0.1179299	0.516976	2.28	0.023	0.0166045	0.2192553
Irrland	1.674808	0.6558903	2.55	0.011	0.3892871	2.96033
Willngcomm	-5.050397	1.728817	-2.92	0.003	-8.438815	-1.661978
GVmaize	-0.9637145	1.053741	-0.91	0.360	-3.029009	1.10158
CONSTANT	-0.0000919	0.0000363	-2.54	0.011	-0.00163	0.0000209
	5.246024	3.274374	1.60	0.109	-1.171631	11.66368
/sigma	2.168592	0.3374995	6.43	0.000	1.507105	2.830079
HCI cab	Coef.	**S.E.**	Z	P>lzl	[95% conf.	Interval]
Type	13.14195	10.31923	1.27	0.203	-7.083365	33.36726
Age	-0.0284303	0.2491972	-0.11	0.909	-0.5168478	0.4599872
Irrland	4.584787	3.127811	1.47	0.143	-1.545609	10.71518
Willngcomm	-2.346043	10.38496	-0.23	0.821	-22.70018	18.0081
GVcab	2.592345	6.26218	0.41	0.679	-9.681302	14.86599
CONSTANT	-0.0004488	0.0001993	-2.25	0.024	0.0008393	-0.0000582
	0.2901659	16.81068	0.02	0.109	-32.65816	33.23849
/sigma	12.9034	1.33248	5.22	0.000	8.062982	17.7482
HCI spin	Coef.	**S.E.**	Z	P>lzl	[95% conf.	Interval]
Type	-10.86303	7.48213	-1.45	0.147	-25.52774	33.36726
Age	0.2886569	0.2299629	1.26	0.209	-0.1620622	0.4599872
Irrland	5.91473	1.680452	3.52	0.000	2.621106	10.71518
Willngcomm	-1.161765	8.563654	-0.14	0.892	-17.94622	15.62269

GVspin	-5.355074	4.633989	-1.16	0.248	-14.43753	3.727377
CONSTANT	-0.0015738 0.2901659	0.0003509 13.6085	-4.49 1.34	0.000 0.181	0.0002216 -8.460681	-0.0008861 44.88367
/sigma						
HCIpot	Coef.	**S.E.**	Z	P>lzl	[95% conf.	Interval]
Type	3.8641	15.49763	0.25	0.803	-26.5106	34.239
Age	-0.152604	0.3415348	-0.04	0.964	-0.6846564	0.6541355
Irrland	13.3053	5.678474	2.34	0.019	2.1757	24.43491
Willngcomm	0.5920823	14.6206	0.04	0.968	-17.94622	29.24247
Membrshpsch	9.965101	8.751863	1.14	0.651	15.265	18.2632
GVpot	-5.355074	14.6206	0.04	0.968	-28.06376	21.222
CONSTANT	9.965101 -5.565972	8.751863 24.3092	1.14 0.23	0.255 0.18	-7.188235 -53.21131	27.11844 42.07936
/sigma	12.43083	2.953887	4.21	0.000	6.641313	18.22034

Source: Field Survey (2013)

According to the results, the TR model predicting commercialization from age, willingness to commercialize, irrigated land and gross value of production was statistically significant (chi-square = -31 97, df = 6, p<-0.000). The variables irrigated land, willingness to commercialize, age and gross value of maize are statistically significant. Gross value was significant at 10% with a coeficiency-.0000919, willingness to commercialize significant at 5% with coefficiency of -.9637145, age significant at 5% with coefficiency .1179299, irrigated land significant at 5% with coefficiency of 1.674808. A unit increase in these variables leads to increase commercialization. For this production function better estimates are found with the CI having profound positive effects.

4.12.3.2 Implications of the overall factors on degree of commercialization

4.12.3.2.1 Field crop

- **Irrigated land**

The analysis revealed that a positive significant relationship (p=0.059) between having a plot on irrigation scheme and commercialization

The coefficient of income was significant at 5% level with a positive sign, indicating a positive relationship between having an irrigated plot and commercialization. Entailing that increase in size of the irrigated land of the farm households will lead to an increase in the probability of commercialization among the farmers. These results support the literature which says that size of the irrigated land available for farmers strongly influence the gross production. Martey *et al* (2012) in his research in Ghana, discovered that size of the farming land influences the level of agricultural commercialization. Machethe, Mollel, Ayisi, Mashatola, Anim and Vanasche (2004) agreed there is a positive relationship between the output and the size of the land. Suggestion is that plots are emerged into one big plot that would allow farmers to produce surplus. This can be formed through cooperative, will not only assist in bulk production but also in means of accessing funds from the government. Some of the irrigated plots are not utilized because of insufficient funds, therefore financial support to these farmers could improve their production and maximize their probability of commercializing.

- **Age**

The coefficient of farm size was significant at 5% level with a positive sign. This means as the age increases, the probability of commercialization increases. This implies that with age, the extent of farming experience increases, therefore increasing the probability of commercialization. Agwu (2009) and (Agwu and Ibeabuchi, 2011discovered that experience has been known to lead to perfection in activities. This increases the knowledge of techniques or otherwise involved in any enterprise.

- **Willingness to commercialize**

The coefficient of willingness to commercialize was significantly related to market orientation and commercialization at one percent probability level. This means that farmer's attitude towards commercialization actually improves commercialization. With positive attitude, farmers are motivated to adopt and employ production techniques that will assist in product maximization. Willingness to commercialize possesses the potentials of increased access to information important to production and marketing decisions. However, willingness is significant with negative sign, possible explanation is that commercialization requires extensive agricultural production resources and subsistence producers are characterized as poor resource farmers. This means, desire to commercialize alone cannot assist in transformation of smallholder production. Farmers need to be supported by the required resources and equipped with the necessary skills.

- **Gross value of production**

Gross value of maize for farmers was significant and negative at 10% risk level, thus negatively influencing farmer's orientation towards commercialization. Challenges that smallholder producers are operating under, increases the production costs. Although high GV means high chances of commercialization but high production costs experienced by these farmers, abstract their commercialization. Smallholder producers lack production and management skills as well information. Lack of these factors may have influence on the allocation of resources, thereby increased their production costs. Lack of credits has been noted as one of the major constraints militating against agricultural productivity among farmers, particularly small holder farmers. GV is expected to enhance farmer's gross sales through increased output produced.

The overall significance from maize was - 0.000 meaning that maize has a strong influence on the development of smallholder farmers, thus commercialization. However the p> value (-0.000) was negative indicating that, the probability of farmers orientation towards commercialization in the study areas is reduced. Possible explanation is that, these farmers are producing at subsistence level because of the small sizes of land they are holding. Again maize is the staple food for rural people.

Therefore even when maize production is high, commercialization of maize production is abstracted because of high utilization of maize in these areas.

4.12.3.2.2 Vegetables

From the 3 vegetables namely, cabbage, spinach and potatoes selected for analysis only GVs were significant. GV for cabbage and potatoes were significant with negative signs. As discussed above, this indicates that GV negatively influence commercialization. GV for spinach was significant at 1% with a positive coefficient (5.91473), indicating an efficient utilization of resources.
Irrigated land showed a positive relation with commercialization for spinach and potato. Spinach was highly significant at 1% and potato at 5%. However spinach had a negative coefficiency. As the number of land increases the commercialization decreases. Explanation could be that, spinach does not necessarily require big land size as the spinach continues to grow for a period of time. Whereas size of irrigated positively influences commercialization.

The overall results from vegetables indicate that only spinach has positive relation with commercialization, this is shown by a significance of the spinach at 1%. Whereas the overall results from cabbage and potato shows that these vegetables have less influence to commercialization of smallholder producers. One generalization that could be made is that vegetables are less sensitive to commercialization than maize. This is because maize is the main crop produced. All most all the producers are producing maize, because is the staple food.

4.12.4 Chapter summary

This chapter presented the descriptive and inferential analyses carried out to assess the effect of smallholder irrigation on commercialization and the degree of smallholder's commercialization. These results are summarized separately as follows:

Both descriptive and empirical analysis (binary regression), shows that irrigation participation highly influences the commercialization of smallholder farmers, because the sample was selected randomly and all the households visited were involved in

agricultural practices. Farmers participating in irrigation are showing a high gross value of production than non irrigation participants.

Looking at TR, this model depicted high positive effects of commercialization of subsistence of production of food crops. However, this does not guarantee that farmers being food secured or going out of poverty if other factors such as production techniques, resource availability and utilization also from an integral part of commercialization process.

CHAPTER FIVE

5.1 SUMMARY OF FINDINGS, POLICY RECOMMENDATIONS AND CONCLUSION

5.1 Introduction

It is apparent that irrigation participation is one of the important rural development interventions for poverty alleviation. There is strong evidence that extent of supply of water determines whether and how fast households shift between traditional self-sufficiency goals and profit/income-oriented production (Chirwa & Matita, 2011). The potential of irrigated agriculture in enhancing food security and alleviating poverty has led the South African Government to prioritise irrigation development rehabilitation and revitalization (Denison and Manona, 2007; Van Averbeke et al., 2011).The main objective of the study was to determine factors influencing farmer's decision to participate in irrigation. The study focused on factors that compel smallholder farmers into making decision about irrigation. In other words, it considered factors that guide farmers in deciding whether to participate in irrigation or not. It further looks at the extent of irrigation participation of smallholder farmers towards commercialization. The alternative hypothesis for the study was accepted, predictor variables have influence over the dependent variable.The empirical results of this study agree with literature that identifies that smallholder commercialization is possible provided that smallholder's farmers have access to all the required aspects when commercializing subsistence farming. In the light of factors affecting decision making in irrigation participation the study provides suggestions on improving smallholder irrigation participation.

5.2 Summary

This section summarizes all the chapters included in the study, which include the literature review, the methodology and the results of the paper

5.2.1 Literature Review

Agriculture plays a significant role in improving wellbeing and the economy of rural people. Specifically, commercialization is a significant approach for improving income of households. Irrigation plays a central and dynamic role in the improvement of rural livelihood. However it is argued that development of smallholder irrigation producers is restricted. Factors that contributed their modest performance were poor infrastructure, limited knowledge of crop production among smallholders, limited farmer participation in the management of water, ineffective extension and mechanisation services and lack of reliable markets and effective credit services (Bembridge, 2000; Crosby *et al*., 2000).Another factor that constrained the economic impact of smallholder irrigation was the predominance of subsistence-oriented farming.

South Africa has about 1.3 million ha under irrigation, of which 0.1 million ha is in the hands of smallholders (Backeberg 2006a). Most of the land is not under irrigation, however recent results indicate the increasing number of land under irrigation. This is because of the potential role of irrigation in transforming smallholder production into a commercial farming. Recent studies shows that the development of smallholder producers is restricted (Bembridge, 2000 and Crosby et al.,2000). Irrigation participation is a pathway to the improvement of smallholder production both qualitatively and quantitatively. Smallholder farmers with improved production techniques such as irrigation are standing chances of producing surplus which can be sold, thus commercialization. It is increasingly recognized that the commercialization of output from small-scale farming is closely linked to higher productivity, greater specialization, and higher income. In smallholder production, the farmer's objective is food self-sufficiency**.**

According to many researchers, the major constraint to smallholder commercialization is the marketing systems that smallholders employ for their products to reach the market. Market access is the main determining factor of commercialization. Smallholder farmers normally produce without having an assurance of market to supply and that result to their surplus not reaching the market. Market access is often difficult due to the remoteness, poor infrastructure and small number of active farmers. Those that have identified the market their

marketing strategies are affected by a number of factors such as high production risk and lack of economies of scale, high marketing risk, high transaction costs, low bargaining power and lack of human and social capital. Markets where smallholders participate are weak, thin and interconnecting. Langat *et al*, (2011) explained that in the Eastern Cape Province it is often difficult for smallholder farmers to partake in market due to a number of obstacles that reduce the motivation for partake. These may be reflected on the hidden costs that make access to markets and productive assets difficult. The major challenge to commercialization is how smallholders can step and participate in markets (FAD 2011). This alternative hypothesis of the study is addressing that question.

5.3 Research Methodology and results presentation

5.3.1. Introduction

The study was carried out in Intsiki Yethu local municipality and Port St John's local municipalities that are situated in the Eastern Cape Province of South Africa. Non – probabilistic sampling methods was employed, since there was a deliberate intention of obtaining respondents that were part of irrigation scheme and those that depends on rainfall. A total of 80 households were sampled and interviewed. The random sampling consisted of 40 respondents from Mgxabakazi and Dinizulu villages and 40 respondents from Ncorha flats and Tshatshu. Purposive sampling method was considered as the best procedure due to the knowledge of a population and the purpose of the study. A questionnaire was designed as the primary tool for data collection and the process of collecting data involved face-to-face interviews with the household head.

To analyze data, descriptive statistics were used together with the inferential that involved the analysis of two models binary regression model and truncated analysis. The main descriptive indicators that were employed were percentages. To analyse Binary regression, participation in irrigation was used as dependent variable and the education level, age, membership in the scheme, ability to sustain and market access were used as independent variables. Binary regression model was chosen because the study is looking at farmers are faced with two choices which are to participate in irrigation or not to participate in irrigation. This model was specifically

selected to examine the determinants of irrigation participation among smallholder farmers.

TR was selected to evaluate the extent of irrigation participation of smallholder farmers towards commercialization in the study areas. HCI was chosen as the dependent variable for TR model and the ID variables that were chosen for this model included, age, membership in the scheme, willingness to commercialization and the irrigated land.

Descriptive results

The descriptive results provided information related to demographic, socio-economicfactors affecting irrigation participation. The results show that the majority of the sampled households contained more males than females. With 76% of males under irrigation while it 57% under non irrigators. The educational levels of all the farmers areaverage, where 58% percent of non irrigatorsattended primary school and 22.5 % with secondary education and 50% of irrigators attended high school and 35% with primary education.The studies indicate that the possibility to adopt and apply new methods of farming increased along with education level. Education level has positive correlation with irrigation participation, the high the level of education there more the good chances of adopting new technology such as irrigation (Haji, 2013).

In membership the results show that 85% of irrigating famers engaged in irrigation scheme, while 15% of the farmers belong to other farmer associations. Being a member of the scheme is an advantage to the farmers. Members belonging to the association do not only benefit from irrigation scheme but also receive support in the form of cash, subsidies and developmental programs such as workshops. In terms of the ability to maintain the business, the results indicate that all of the irrigating farmers can sustain their business with 57.5% who can strongly maintain the business and 42.5% who can partially sustain the business. On the other hand 60% of non irrigating farmers can partially maintain their business and 25% who can strongly maintain the business, its only 5% who is unable to sustain the business. The training and experience play a major role in helping these farmers to cope with their production.

5.3.2 Empirical results

The effects of irrigation participation were determined using BRM. As mentioned in the previous chapters, production of irrigators differs from that of non irrigating farmers. Irrigators are market orientated because of their improved production, which increases their chances of commercialization.The results of the BR model revealed that the irrigation participation decision of the sampled smallholder is influenced by some socio economic factors. The statistically significant variables are market access, membership in the scheme and the ability to sustain the business. The explanations for the relationship between the significant variables and irrigation participation can be Summarized as follows:

- ✓ Membership in the scheme is significant at 1%,this suggest that involvement in irrigation scheme has a strong influence in determining whether the farmers should participate in irrigation. Farmers in irrigation scheme are likely to improve their production both quantitatively and qualitatively, increase their access to profitable and thus commercialise their production. Membership in irrigation scheme not only improve smallholders production quantity and quality but also increases chances of receiving support in the form of cash, subsidies and developmental programs such as workshops
- ✓ Market access significant at 5%. Access to market has an impact in irrigation participation because this will improve the production in order to gain access to the market. The findings from the model also indicate that market access has influence on whether to participate in irrigation or not. With access to market, farmers are motivated to participate in irrigation as their output stand a chance of reaching profitable markets.
- ✓ Ability to sustain business significant at 10% risk level. Ability to sustain the business has influence in commercializing. When the farmers are able to sustain their production, it means that they are able to manage their production costs. Farmer's ability to sustain the business is also influenced by the level of experience and trained received by the farmer.

From the discussion in the previous chapters, it is quite evident that irrigation participation has positive impact on the improvement of smallholder productionThere seems to be an opportunity to improve commercialization of smallholder production through irrigation participation, if each one of the significant variables can be adjusted. This requires consideration of certain policy options and such are discussed in the following section. It is also important for the farmers to identify the areas where they can have a direct impact and make efforts to address them.

5.3.3Truncated Regression model

Household Commercialization Index was used as an indicator to measure the extent of smallholder commercialization. Maize, cabbage, spinach and potato were analysed to measure the proportion of output of each crop in order to determine if the farmer is commercializing or not. A distinction was made between field (maize) and vegetables crops (cabbage, spinach and potato), refer to table 5.1.
The results of the TR model revealed that the. The statistically significant variables are irrigated land, willingness to commercialize, age and gross value of maize has influence on the degree of commercialization. The explanations for the relationship between the significant variables and level of commercialization can summarized as follows:

- ✓ Willingness to commercialize significant at 5%. Willingness to commercialize was significantly related to commercialization at one percent probability level.This means that farmer's attitude towards commercialization actually improves commercialization. With positive attitude, farmers are motivated to adopt and employ production techniques that will assist in product maximization. Willingness to commercialize possesses the potentials of increased access to information important to production and marketing decisions
- ✓ irrigated land significant at (p=0.059). This positive relationship between having a plot on irrigation scheme and commercialization. Irrigated land available for farmers strongly influences the gross production. Size of the farming land influences the level of agricultural commercialization.
- ✓ Agewas significant at 5% level with a positive sign. This means as the age increases, the probability of commercialization increases. This implies that with age, the extent

of farming experience increases, therefore increasing the probability of commercialization.

- ✓ Gross value was significant at 10%.This means that gross value of maize negatively influencing farmer's orientation towards commercialization. Challenges that smallholder producers are operating under, increases the production costs. Although high GV means high chances of commercialization but high production costs experienced by these farmers, abstract their commercialization
- ✓ A unit increase in these variables leads to increase commercialization. For this production function better estimates are found with the CI having *profound positive effects.*

Smallholder production development has received greater attention. Strategies to better smallholder production include improving access to production resources, access in markets, reducing production costs and encouraging cooperatives. Now recently the focus has shifted to introduction of irrigation schemes as production technique. It has been revealed that access and participation in irrigation improves smallholder production both qualitatively and quantitatively. Participation in small-scale irrigation schemes has been found to provide one means by which these farmers can overcome some of the production constraints and expand production beyond subsistence needs. Among factors influencing high yield thus commercialization of smallholder production, lack of information, lack of access to market and poor access to support services. These factors are challenges in the improvement of smallholder production and because of them, smallholder producers are finding difficulties in commercializing their production.

From the discussion, it is evident that demographic patterns of irrigators and non irrigators are different although the farmers are occupying the almost the same geographic area. In that note, smallholder irrigators have a better wellbeing than non irrigators. The analysis of the Household Commercialization Index indicated that, even though subsistence farming is prevalent for both groups, it was more pronounced among non-irrigators.

The majority of the non irrigators in the study were classified as less privileged compared to irrigators. The literature review and descriptive analysis show that the priority of non-irrigators was household consumption, this is evidence by 52.5%

compared to 35% of sales. Even though smallholder irrigation schemes are failing to deliver at the expected level when operational, they play an important role in the improvement of smallholder production. Therefore, government investment in smallholder irrigation with an effort to transform smallholder production to commercial production should persist. Collapse of irrigation scheme should not be interpreted as failure of smallholder irrigation, but an indication of the need for a cohesive package of complimentary rural development strategies where smallholder irrigation plays a part. Smallholder irrigation is positively correlated with commercialization as indicated by the descriptive analysis and from the truncated regression model, and thus should continue to be prioritized in the poverty-stricken rural areas of South Africa. There is also a need to ensure water security among irrigators for better welfare outcomes.

5.4 Policy recommendations

Looking upon the smallholder factors from the presentation of the results, there are few policy recommendations that can be suggested. This section gives discussion and conclusions on series of options that can be considered in Eastern Cape with an attempt to improve the potential of irrigation in transforming smallholder farmers into fully commercialized farmers**.** Looking at the descriptive and empirical results, the following recommendations can made:

Government and other relevant stakeholders ought to continue sustaining smallholder irrigation by the government as it plays an important role in the improvement of rural livelihoods. Considering the importance of agricultural commercialization in agricultural and rural development policy and its potentially strong and favourable impacts on agricultural productivity, rural poverty reduction, and food and nutrition security, it is important to understand the factors affecting the extent of commercialization. A cohesive approach should be adopted in addressing poverty in the rural areas. Smallholder farmers need full access to irrigation as water availability determines the quality and quantity of product produced. Nonethelessaccess to irrigation alone is not enough to significantly reduce poverty as poverty prevalence is still high even among the irrigators. Other socio-economic factors such asimproved market access, development of market infrastructure and employment of adequate resources can be improved by providing jump-starting to

first bring the situation into normality so that the farm can operate effectively. The farmers need to committee themselves and get assistance in the improvement of their capacity to initiate actions to improve their own actions.

These factors will not only improve smallholder production but also creates an enabling and conducive environment, for private sector involvement in developing and expanding agricultural, marketing infrastructure, including storage, processing, telecommunications, marketing centers, and roads, promoting community participation in the development, implementation, operation, and maintenance of agricultural marketing infrastructure.

Water source among the irrigators should be prioritized by policy makers. Non irrigators should be encouraged to adopt the use of irrigation scheme , as there was less poverty among the irrigation participant farmers compared to the non irrigators farmers. Specifically, it is recommended that schemes where there is secured water source be introduced for non irrigators of the Eastern Cape and South Africa at large. Agricultural training, particularly in use and maintenance of the irrigation schemes, should be offered and emphasized to irrigators. Irrigation is not only a matter of water supply but also a function of the efficient use of the scheme. Farmer empowerment and participation should continue to be promoted. The blocks where farmer participation was high were found to be more water secure than those with little farmer participation. Specifically, it is recommended that farmer associations be promoted in the scheme. The formation and running of these associations should be farmer-led and farmer driven, with outsiders only involved at coordination level and offering technical support as it is needed. It is important to identify the ideal social, economic and institutional development pathways that could best benefit smallholder farmers. In coming up with different ways of developing smallholders farmers into commercial farmers, it has to be accepted that smallholder farmers

REFRENCES

AIHOON, K.J., ONUMAH, G. D., AND MUKWENE M., 2009. Empowering Smallholder Farmers in Markets. Country Background Paper-South Africa.

ALIBER, M., 2005.Overcoming Underdevelopment in South Africa's Second Economy. Synthesis Report 2005.

ALIBER M.,2003. Chronic poverty in South Africa: incidence, causes and policies. *WorldDevelopment* 31 (3) 473-490.

ALTMAN, M., HART, T. AND JACOBS, P., 2009. Household food security status in South Africa. Agrekon 48(4):345-361.

ADELZADEH, A., ALVILLAR, C., AND MATHER, C., 1998. Poverty elimination, employment creation and sustainable livelihoods in South Africa. NIEP Research Articles no. 12

.

ANNOTATED STATA OUTPUT, 2004., Truncated Regression. Available online at:

http://www.ats.ucla.edu/stat/stata/output/Stata_Truncated.htm

ARCUS,G., 2004. Principles, approaches and guidelines for the participatory revitalisation of smallholder irrigation schemes. Year 1 Progress Report, WRC Project No. K5//1463/4. Arcus Gibb, Berea, East London. 26pp.

Ali I, Pernia AND E.M., 2003. Infrastructure and povertyReduction –What is the connection?. *ERD PolicyBrief Series, Brief 13.* Manila: ADB.

ASAYEHEGN,K , YIRGA, CAND RAJAN, S., 2013. effect of small-scale irrigation on the income of ruralfarm households: the case of laelay maichew district,central tigray, ethiopia. Journal of Stored Products and Postharvest Research Vol. 2(10), pp. 208 – 215, 16 September, 2011Available online http://www.academicjournals.org/JSPPRISSI 2141 - 6567 ©2011 Academic Journals.

AVERBEKE, W., DENISON, J. AND MNKENI, P.N.S 2011. Smallholder irrigation schemes in South Africa: A review of knowledge generated by the Water Research Commission

AVERBEKE,W.V., 2012. Performance of Smallholder Irrigation Schemes in the Vhembe District of South Africa, Problems, Perspectives and Challenges of Agricultural Water Management, Dr. Manish Kumar (Ed.), ISBN: 978-953-51-0117-8, InTech, Available from: http://www.intechopen.com/books/problems-perspectivesand- challenges-of-agricultural-water-management/performance-of-smallholder-irrigation-schemes-in-thevhembe- district-of-South-Africa

AGWU N.M, ANYANWA, C.I, AND MEINDIE, E. I., 2013. Socio-Economic Determinants of Commercialization among Smallholder farmers in ABIA State, Nigeria. Invited paper presented at the 4th International Conference of the African Association of Agricultural Economists, September 22-25, 2013, Hammamet, Tunisia

BACKEBERG GR 2003 Water usage and irrigation policy. In: Nieuwoudt L and Groenewald J (eds.) The Challenge of Change:Agriculture, Land and the South African Economy. University of Natal Press, Scottsville, South Africa. 149-170.

BACKEBERG G.R., BEMBRIDGE TJ, BENNIE ATP, GROENEWALD J.A, HAMMES P. S., PULLEN R. A. AND THOMPSON H.,1996. Policy Proposal for Irrigated Agriculture in South Africa. WRC Report No. KV96/96. Water Research Commission, Pretoria, South Africa. 119 pp.

BACKEBERG G.R., 2006a. Reform of user charges, market pricing and management of water:problem or opportunity for irrigated agriculture? *Irrigation and Drainage***55**(1) 1-12.

BACKEBERG G.R., BEMBRIDGE, T.J., BENNIE, A.T.P., GROENEWALD J.A., HAMMES, P.S., PULLEN, R.A. AND THOMPSON H., 1996. Policy Proposal for Irrigated Agriculture in South Africa.WRC Report No.KV96/96.Water Research Commission, Pretoria, South Africa.119 pp.

BACHA, D., NAMARA, R., BOGALE, A. AND TESFAYE, A., 2011. Impact of small-scale irrigation on household poverty: Empirical evidence from the Ambo District in Ethiopia. Irrigation and Drainage 60:1-10.

BALOYI, J.K., 2010. An Analysis of Constraints facing Smallholder Farmer in Agribusiness value chain: A Case Study of Farmers in Limpompo Province. University of Pretoria.

BEMBRIDGE, T.J., 2000. Guidelines for Rehabilitation of Small-Scale Farmer Irrigation Schemes in South Africa, WRC Report No 891/1/00, Water Research Commission, ISBN 1-
86845-683-8, Gezina, South Africa

BERNARD,T., ELENI G. AND ALEMAYEHU, S.T., 2007.Smallholder's Commercializationthrough Cooperatives: A Diagnostic for Ethiopia. IFPRI Discussion Paper No. 00722, Oct.2007. Available on: www.ifpri.org/PUBS/dp/ifpridp00722.pdf, [Accessed on 26 June 2013]

BEMBRIDGE, T., 2000. Guidelines for rehabilitation of small-scale farmer irrigation schemes in South Africa. WRC Report 891/1/00. Pretoria, South Africa: Water Research Commission.

BIENABE E., CORONEL, C., LE COQ, J.F. AND LIAGRE, L., 2004. Linking Smallholder Farmers to Markets: Lessons learned from the literature review and analytical reviews of selected project: Final Report.

BLATT, H., AND TRACY,J., 1996.*Petrology: Igneous, Sedimentary and Metamorphic*, 2nd ed., Freeman, pp. 281–292 ISBN 0-7167-2438-3.

BROWN,L.R.,2000. In search of a systems model for the decision making behaviour of first-generation Black commercial farmers in the Border Kei region of the Eastern Cape Province. University of Fort Hare;Alice.

BURGER, S., 2011. Not either/ or between small and large farming, both needed. Available at http://www.engineeringnews.co.za/article/not-eitheror-between-small-and-large-farming-both-needed-2011-08-05 [Accessed on 25 June 2013]

CASTILLO, J.J.,2009. Probability Sampling and Randomization. Retrieved 26 Jan. 2012 from Experiment Resources: Available at: http://www.experiment-resources.com/probability-sampling.html [Accessed on January 2013]

CHAMBERS R., CONWAY G.*21st*.1992.*Sustainable rural livelihoods: practical Conceptsfor the century*. IDS Discussion Paper 296. Institute of Development Studies,Universityof Sussex, Brighton. 28pp.

COX, D.R., SNELL, E.J. 1981Applied Statistics: Principles and Examples, Chapman and Hall

CROSBY, C.T., De LANGE, M., STIMIE, C.M., & VAN DER STOEP, I. (2000). A Review of Planning and Design Procedures Applicable to Small-Scale Farmer Irrigation Projects, WRC Report No578/2/00, Water Research Commission, ISBN 1-86845-688-9, Gezina, South Africa

DE CRANE, S., 2010. Aid-For- Trade: Case Story. Trade for Development Centre-Producer Support Programme. Region: Africa, Latin America, Middle East, Asia.

DENISON, J. AND MANONA, S.,2007b. Principles, approaches and guidelines for the participatory revitalization of smallholder irrigation scheme. Volume 2: Concepts and cases. WRC Report TT 308/07. Pretoria, South Africa: Water Research Commission.

DE LANGE M., 1994.*Small scale irrigation in South Africa*. WRC Report 578/1/94. Pretoria: Water Research Commission. 29pp.

DERCON, S., 2001. Assessing vulnerability. Jesus College and CSAE. Department of Economics, Oxford University.

DU PLESSIS FJ, VAN AVERBEKE W AND VAN DER STOEP I., 2002. Micro-Irrigation for Smallholders: Guidelines for Funders, Planners, Designers and Support Staff in South Africa. WRC Report No. TT 164/01. Water Research Commission, Pretoria, South Africa. 67 pp.

ECONOMIC DEVELOPMENT DEPARTMENT, 2010. The New Growth Path: The Framework. Available from http://www.info.gov.za/view/DownloadFileAction?id=135748 [Accessed on 25 June 2013]

FAD CAAP, 2011. Pathways to commercialization supporting small farmers: Future Agricultures. Available at:

https://docs.google.com/viewer?a=v&q=cache:MiKAHsyqY04J:www.future agricultures.org.....[Accessed on 17 October 2013]

FAN S, Hazell P, Throat S 1999. *Linkages BetweenGovernment Spending, Growth and Poverty in RuralIndia.* Washington D.C.: International Food PolicyResearch Institute.

FRASER, G., 2009. Obstacles to Agricultural Development in communal areas of the Eastern Cape. Report for the Eastern Cape Provincial Growth and Development Plan.

GABRE-MADHIN, E.Z., 2009. A Market for all Farmers: Market Institutions and Smallholder Participation.

GEBREGZIABHER, G., NAMARA, R.E. AND HOLDEN, S., 2009. Poverty reduction with irrigation investment: An empirical case study from Tigray, Ethiopia. Agricultural Water Management 96:1837-1843.

GILIMANI, M., 2005.The economic contribution of home production for home consumption in South Africa.MsC in Agricultural Economics, University of Stellenbosch

GOITOM, A., 2009. Commercialization of Smallholder Farming: Determinants and Welfare Outcomes. A Cross-sectional study in Enderta District, Tigrai, Ethiopia

GOVEREH, J., JAYNE, T.S AND NYORO, J. 1999. Smallholder Commercialization, Interlinked Markets and Food Crop Productivity: Cross Country Evidence in Eastern and Southern Africa, the Department of Agricultural Economics and the Department of Economics,Michigan State University, June 1999. Available on:www.aec.msu.edu/fs2/ag_transformation/atw_govereh.PDF, [Accessed on 26 June 2013]

HAJI, J., 2013. Impact analysis of Mede Telila Small Scale Irrigation scheme on house poverty Alleviation: Case of Gorogutu District in Eastern Haratghe Oromia National Regional State Ethiopia. International Journal of Development and Economic Sustainability. Vol.1, No. 1, March 2013, pp.15-30

EVDSA 1996, National Irrigation Policy (draft). Addis Ababa, Ethiopia.

ENKI, M., BELAY, K. & DADI, L., 2001. Determinants of Adoption of Physical Soil Conservation Measures in Central Highlands of Ethiopia: The Case of Three Districts of Shewa. Agrekon, Vol 40(3): 293-315.

FOOD AGRICULTURAL ORGANIZATION 2000. A Perspective on Water Control in SouthernAfrica: Support to Regional Investment Initiatives,Land and Water *Paper No 1*. Rome: FAO.Food and Agricultural Organization, 2003, Rising water productivity, FAO Spotlight.: http:// www.fao.org /AG/magazine/0303sp2.htm.

FAN S, ZHANG L, ZHANG X 2000. Growth and Poverty in Rural China: The role of public investment. *ResearchReport No.125*. Washington, DC: International Food Policy Research Institute

FAN S., HAZELL P., THROAT, S.,1999. *Linkages BetweenGovernment Spending, Growth and Poverty in RuralIndia.* Washington D.C.: International Food PolicyResearch Institute.

.

HUSSAIN I. AND HANJRA M., 2004. Irrigation poverty alleviation: review of theempirical evidence. International Water Management Institute,Colombo, Sri Lanka

HUSSAIN, I. AND WIJERATHNA, D., 2004. Irrigation and income-poverty alleviation: A Comparative analysis of irrigation systems in developing Asia. Colombo, Sri Lanka: International Water Management Institute.

INTERNATIONAL FOOD POLICY RESEARCH INSTITUTE(IFPR), 2012. The Centrality of Land, Water, and Energy for Smallholders. Available online at:

http://www.ifpri.org/ghi/2012/centrality-land-water-energy-smallholders?print[Accessed on 29 June 2013]

JARI, B., 2009. Institutional and Technical factors influencing agricultural marketing channel choices amongst Smallholder and emerging farmers in the Kat River Valley. McS in Agriculture (Agricultural Economics), University of Fort Hare.

SALAMI A, KAMARA A.B., AND BRIXIOVA Z 2010. Smallholder Agriculture in East Africa: Trends, Constraints and Opportunities, Working Papers Series N° 105 African Development Bank, Tunis, Tunisia.

SENYOLO, G.M.,2007. Factors low turnover emerging farmers from high turnover emerging farmers in South Africa.University of Limpompo

SHAH T. AND SINGH O. P., 2004. Irrigation Development andRural Poverty in Gujarat, India: A DisaggregatedAnalysis. *Journal of Water International,* 29(2): 167-177.

SISTO L., 2004.FAO' s experience in socio-economic and gender analysis in farmers' water man agement. In : Hamdy A. (ed.), Sagardoy J.A. (ed.), Q u agliariello R. (ed.), Trisorio-Liu zzi G. (ed.).*Integration of Gender Dimension in water management in the Mediterranean region : INGEDI Project.* Bari: CIHEAM. p. 41 -45

SMITH, L.E.D. 2004. Assessment of the contribution of irrigation to poverty reduction andsustainable livelihoods. International Journal of Water Resource Development20(2):243-257.

INOCENCIO,A., KIKUCHI, M., TONOSAKI, M., MARUYAMA, A., MERREY, D., SALLY, H., AND DE JONG, I., 2007. Cost and Performance of Irrigation Projects: A Comparison of Sub-Sharan Africa and other Developing Regions. IWMI Research Report 109, International WaterManagement Institute, ISBN 978-92-9090-658-2, Colombo, Sri Lanka.

INTSIKA YETHU MUNICIPALITY, 2008, Report on housing sector plan 2008 to 2012, Prepared By: Tshani Consulting; Wanklin & Naidoo Development Specialists.

IFAD STRATEGIC FRAMEWORK, 2011. Enabling the rural poor to overcome their poverty: IFAD Rural poverty report.

JALETA, M., GREBREMEDHINI, J.B., AND HOESTA, D., 2009. Smallholder commercialization: Processes, determinants and impact. Discussion Paper No. 18. International Livestock Research Institute.

JAYNE, T.S, HAGGBLADE,S., MINOT, N., AND RASHID,S. 2011. Agricultural Commercialization, Rural Transformation and Poverty Reduction: What have We Learned about How to Achieve This?. African Agricultural Markets Programme Policy Symposium,Alliance for Commodity Trade in Eastern and Southern Africa, Kigali, Rwanda

KANDIJI S.T., VERCHO, L. AND MACKENSEN J., 2006. Climate change and Vulnerabiliy in the Southern AFRICA:Impact and adaptations strategies in the agricultural sector. Word Agroforestry (ICRAF). United Nations Environment Programme (UNEP).

KANGANZI E., FERRIS, S., BARHAM, J., ABENAKYO, A., SANGINYA, P. AND NJUKI, J., 2008. Sustainable Linkage to high value Market through Collective Action in Uganda. The Case of Nyabyumbei Potato Farmers.

KAWA, I.H. AND KAITIRA, L.M., 2007. Enhancing Smallholder's Market Competitiveness in Tanzania. Food Policy for Developing Countries: The Role of Government in the Global Food Sysytem. Case Study H (6-7).

KIRSTEN, J. F. & VAN ZYL, J. 1998.Defining small-scale farmers in the South African context.Agrekon, 37(4): 560-571.

KUMAR, M.D. 2003. Food security and sustainable agriculture in India: The water management challenge. IWMI Working paper 60. Colombo, Sri Lanka: International Water Management Institute.

KODUA-AGYEKUM C., 2009, —The transfer of technology to the rural poor: The case of Qamata Irrigation Scheme in the Eastern Cape Province of South Africa□. Phd Thesis, Faculty of Humanities, Development and Social Sciences, University of Kwazulu-Natal, South Africa.

KWARU, V.V. AND GOGELA, P.S., 2002. Report of National Strategy on Education and Training in Agriculture and Rural Development in Eastern Cape. Available at:http://www.nda.agric.za/doaDev/sideMenu/EducationAndTraining/Eastern/%Cape.pdf (Accessed on the 10 October 2011)

LANGAT, B.K,NGENO, V.K., SULO, T.K., NYANGWESO, P.M., KORIR, M.K, KIPSAT, M.J. AND KEBENEI, J.S., 2011. Household Food Security in a commercialized subsistence economy: A Case Study of small tea in Nandi South District, Kenya. Department of Agricultural Economics and Resource Management, Moi University.

KEBENEI, J.S., 2011. Household Food Security in a commercialized subsistence economy: A Case Study of small tea in Nandi South District, Kenya. Department of Agricultural Economics and Resource Management, Moi University.

NKHORI, P.A., 2005. The impact of transaction costs on the choice of cattle markets in Mahalapye district, Botswana. MSc dissertation, University of Pretoria, South Africa

LAHIFF E., Cousins, B., 2005. Smallholder Agriculture and Land – Reform in South Africa.

LIPTON, M., 1996. Rural Reforms and Rural Livelihoods: The Context of InternationalExperience, In: Land, Labour and Livelihoods in Rural South Africa, Volume One: Western Cape, M. Lipton, M. De Klerk & M. Lipton, (Ed.), 1-48, Indicator Press, ISBN1-86840-234-7, Dalbridge, Durban, South Africa

LIPTON M, LITCHFIELD J, FIGURES JM 2003. The effects ofirrigation on poverty: A framework for analysis. *WaterPolicy Journal,* 5(5-6): 413-427.

MACHETHE, C.L., MOLLEL, N.M., AYISI, K., MASHATOLA, M.B., ANIM, F.D.K., &VANASCHE, F. 2004.Smallholder Irrigation and Agricultural Development in the Olifants River Basin ofLimpopo Province: Management Transfer, Productivity, Profitability and Food SecurityIssues, WRC Report No: 1050/1/04, Water Research Commission, ISBN 1-77005-242-9, Gezina, South Africa

MACHINGURA C., 2007. Methodology.Availableat:

http://docs.google.com/viewer?a=v&qcache:PJ3mGE5aruAJ:ufh.netd.ac.za/jspui.bitstream/10353/77/4/CHAPTER%25203.PDF=Eastern cape + province + ha.[Accessed on 25 June 2013]

MACHETHE, C.L., MOLLEL, N.M., AYISI, K., MASHATOLA, M.B., ANIM, F.D.K., & VANASCHE, F. 2004.*Smallholder Irrigation and Agricultural Development in the Olifants River Basin ofLimpopo Province: Management Transfer, Productivity, Profitability and Food SecurityIssues,* WRC Report No: 1050/1/04, Water Research Commission, ISBN 1-77005-242-9, Gezina, South Africa

MAHELET, G.F. 2007.Factors Affecting Commercialization of Smallholder Farmers inEthiopia: The case of North Omo Zone, SNNP region. Paper presented at the FifthInternational Conference on the Ethiopian Economy, Addis Ababa, June 7-9, 2007. Availableon: www.eeaecon.org/6th

MARTEY, E, R. M.,HASSAN, A.I,AND. KUWORNU,J. K. M.,2012. Commercialization of Smallholder Agriculture in Ghana: A Tobit regression analysis. African Journal of Agricultural Research Vol. 7(14), pp. 2131-2141, 12 April, 2012 Available online at http://www.academicjournals.org/AJAR DOI: 10.5897/AJAR11.1743

MATSHE, I., 2009. Boosting smallholder production for food security: Some approachesand evidence from studies in sub-Saharan Africa. Agrekon 48(4):483 511.%20Int'l%20Papers%20.htm, [Accessed on 27 June 2013].

MAY J., 2000. The structure and composition of rural poverty and livelihoods in SouthAfrica. In: Cousins B (ed.) *At the crossroads: Land and agrarian reform in South Africa intothe 21st century*. PLAAS, University of the Western Cape, Belville. 21-34.

MAKHURU M. AND MOKOENA 2003. Market Access for Smallholder Farmers in Agriculture in Niewoudt and GroenewaldcJ eds.

MNKENI PNS, C. CHIDUZA, A.T. MODI, J.B STEVENS, N. MONDE, I. VAN DER STOEP AND R.W DLADLA., 2010, *Best Management Practices for Smallholder Farming on Two Irrigation Schemes in the Eastern Cape and KwaZulu-Natal through Participatory Adaptive Research*, WRC Report No. TT 478/10. Water Research Commission, Pretoria, South Africa. 359 pp.

MOUSTIER, P., 1998. Offre vivriere et Organization des Exchange: Problematique General in inter Reseaux. Constraints et Concentationentre acteurs des Filieres vivneres Recontres de Mbalmayo, Cameroun.

MUSEMWA L., MUSHUNJE A, CHIMONYO M., FRASER G., MAPIYE C. AND MUCHENJE V., 2008. Nguni cattle marketing constraints and opportunities in the communal areas of South Africa: Review.

MURIITH, B.W., MBURU, J., NGIDI, N., 2010. Constraints and determinants of compliance with Eurogap standards: A case of Smallholder French Bean Exporters in Kinnyaga, Kenya.Agribusiness, 27, p 1-13..27:1-12.

NAMARA, R.E., HANJRA, M.A., CASTILLO, G.E., RAVNBORG, H.M., SMITH, L. AND VAN KOPPEN,B. 2010. Agricultural water management and poverty linkages. Agricultural Water Management 97:520-527.

NARAYANAMOORTHY, A., 2001. Does groundwater irrigation reduce rural poverty? Evidence from Indian states. *Irrigation and Drainage,* 56: 349–362.111

NGOMEZULU, S., 2010. Formal Marketing of Cattle by Communal Farmers in Eastern Cape Province of SouthAfrica. Animal Production Group.

NYAMATULE, R. AND AYESSAKI, B., 2009. Proceedings of the Regional Workshop on Agricultural Financing Across Commodity Specific Chains. Summary Held at Fairway Hotel-Kampala/Uganda.

OMIT, J., MCCULLOUGH, OTIENO, D., MADON, M., NYANAMBA, T. AND MURAGE, A., 2006. Participatory Priori9tization of issue in Smallholder Agriculture Commercailization in Kenya. Kenya Institute for Publi8c Policy Research and Analysis. KIPPRA Discussioon Paper No.64 December 2006

TAPSON D.R.,1990. Rural Development and the Homelands,*Development Southern Africa*, 7: 561-581

PERRET, S. 2002. Water policies and smallholding irrigation schemes in South Africa: A history and new institutional challenges. Water Policy 4(3):283-300.

PINGALI, P., KHWAJA, Y. & MEIJER, M., 2005. Commercializing Small Farms: Reducing Transaction Costs. Agricultural and Development Economics Division, Food and Agriculture Organization (FAO), Italy. 14pp.

PINGALI, P.L. AND ROSEGRANT, M.W., 1995. Agricultural Commerciallzation and Divedrsification: Proccess and policies. Food Policy, 20(3), p. 171-185

POUTON, C., JONATHAN, K. AND DORWARD, A., 2006. Overcoming Market Constraints on Pro-Poor Agricultural Growth in Sub-Saharan Africa

PUNDO, M.O., 2005. The Difference between Smallholder Farmers and Commercial farmers

RANDELA R., ALEMU , Z.G., GROENEWALD, J.A., 2008. Factors enhancing market participation by small-scale cotton. Agrekon, Vol.47, No4, (December 2008),pp.43

SALAMI, A., KAMARA, A.B., AND BRIXIOVA, Z., 2010. Smallholder Agriculture in East Africa: Trends , Constraints and Opportunities. African Development Bank group.

SEID, Y.L., 2002**.** Small-Scale Irrigationand Household Food Security: A Case Study of Three Irrigation Schemes in GubalaftoWoreda of North Wollo Zone, Amhara Region.

SHAH T, SINGH O.P., 2004. Irrigation Development andRural Poverty in Gujarat, India: A DisaggregatedAnalysis. *Journal of Water International,* 29(2): 167-177.

SIBALE, E., 2010. Strategies for Commercialization of Smallholder agriculture. Food and Agricultural organization (FAO),United Nations. Maritz Publication, Malawi.

SINYOLO S., 2013. The Impact of Smallholder irrigation and water security on householde welfare. The Case of Turgela Ferry Irrigation scheme.

SMITH, L.E.D., 2004. Assessment of the contribution of irrigation to poverty reduction and sustainable livelihoods. International Journal of Water Resource Development 20(2):243-257.

STRASBERG P.J, JAYNE, T.S. YAMANO,T. NYORO,J. . KARANJA, D AND STRAUSS, J.,1999. Effects of agricultural commercialization on food crop input use and productivity in Kenya. Michigan State University International Development Working Papers No. 71. Michigan, USA.

TEKANA, S.S. AND OLADELE, O.I. 2011. Impact analysis of Taung irrigation scheme on household welfare among farmers in North-West province, South Africa. Journal of Human Ecology 36(1):69-77.

STROEBEL, A., 2004. Socio-economic complexities of smallholder resource-poor ruminant livestock production systems in sub-Saharan Africa. Unpublished PhD thesis, University of the Free State, Bloemfontein.

TURRAL, H., SVENDSEN, M., & FAURÈS, J.M. 2010. Investing in Irrigation: Reviewing the Pastand Looking to the Future. Agricultural Water Management, Vol. 97, pp. 551-560,ISSN 0378-3774

TSHUMA, M.C. 2012. A review of the poverty and food security issues in South Africa: Is agriculture the solution? African Journal of Agricultural Research 7(28):4010- 4020.

UMHLABA 2010.A Review of Experiences of Establishing Emerging Farmers in South Africa: CaseLessons and Implications for Farmer Support within Land Reform Programmes, Food andAgricultural Organization of the United Nations, ISBN 978-92-5- 106490-5, Rome,Italy.

VAN AVERBEKE, W., M'MARETE, C.K., IGODAN, C.O., & BELETE, A., 1998. *An Investigation into Food Plot Production at Irrigation Schemes in Central Eastern Cape*, WRC Report No719/1/98, Water Research Commission, ISBN 1 86845-334-0, Gezina, South Africa

VAN AVERBEKE, W., 2008. Best management practices for small-scale subsistence farming on selected irrigation schemes and surrounding areas through participatory adaptive research in Limpopo Province. Draft Final Report of WRC Project K5/1464//4. Pretoria: Centre for Organic and Smallholder Agriculture (COSA), Department of Crop Sciences, Tshwane University of Technology.

VAN AVERBEKE, W. AND MOHAMED, S.S., 2006. Smallholder irrigation schemes in SouthAfrica: Past, present and future. Pretoria: Centre for Organic and SmallholderAgriculture, Department of Crop Sciences, Tshwane University of Technology.

Vink, N., & Van Rooyen, J. 2009.The Economic Performance of Agriculture in South Africasince 1994: Implications for Food Security. Development Planning Division WorkingPaper No 17, Development Bank of Southern Africa, Halfway House, South Africa

VON BRAUN J. H., BOUIS AND. KENNEDY, E., 1994. Conceptual framework. In: von Braun J and E. Kennedy (eds), *Agricultural commercialization, economic development, and nutrition.* Johns Hopkin University Press, Baltimore, Maryland, USA. pp. 9–33.

WORLD BANK, 2008. World Bank Report 2008: Agriculture for development. Washington
D.C: The World Bank.

YOKWE S.C.B., 2004. Investigation of the economics of water as used by smallholder irrigation farmers in South Africa. M Inst. Agrar. Dissertation, Department of Agricultural Economics, Extension and Rural Development, University of Pretoria, Pretoria. 71pp

TEKANA, S.S. AND OLADELE, O.I., 2011. Impact Analysis of Taung Irrigation Scheme on Household Welfare among Farmers in North-west Province, South Africa Department of Agricultural Economics and Extension, North-West University,Mafikeng Campus, South Africa.

WEBB P., 1991. *When projects collapse: Irrigation failure in the Gambia from a householdperspective.* Journal of International development Vol. 3, No. 4. July Institute,Washington D.C.

WILLIAMS, M.K.T., 2006. Research Methods.Knowledge base. Available at: http://www.socialresearchmethods.net/kb/Sampprob.php

APPENDIX 1

Questionnaire for smallholder farmers

BACKGROUND INFORMATION

Date……

Interviewer…….

Name of village……...

Name of respondent (Optional)…….

Contact details……..……..

Relation to household head ……

A. DEMOGRAPHIC DETAILS

Fill in the relevant information and where possible please tick.

1. Demographic information

Age of the H/H (years)	Size of the H/H head	Sex of the H/H	Marital status	Educational status
		1 female ☐ 2 male ☐	1=married ☐ 2=single ☐ 3=divorced ☐ 4=widow ☐ 5=separate ☐	1= primary ☐ 2=secondary ☐ 3=tertiary ☐ 4= other ☐

B. AGRICULTURAL PRODUCTION, INCOME SOURCES SKILLS AND ASSET OWNED

2. Agricultural production

2.1 Type of the production area

1= home garden ☐ 2 = plot ☐

2.2. Indicate the land tenure system on the land in use and how you acquired it?

Land tenure system 1=Communal 2=lease 3= privately owned 4= bought	How was the land received? 1= Inherited 2= Resettled 3= Other (specify)	How much is the land holding size of the family? (Hectare).		
		Total	1= Irrigable	2= Non-irrigable

2.3 Type of farming

1= crop productio☐ 2= Livestock production ☐ 3☐th 4 Other specify----

2.4. Rank in order of importance why are you farming. (1) Very important, (2) Important, (3) Not important (indicate with a number)

Reason for farming	Important (1)	Not Important (2)
1=Household consumption		
2=Ritual slaughter		
3=Sales		
4=Savings		
5=For food security		
6=Other (specify)		

2.5 Area cultivated

Have you cultivated the bulk of your irrigation land? 1= Yes☐ 2= N☐	**If no** **What were the reasons?** 1 = Shortage of labourel☐ 2 = Lack of implements 3 = Lack of interest in productio☐ 4 = Lack of capital 5 = Water shortage☐ 6 = Other specify ----------

2.6 Using irrigation, which of the following you often grow?

1 =Vegetables ☐ 2=maize ☐ 3=other specify ☐

2.7 How often do you plant in the garden/plot or any other area of the production?

1 = Once a year☐ 2=Twice a year☐ 3Thrice a year ☐ 4= throughout ☐ the year

2.8 Indicate labour usage and operations and inputs

Operations	**What is the source of labour for these farm operations?** 1. Family labour 2. Hired labour 3. Other specify	**Amount per ha (2)**	**Cost per ha (3)**	**Other (specify)(4)**
Labour				
1= for cultivation				
2= for planting				
3= for weeding				
4= for harvesting				
5 = for irrigation				
6=for livestock				

herding				
7 = for milking				
8= Other specify				
Inputs				
1= Treated seeds				
2= Fertilizer				
3 =Pesticides				
4= Insecticides				
5= Medication				
6= Kraal manure				
7= Other specify				

2.9 Irrigation crop farming and output

Crops Type		**Using irrigation, which crop/veg you often grow?**	**Land under cultivation for each crop/vegetable (Ha).**	**What was your total production from 2011/12 irrigation?(kg)**		**How much do you consume?(kg)**		**Income received (R)**	
				2011	**2012**	**2011**	**2012**	**2011**	**2012**
Beans	1								
Beetroot	2								
Butternuts	3								
Pumpkin	4								
Maize	5								
Spinach	6								
Tomato	7								
Carrots	8								
Green Pepper	9								
Cabbage	10								
Others (Specify)	11								

2.10 Why do you prefer to grow such crops/vegetables above?

1= Better price ☐ 2= good productio☐ 3= high disease to☐ance

4= Easy to cultivate and mana☐ 5= Seeds ava☐ble 6=Other specify------

2.11 Did you purchase crops/vegetables for your family consumption in 2012/2013?

1= ☐ Yes 2 No ☐

2.12. Indicate the total amount of money you spent to purchase crop/veg in a year: _____

2.13. Do you rent your irrigable land?
1= Yes ☐ 2= No☐

2.14. If yes to Q. 2.13, how much in rands---------

2.15Indicate the number of domestic animals you own
1= cattle _____ 2=sheep _____3= goat _____ 4= poultry _____ 5= piggery _____ 6= Donkey _____ 7= Horse _____ 8) _____ other specify _____

2.16 Irrigated land, size and its use

Are there any irrigated pastures for livestock? 1= yes 2= no	**If yes how much is the area under irrigation?** (actual number)	**Which stock is fed on those irrigated pastures?** 1= cattle 2= goat 3= sheep

2.17 Indicate livestock owned, the amount donated, consumed and the total income in 2011 and 2012.

Number of animals received in 2012/13 (actual number)	**How many consumed? (kg)**		**How many donated? (kg)**		**Number/Amount Sold from 2011/12**		**Total Income (R)**	
Cattle	**2011**	**2012**	**2011**	**2012**	**2011**	**2012**	**2011**	**2012**
Sheep								
Goat								
Piggery								
Poultry								
Duck								
Horse								
Donkey								

2.18. Source of water

What is your water source? 1=River 2=dam 3=borehole 4=windmill 5=water tank 6=rain 7= Other specify	**Do you have access to Irrigation systems?** 1= yes 2= no	**If yes, what type of irrigation system you have access on?** 1=sprinkler 2=Dip irrigation furrow 3=Furrow irrigation 4=other specify	**Who provided the irrigation system?** 1=government 2=NGO 3=local municipality 4=own funds 5=other specify

2.19 Membership of the scheme

Are you a member of the irrigation scheme? 1= yes 2= no	**If yes, how long have you been the member** (actual years)	**If no why?** 1= no funds 2= social conflicts 3= lack of information 4= not interested	**How long has it been in operation?** (actual years)	**What is the current status of the scheme?** 1= no longer working 2= poor 3= fair 4= good

2.20 What area of land did you cultivate before and after installing irrigation system?

		Periods		**Source of labour**
		Before irrigation	After irrigation	1=hired 2=exchange 3= family
Land area (ha)				
Yields				
Quantity sold				

3. Labour and investment

3.1 Source of labour

What is the main source of labour? 1=family labour 2=hired labour 3= both	**Did you hire labour in operating your irrigation farm?** 1= yes 2= no	**If Yes, on the average for how many working days each growing season?** Actual number of days ----------		
		In agric	**At home**	**Off-farm work**

3.2 Have you ever made any investment in your area of production?

1= water harvestin☐ 2= irrigation pip☐ 3= on farmin☐ 4= other specify.....

3.3 Investment on farming

Would you like to invest more on farming? 1 =yes 2= no	**If yes why?** 1= profitable 2=stable food 3=other specify	**Do you have knowledge of production increase?** 1= yes 2= no	**Is your production sustainable?** 1=with support 2= without support

4. Physical household/farm assets (Tick)

Assets	**Own (1)**	**If owned State the value of the household assets using recent prices**	**Conditions Of the infrastructure have 1 Good 2= Fair 3= Bad**	**Borrowed (2)**	**Hired Cost (3)**
1 =Tractor					
2=Animal Traction					
3=Spade					
4=Rake					
5=Fork spade					
6=Cultivator					
7=Plough					
8=Hand hoe					
9=Sledge					
10 Homestead fence					
11 Harrow					
Trailer					
12 Wheelbarrow					
13 Scotch cart					
14 Vehicle					
15Cell phones					
16 Other specify					

5. Level of entrepreneurial Spirit

Description	**Please rate/rank as indicated below with a tick**			
	1=Strong disagree	**2=Disagree**	**3=agree**	**4=Strongly agree**
You are not afraid to try new technique				
I keep on trying irrespective of any challenge				
If there is a change in supply and demand, you take action faster before any government response				
Take action always on the basis of what you perceive profitable				
Do not wait for support before applying new technology				
Not afraid to be different when applying new technology in your farm				
Spend more time on new technologies where you anticipate profit				
You are not afraid of investing money on new technology				
You are not afraid of the risks of adopting a new technology				
Can you produce on credit				
Are you willing to pay for training				

C. HUMAN CAPITAL ENDOWMENTS

6. For how long have you been farming? …….....years

7. How do you rate the farming knowledge applied on your farm?

Farmer knowledge	Poor (1)	Average (2)	Good (3)	Employees knowledge)	Poor (1)	Average (2)	Good (3)
How knowledge was obtained	1 Experience			1 Experience			
	2 Education			2 Education			

8. Skills obtained

Is there any household member with any of the following skills?	**Please tick**		**Where they studied?**	**Which specific skill do u need a training in and why?**	
	1=Yes	**2=No**			**tick**
1=Crop or Animal production				1=Production	
2=Entrepreneurial & management skills				2=Management	
3=Financial management				3=Marketing	
4=Marketing				4=Budget	
5=Risk				5=Record keeping	
6=Other (specify)				6=Other (specify)	

9. Do you attend workshops to learn about farming practices?

1=Yes	**How Often**	**Tick**	2=No	**Reason for not**	**Tick**
	1=Once a month			1= do not afford to pay	
	2=Twice a year			2= No workshop provided around	
	3=Once a year			3=other specify	
	4=Other specify				

10. Indicate your proficiency on the following languages (speaking)

Language	**Good**	**Poor**	**Fair**	
Xhosa				1
English				2
Other (specify)				3

11. Which farm records do you keep? (Tick)

Cost (1)	Sales (2)	Output(quantity) (3)	Others (specify) (4)

D. MARKETING MANAGEMENT

12. Market access

Do you have access to markets?	**If yes, what type?**	**Why do you use the market you are using?**	**Where do you sell most of your produce?**
1=yes **2=no**	1= Informal 2= I do not sell 3=Formal	1=lack of market information 2=lack of transport 3=its profitable 4=Easy to access 5=other specify	1=Farm gate 2=In pension points 3= Road side 4=Nearest town 5=Around the village 6=supermarkets 7=Other (specify)

13. Do you always find a market for all the goods you produce?

1=yes ☐ ☐ **= no**

13.1. If NO, what happens to the unsold produce? Mark with an X.

Consumed within the household (1)	Lose to spoilage (2)	Sell at a low price (3)	Store & sell late (4)	Process It (5)	Other specify (6)

14. How difficult is it to look for buyers? Mark with an X.

Easy (1)	Fair (2)	Difficult (3)

15. Marketing channels

In terms of the market channels you use regularly, what are the main benefits?	1=Understand the contract	2=Provide inputs	3=Near Other	4=Other (specify)

16. Do you have any contractual agreements or a guaranteed/ready market (formal or informal) with any agribusiness outlet e.g vegetable shop, butchery etc?

1= yes ☐ 2=no ☐

17. Do you have regular customers, who always buy from you?

1=yes ☐ 2=☐

18. If Yes, how long have you been trading with these customers?

.....

.....

19. How well do you know your customers?

.....

.....

20. Transportation of products to the market

How is your produce moved to the marketing points? 1=Own transport 2=Hired vehicle(group) 3=Public transport 4=Buyers transport 5=By foot 6=Other (specify)	**What problem encountered when moving produce?** 1= Lack of transport 2=Small size of transport 3=Higher transport costs 4=Other (specify)

21. How far are the marketing points? .....km

22. When selling, do you combine with other farmers?

1=Yes	2=No	If yes reason
		1=Cheaper
		2=Do not have your own market
		3=Do not have your own transport

23. Before selling your produce what value adding activities do you perform?
(If any list them)

Value activities	**why**	**List the marketing channel**	**How are paid**	**Time taken for the payment**
1=Washing 2=Drying 3=Storing 4=Packing 5Other (specify)			1=Check 2=cash 3=credit 4=Other specify	

24. Market information

24.1 Do you have access to market information?

1=yes ☐ 2=no ☐

24.2 Do you receive market information prior to sales?

1= yes☐ 2= no ☐

24.3 Distribution of market information

How would you like the information to be delivered?	**tick**	**Which of these communication methods do you have access on?(tick)**
1= Community meetings		
2= Project meetings		
3= Radio		
4= News paper		
5= Television		
6= Other specify		

24.4 Source of information

How is the information obtained	**Most preferred language**			**How often do you receive the information?**
1=Farmer groups	1=Xhosa	2=English	3=Other (specify)	1=daily
2=Extension officers				2=weekly
3=Telephone				3=monthly
4=Internet				4=annually
5=Cell phone (sms)				5=other specify
6=Other (specify)				

24.5 Road access to the market

What type of road do you use to the market?	**How do you rate the road?**	**What is the condition of the marketing trails you have access to?**	**Are the road links to the market satisfactory?**
1=Gravel road only 2=Tar road 3=Both (gravel and Tar road)	1=good 2=fair 3=bad	1=god 2=fair 3=bad 4=unavailable	1=yes 2=no

EXTENSION SERVICES

25. Availability of the extension officers

Are the extension officers always available when you need help?	**List the problems that you face in contacting extension officers?**
1= always available	1= they are far
2=available sometimes	2=no money to visit them
3= never available	3= they don't show when requested

26. How do you rate the services provided by extension officers in your area?

1=Helpful enough	2= Helpful	3=Unavailable

27. Do you contact extension officers during the marketing period?

1= yes☐ 2= no☐

28. What services are provided by extension officers?

1=Advice on production	2=Advice on marketing	3=Advice on management	4=Advice on funding source	5=Other (specify)

F. INSTITUTIONAL SUPPORT SERVICES

29. Membership of the organization

1.1.1 Are you a member of any organization? 1=yes 2=no	**1.1.2 If yes, name the organization**	**1.1.3 If no, why?** 1 =No organizations around 2= It is expensive to join 3= Not interested

30. Are you aware of the role played by organizations in marketing?

1= yes☐ 2= no ☐

31. Do you think that public institutions (such as local administration, national government, public organizations) are willing to help and to support your farm business? Explain

……

……

.....

32. In which of the following sections do you think that lobbying towards your government would bring an improvement in the performance of your farm business?

	1=Important (1)	**2=Not important (2)**
1=Make access to finance		
2=Raise the price of your produce		
3=Others (specify such as)		

33. Selling of produce

Do you seek advice before taking a decision?	**Who do you consult?**	**Do you perform price surveys, before selling?**	**How is price set during the sales?**
1=yes 2=no	1=Extension officer 2=Other farmers 3=Family member 4=Friends 5=Other specify	1=yes 2=no	I =set price 2=We negotiate it 3=The buyer set the price 4=It is market driven 5=Other specify

34. How do you decide the selling price of your produce? Rank according to 1.Very important, 2. Important 3. Not important (indicate with a number)

Selling price	**Very important(1)**	**Important(2)**	**Not important(3)**
It depends on the demand (2)			
It depend on the market (3)			
It depends on the production costs (4)			

35. How do the prices that the buyers are willing to pay differ from your expectations?

Higher than expected (1)	Equal (2)	Lower than expected (3)

36. Price determination

When selling, who negotiates on your behalf?	Which language is used for communication?	If not own language, are you able to negotiate as well as you would do if you were to use your own language?	If no, what do you do?
1=Yourself	1=Xhosa ☐ 2= English ☐	1= yes ☐ 2= no ☐	1=Ask someone to interpret for you
2=The buyer			2=Someone negotiate on your behalf
3=The middle men			3=Other specify
4=other specify			1=Ask someone to interpret for you
			2=Someone negotiate on your behalf

37. Challenges

Major problem/s encountered when marketing	Please tick
1=Market availability	
2=Transport	
3=Advertising	
4=Market requirements	
5=Consumer preference	
6=Lack of capital	
7=Lack of information	
8=Location of the markets	
9=Other (Specify)	

39. Improvement strategies on marketing challenges

Suggest ways in which such problems can be addressed	Please tick
1=Funding	
2=Construction of irrigation schemes and water source	
3=Provision of training	
4=Bringing market close to the farmers	
5=Other specify	

40. What are the main challenges that you face in running your farming business?

Challenges	Major (Tick)	Minor (Tick)
1=Inputs		
2=Drought		
3=Production costs		
4=Laborers		
5=Disasters		
5=Management skills		
6=Market availability and access		
6=Transport		
7=Other specify		

THE END

THANK YOU!!!!!